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ANIMAL AND PLANT HEALTH AND FOOD SAFETY AN ISSUE PAPER CONCERNING FUTURE WORLD BANK INVOLVEMENT*

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1. Background

There are compelling arguments for the World Bank to place greater emphasis on animal and plant health and food safety issues. Animal and plant health and food safety are connected with worldwide public health as well as sustainable development. Animal and plant health and food safety relate to three different desired outcomes in client countries: (1) enhanced agricultural production; (2) better human health and nutrition; and (3) market access for food exports. These outcomes depend on establishing policies and institutions to improve animal and plant health and food safety. The export market access outcome and the improved health and nutrition outcome require further strategy development, as they are relatively new areas of Bank involvement. The export outcome is the focus of the Rural Week seminar. The enhanced production outcome is already a more established part of the Bank's program and does not require the same strategy development regarding Bank involvement that the others require.

Animal and plant health and food safety issues are receiving greater attention in international trade. The Bank will need to become more involved in addressing these issues, but at the same time, there are important reasons for Bank clients to be cautious in making large investments. This paper explores the main issues which need to be addressed in development of a Bank strategy for investments in food safety and in animal and plant health as part of the rural development agenda. Such issues include:

- how to evaluate investments to improve food safety, animal and plant health in Bank client countries;
- whether such investments should focus on export market access or should also be undertaken for domestic benefit;
- the role of public and private actors in making investments and ensuring food safety, animal and plant health;
- the role of infrastructure, institutions, and policies in ensuring food safety and animal and plant health;
- to evaluate the different models for regulatory intervention under discussion in the World Trade Organization (WTO), including risk assessment and HACCP, and their respective appropriateness for the differing conditions in the Bank client countries;
- the needs of client countries in setting and responding to sanitary and phytosanitary standards in international trade; and

- the potential partnerships for the Bank and Bank client countries with existing institutions involved in food safety and animal and plant health.

1.1 *Production Capacity and the Environment*

One dimension of food safety relates to our client countries' efforts to promote sustainable rural development. Many of our clients have moved toward more intensive forms of agricultural production to increase productivity and to meet domestic needs. In order to achieve such growth, high yielding crop and livestock varieties have often replaced locally adapted varieties. In some cases, the narrowing of the genetic pool has made crops and livestock more susceptible to disease. The transfer of more intensive technology often means greater movements of animals and plants across borders, which also increases the potential for disease transmission. With the move toward more intensive forms of agricultural production, it will become increasingly important to strengthen our clients' capacity to control plant and animal diseases to prevent crop and animal losses.

There are also significant linkages in agricultural production between environmental concerns, on one hand, and animal and plant health and food safety on the other hand. Examples include protecting the environment from animal and plant diseases that threaten biodiversity or from pesticide residues and other toxins that threaten fragile ecosystems. Another aspect of this linkage involves the importance of safe water as an input into agricultural production and processing. Water quality and quantity are important in the production of safe food and are also influenced by agricultural production and processing practices.

1.2 *Human Health and Nutrition*

Biologically contaminated food is a major cause of death in children in the developing world, and diarrheal disease in small children contributes to malnutrition. According to the WHO website, "Of the approximately 1,500 million global episodes of diarrhea occurring annually, resulting in 3 million deaths among children under five (mainly in developing countries), 70% have been estimated to have been caused by biologically contaminated food. Contaminated food has been recognized as playing a major role in the epidemiology of cholera and other forms of epidemic diarrhea, substantially contributing to malnutrition."[1] Serious health problems can be caused by foodborne microbial pathogens, parasites, and exposure to chemicals, including, pesticide

[1] Motarjemi, Y., F. Kaferstein, G. Moy, and F. Quevedo, "Contaminated weaning food: a major risk factor for diarrhoea and associated malnutrition, Bulletin of the World Health Organization, 71 (1):79-92, 1993.

residues, and naturally occurring toxins (Table 1).[2] These problems contribute to higher health care costs, reduced workforce productivity, and diminished quality of life. Outbreaks of foodborne disease may also be potentially damaging to a country's tourist industry. Foodborne illness is likely to be a problem of increasing importance in developing countries in the future.[3]

Table 1. Potential Hazards to Human Health in the Food System

Type of Hazard	Nature of Hazard	Where it occurs in system
Antibiotic Drugs	Residues can pose chronic risk to human health. Use can promote antibiotic resistance, which threatens animal and human health.	Used as additive in feeds. Used to treat animal infections.
Microbial Pathogens	Can cause acute illness in humans or animals. Long term sequellae in humans.	Some live in gastro-intestinal systems of animals and humans, others in the environment; can be introduced at any point in food system.
Pesticides	Improper use can cause chronic or acute illness or death in farm workers. Residues in food or water can cause chronic or acute human illness.	Applied in production, processing, or distribution.
Mycotoxins	Can cause chronic illness in humans.	Occur naturally on plants and in animal products when in feed, if stored under conditions that permit fungal growth.
Parasitic Diseases	Can cause acute or chronic illness in humans.	Live in animals, water, or soil.
Heavy Metals or Toxic Waste	Can cause acute or chronic illness in humans.	Enter through soil, water, or food that is contaminated.

[2] WHO website: Food Safety—a worldwide public health issue http://www.who.int/fsf/fctshtfs.htm, viewed 3/1/99

[3] Kaferstein, F. and M. Abdussalam, "Food Safety in the Twenty-first Century", Proceedings of the 4th World Congress on Foodborne Infections and Intoxications", Berlin, Germany, June 1998.

1.3 *Access to Markets for Exports and Participation in Global Food Trade*

Food exports can contribute to rural growth and poverty alleviation in low income countries, where agriculture is an important part of the economy. Developing country food exports expanded with worldwide economic growth from 1993 to 1996 (see Annex A), both from developing countries to developed economies and among developing countries. The potential for food export expansion is enhanced by the 1994 GATT agreement on agriculture, but sanitary and phytosanitary standards remain a potential barrier to expanded trade.

As trade participation grows with reduced trade barriers and development, a country's ability to meet and apply sanitary and phytosanitary standards becomes more important for market access and domestic consumers. Applying such standards means building effective systems to control or eradicate plant and animal diseases and to ensure the safety of exported and imported food products.

Sanitary standards are particularly important for fresh food items, such as meat products, seafood, fruits, and vegetables. Exports of these products account for half of the value of all food exports from developing countries in the 1990s (see Annex A). Seafood is the single largest fresh food category in developing country exports, and is especially important in South Asia and sub-Saharan Africa. The other categories of fresh food exports are growing more rapidly for low income countries, and are important in particular regions (see Annex A).

Fresh food products are more likely to be subject to sanitary disputes for several reasons. First, they are shipped and consumed in fresh form, so handling at all points of the food chain can influence food safety and quality. Manufactured or processed food products have more widely established and recognized standards, and may not deteriorate during shipping and handling. Second, standards in developed country markets are based on sanitation and good manufacturing practices that may not exist in less developed countries. Meeting such standards may require greater initial investments in quality control and sanitation in developing countries. Third, these fresh commodities are subject to increasing scrutiny and regulation in developed economies as food safety hazards are better understood and more often traced to their sources. Taken together, these concerns pose challenges for expanding food exports from developing countries.

2. Evaluating Investments in Improved Animal and Plant Health and Food Safety

Improvements in food safety and in animal and plant health will not come without a cost. They may require significant human and institutional capacity, which many of our clients do not have. A key question therefore needs to be answered concerning the

institutional and economic desirability of increased investments in animal and plant health and food safety. This issue has several dimensions, which need to be considered in developing a Bank strategy.

2.1 *Market Failures*

Animal and plant health and food safety issues arise because of incomplete markets for food safety or for animal and plant health. These problems may be exacerbated by the failure of market forces to properly signal consumer demand to producers, since full social costs of these problems are not reflected in market incentives. Imperfect information arises when workers and consumers are only partially aware of the hazards associated with the production and consumption of a good. Thus, they are unable to trade off risks in an informed way. Consumers buying the product are unaware of the potential costs associated with improved food safety. Thus the amount they pay for the product does not consider the cost of "safe" food. For instance, if purchasers could see pathogens on food, then those planning on cooking the products thoroughly might choose less expensive products exhibiting low levels, whereas those desiring lightly-cooked products pay a premium price for near-zero levels.

Plant and animal health problems are often external to the decision making process of individual producers, creating a free rider situation. That is, an individual producer may take steps to eliminate a plant or animal health problem, but cannot do so completely without the cooperation of other producers. This can create a public good problem and the underproduction of animal or plant health. The importance of particular market failures will vary widely among the type of animal or plant health problem and the individual requirements of client countries. *Identifying the level of market failure for the different classes of health interventions will be an important task for the strategy.*

2.2 *Public vs. Private Roles*

The public sector has played a significant role in the development, implementation and enforcement of animal and plant health and food safety standards and regulations, coordination with international organizations on harmonization of standards and regulations, surveillance of foodborne diseases, consumer education, training, extension, and research. It could naturally take a role in establishing food quality standards. Increasingly, however, mixed public/private sector institutes, such as Produce Boards and private sector groups, such as producer organizations and cooperatives, are taking the responsibility for these tasks.

Public intervention in animal and plant health and food safety issues is often justified by the above described market failure. Many countries have regulatory agencies in place to remedy the failure of the free market to allocate resources efficiently in the

areas of food safety and animal/plant health. These agencies are supposed to intervene to reduce the social costs associated with food safety or animal/plant health problems.

The public sector clearly has a responsibility to intervene in cases where export opportunities for many smallholders are threatened and the benefits of the intervention greatly exceed the costs. There are many cases where this is true for issues of food safety or animal and plant health, even in Bank client countries where public institutions require major investments. But public intervention is costly, enforcement is difficult, and once established, public systems can fail to respond to changing market conditions. Private solutions to animal and plant health and food safety problems can emerge, when the costs of information or monitoring can be overcome. Public interventions can facilitate such private solutions. *One of the key questions to address in the Strategy would be which criteria to adopt for the assessment of the capacity of the main groups operating in the sector to carry out the above functions.*

In most developed countries, the public sector has historically borne the cost of instituting corrective measures or has sponsored research to find solutions to problems of food safety or animal and plant health. The public and private sectors have tended to support different kinds of efforts (See Annex B). The economic nature of the services tends to determine whether the public or the private sector is responsible for the delivery of the service.[4]

The private sector has tended to focus on production and marketing of the product, and on standardizing and certifying food quality. In research, the private sector focuses on those products for which there is the ability to capture economic benefits, due to the nature of the technology and market demand or size. One example is animal pharmaceuticals. Private research tends to be biased toward those commodities, technologies, or research areas that have patentable technologies, larger markets, or expanding demand. Likewise research incentives faced by these firms are affected by changes in consumer demand for products and the structure of the industry.

2.3 *Risk Assessment and Cost/Benefit Analysis*

Risk assessment is recognized by the WTO as a necessary step to ensure that standards for food safety or for animal and plant health actually reduce risk and have a scientific basis. As such, risk assessment is the basis for establishing mutual recognition of standards in food, animal, and plant trade. Standards across countries may differ, but are considered equivalent if they ensure the same level of risk reduction.

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[4] Umali, Dina; Gershon Feder, and Cornelis de Haan 1992 The Balance Between Public and Private Sector Activities in the Delivery of Livestock Services. World Bank Discussion Paper 163, Washington DC.

Despite recognition by the WTO, risk assessment is not the universal model for setting food safety or animal and plant health standards. Different countries have different institutional and political frameworks for evaluating risk.[5] Furthermore, the applications of these principles and the methodologies to implement them are still in their infancy for many animal and plant health and food safety hazards.[6] Quantitative risk assessment is not well developed for biological hazards, but there is more consensus in the area of chemical hazards. There are additional problems of comparisons among different kinds of risks. A good example is the balance between the risk of infectious agent for cholera and the potential risk of chronic effects of carcinogens from the water chlorinating process, which reduces cholera causing agent.

Nevertheless, risk assessment and cost/benefit analysis do provide a framework for finding cost-effective solutions to animal/plant health and food safety problems. Risk assessment means identifying the sources and importance of different risks and evaluating the costs and benefits for different kinds of interventions to reduce risks. While Bank strategy should clearly promote the use of risk assessment by client countries, the limited technical basis for such analysis may hamper evaluation of investments. It should also be recognized that not every WTO member needs to be able to tackle risk assessments. This is as reported by the WHO "because as long as countries base their food regulations and import requirements on Codex standards, guidelines and recommendation, they are fulfilling their obligation in regard to the SPS Agreement.[7] It is only in cases when a country wants to set a regulation in areas where no international standard exists, when applying more stringent requirements to imported products than domestic products, or when applying import requirements that are stricter than Codex standards, guidelines and recommendations, countries ought to ensure that those measures are based on risk assessment." *The identification of methods to be used to assess risks for the different conditions of our client countries would need to be a part of the strategy.*

Improvements in domestic animal/plant health and food safety in Bank client countries would have to be justified by the identification of market failures and a public role for intervention, and by risk assessment and cost/benefit analysis of alternative interventions. Risk assessment might consider, for example, the prevailing food preparation habits in the country concerned. If those preparation practices always include

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[5] Jasonoff, Sheila. "Technological Risk and Cultures of Rationality", paper presented at the NRC Conference on Incorporating Science, Economics, Sociology, and Politics in Sanitary and Phytosanitary Standards in International Trade, January 1999.

[6] Hathaway, S.C. and Cook, R.L. 1997. "A Regulatory Perspective on the Potential Uses of Microbial Risk Assessment in International Trade." *International Journal of Food Microbiology* 36:127-33

[7] WHO/FSF/FOS/97.8 Rev 1. 1998. Food Safety and Globalization of Trade in Food: A Challenge to the Public Health Sector.

thorough cooking and boiling, as in many developing countries, "modern" food hygienic standards might be counterproductive. This is because they increase the cost of the product (and therefore affect the rural producer as well as the poor urban consumer), and might introduce health hazards by creating a false feeling of safety in sometimes inadequately processed products. An example would be the pasteurization of milk, which about doubles the costs, and therefore depresses the market for small producers, and brings the product out of reach for poor consumers. In many countries the milk is boiled, while pasteurization is often inadequately carried out under conditions of irregular power and water supplies. Thus the issue is when in the process of market development should the cost of ensuring safety shift from the consumer (boiling the milk) to the processor (pasteurizing the milk). This simple example illustrates the complexity of assessing who benefits from food safety interventions, both in terms of direct economic costs and in terms of less direct health benefits. *The Bank strategy paper will consider the likely magnitude and distribution of benefits from such interventions in Bank client countries.*

2.4 *Export Promotion*

Ensuring animal/plant health and food safety purely for the export market requires considerable investments in human and institutional capacity building, and needs to be justified by increased exports. Such investments may focus on developing processes or standards that will be recognized as equivalent to those in the importing countries. The private sector may undertake such investments for specific products, but this often requires some public capacity to provide services. When one firm or industry tries to improve safety to meet export market requirements, the costs will be high without basic public investments in sanitation or public institutions to certify safety.[8]

2.5 *Farm to Table Approaches*

Increasingly farm-to-table approaches are being adopted in the developed world. Such approaches address hazards that are introduced at various points in the food chain or are difficult to measure. While the concept of controlling hazards throughout the system originated in the private sector, it is increasingly being used as a standard by the public sector. Hazard Analysis and Critical Control Points (HACCP) methodology is increasingly being implemented worldwide to improve food safety and reduce the incidence of foodborne illness. The HACCP system seeks to incorporate animal/plant health and food safety controls into the growing and processing of foods (i.e. preventing failure) rather than focusing on testing of the end-product. An advantage of the HACCP approach is to focus resources on the most important control points, which can minimize

[8] Cato, J.C. and Dos Santos, C.A.L. 1999 "Costs to Upgrade the Bangladesh Frozen Shrimp Processing Sector to Adequate Technical and Sanitary Standards" in The Economics of HACCP, Eagan Press, forthcoming.

resources used to improve safety.[9] An additional benefit is that responsibility can be identified at various segments along the process. Thus problems at the farm can be separated from problems at the plant level, at the processing level, and distribution level. However, implementation of full HACCP evaluation may be costly and our clients may lack the institutional capacity or finances to do so (Table 2).

3. Animal and Plant Health and Food Safety Needs of World Bank Clients

The World Bank clients' efforts to strengthen internal institutional capacity will need to take place in an environment increasingly characterized by: (1) greater participation of the private sector; (2) heightened awareness about emerging international food safety and agricultural health events and concerns; (3) increased attention to domestic and international consumer requirements; (4) greater focus on the entire process from production to consumption; and (5) increased efforts to incorporate good agricultural practices (GAP) and hazard analysis and critical control points (HACCP).

An important issue is the difference in approaches to safety and quality control among the major markets. Significant differences between the systems used in the different importing countries could lead to the imposition of certain models in our client countries. Thus, how to adapt existing models for our client countries, given their need to establish internationally recognized systems at least cost, needs to be examined. *The study currently carried out by the Animal Resources group would provide guidance on the different models currently used and how they might meet the different requirements of our clients.*

3.1 *Legislative – Regulatory Framework*

The legal framework plays an important role in addressing market failures by defining responsibility for agricultural health and food safety. As a food system develops, this responsibility shifts upstream away from the consumer towards the food processor and food producer. Establishing liability for animal and plant health and food safety will help to create incentives for private actions as an economy develops.

An effective animal and plant health and food safety system requires a framework of science-based regulations and standards. Many of our clients will need support in strengthening their legislation and standards affecting the production, distribution and processing of foods. This includes regulation of inputs that affect animal, plant and human health.

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[9] Unnevehr, L.J. and H.H. Jensen 1999 "The Economic Implications of Using HACCP as a Food Safety Regulatory Standard" *Food Policy*, forthcoming.

Table 2. Responsibilities on Food Safety[10]

AGRICULTURAL SECTOR			HEALTH SECTOR		
PRODUCTION FARM	**TRANSPORT OF ANIMALS AND AGRICULTURAL PRODUCTS**	**SLAUGHTER HOUSE, PACKING HOUSE, FIRST DISTRIBUTOR**	**TRANSPORT OF PRODUCTS**	**INDUSTRIAL PROCESS**	**RETAILERS, FOOD SERVICES**
• Hygiene of facilities • Hygiene of personnel • Use of water • Sewage contamination • Control of use of agricultural pesticides • Control of use of veterinary pesticide, antibiotics, hormones	• Cleaning • Disinfection	• Hygiene of establishments • Hygiene of personnel • Ante and post-mortem inspection and hygiene handling • Hygienic handling of products • Monitoring of agro-chemical residues • Monitoring of residues of antibiotics, hormones, etc. • Microbiological monitoring • Labeling	• Cleaning vehicles • Cooling • Hygiene of personnel	• Hygiene of establishments • Hygiene of personnel • Hygienic handling of products • Microbiological monitoring • Labeling	• Hygiene of establishments • Hygiene of personnel • Hygienic handling of products • Labeling

[10] Source: Dr. Kevin D. Walker, director, Agricultural Health, IICA/HQ
Prepared for World Bank Rural Week Conference: Political Dimensions of Food Safety, Trade and Rural Growth, March 26, 1999

The international organizations have established standards that are intended to be adopted by WTO member countries (see below). *Whether such uniform standards are useful in client countries where benefits and costs of animal and plant health and food safety differ widely from importing countries is an important issue for the Bank strategy to consider.*

3.2 *Effective Institutions and Infrastructure*

The Bank's clients need to build strong institutions to ensure food safety, animal and plant health. This includes inspection, surveillance, certification, laboratory, and public information systems. Countries need to develop their institutional capacity to diagnose pests and diseases, approve entry of products and animals, conduct surveillance of pests and diseases, undertake risk assessments, conduct emergency actions, establish and maintain pest and disease-free (or low prevalence) areas; and to establish and enforce food standards for domestic and imported products, among other functions. As such, their institutions must have the appropriate legal authorities, technical capability, efficient operations, information systems, and funding mechanisms, among other requirements.

Many countries try to maintain internal surveillance programs to detect problems as soon as possible and to facilitate responses to emergencies. National surveillance programs for animal diseases, plant pests and diseases, and foodborne illnesses are key components of national agricultural health and food safety systems. They also play a vital role in international disease surveillance and control efforts. Many countries that lack this type of surveillance are faced with continual disease problems associated with the smuggling of animals and plants across borders. Further, countries with large numbers of small producers may find it more difficult to conduct surveillance. These two issues may be a particular problem with some of the client countries in Africa and Central Asia.

The ability to demonstrate that one's agricultural products are free from animal or plant disease is a major constraint faced by many of our clients in accessing import markets. Many importing countries have followed a zero risk policy for imports of animal or plant materials. Recent recognition of regionalization by the World Trade Organization represents a major departure from past policies for countries practicing zero-risk tolerance. The regionalization concept gives countries the opportunity to export from areas demonstrated to be free from particular diseases or in which the prevalence of the disease is low even though that disease or pest may exist elsewhere within the national territory. The burden of proof is on the exporting country, which must successfully demonstrate to importing countries that its region is either disease- or pest-free or has a low prevalence of outbreaks. This process may require in situ infrastructure for collecting necessary information to facilitate exports. Many of our client countries may lack this infrastructure or require major improvements.

As countries develop, they set standards and test their food products for the presence of pathogenic microorganisms and drug and chemical residues. Food products destined for export markets also have to meet the animal and plant health and food safety requirements of importing countries, which may be stricter. This may be problematic for many of our clients, who may not have the capacity to meet these standards or conduct adequate testing. Whether recognition by the importer of the existence of safe production processes and controls may provide an alternative to more expensive testing is another issue for client country strategy.

3.3 *Role and Assistance of Importing Countries*

Some importing countries have established pre-clearance surveillance programs in exporting countries. This enables the inspection and treatment of the product onsite in exporting countries and prevents exotic pests and diseases from entering a country's ports. Pre-cleared products may be spot re-inspected when entering a country. The spot re-inspection is often based on the plant and country's compliance history for a specific product.

Another mechanism to facilitate trade is recognition that an exporting country's regulations and production systems provide equivalent protection to the standard in the importing country. That is, if the importer determines that regulations in the exporting country provide adequate protection, then no inspection at the border is necessary.[11] Client countries might want to examine such experiences to see if they can promote such recognition for their own exports. The private sector also may invest in coordination mechanisms to ensure that production in one country meets another country's standards. When this occurs, client country governments may be interested in whether and how the benefits of such coordination are reflected in domestic markets.

3.4 *Information to Address Arbitrary or Unsubstantiated Import Restrictions*

Although rejection of imports for noncompliance with the standards above is justifiable to safeguard a country's overall agricultural health, there exists the potential for importing countries to use arbitrary technical and phyto-sanitary restrictions as barriers to imports to protect their domestic industry. Our clients need to be aware of this potential in their efforts to gain access for their agricultural products in export markets. Kroehle and Weinberger (1994) suggest this use may be increasing for several reasons.[12] First, quotas and other non-tariff barriers, which have worked in the past as de facto disease controls, are being replaced by tariffs. This may result in many countries

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[11] Unnevehr, L.J., L. Deaton, and C. Kramer 1994 "International Trade Agreements Provide New Framework for Food Safety Regulation" *Food Review* 17:2-6.

[12] Kroehle, K. and Weinberger, J. 1994 "Foreign Concerns: Sanitary and Phytosanitary Issues in Grain Trade." Washington DC: APHIS.

tightening sanitary and phyto-sanitary standards in an effort to achieve the pest control results of previous non-tariff barriers. Second, as tariffs and quantitative restrictions are reduced, many countries are likely to turn toward standards and regulations to protect their agricultural sectors from foreign competition while appearing to remain in compliance with the WTO agreements.

It is unclear what impact SPS issues are having on trade between client countries and developed country markets. Few attempts have been made to try to quantify impacts. Thiermann and Greifer (1995) analyzed APHIS phyto-sanitary certificates issued and interceptions of reportable pests between 1991 and 1994 to see if any significant changes had occurred in the US.[13] They concluded that, while the data required further analysis, it did not contain any apparent evidence that either pest interceptions or seizures of illegal plant and animal material have increased within the first year of NAFTA. Though this may not affect our clients directly, those wishing to increase their access to the US market (or other markets which collect this information) may want to be familiar with those products that appear to have higher proportions of interceptions of reportable pests for their country or region. If there appears to be a problem, client countries (or regions) may need to develop infrastructure that will enable them to mitigate or identify the problems to avoid incurring the costs of bringing products to market and having them denied entry or requiring additional treatment prior to entry.

Our client countries need additional information regarding the scope of potential barriers to their food exports, including the types of products most likely to be affected and the types of hazards and regulations likely to be at issue. Seafood and horticultural products are examples of potential exports by Bank clients, which are frequently the focus of trade disputes over SPS regulations between exporting and importing countries. Specific aspects of potential barriers include trends in rejections from major importers, whether there have been significant changes in trade flows to meet SPS requirements, and whether the adoption of regionalization is affecting livestock trade. *The strategy will consider how to enhance current Bank efforts to build client capacity for addressing these potential barriers to trade.*

3.5 *Investments in Public Health for Food Safety*

The Bank's client countries need assistance in identifying cost-effective ways to reduce the risk of food and water-borne illness. Kaferstein and Abdussalam suggest that these might include: participation in global surveillance of foodborne disease, so that early warning systems for the spread of foodborne diseases can be established; public health and food control laboratories to monitor the food supply; establishment of national

[13] Thiermann, A.; J. Greifer. 1995. "NAFTA: Implications for Regulating Food and Agricultural Trade in the Region." Food Control 6 (5): 295-301.

food safety regulatory systems; greater application of risk assessment principles; and culture specific health education programs for food preparers.[14]

The World Health Organization states that "a ... serious challenge to food safety will come from changes resulting directly in the degradation of sanitation and the immediate human environment." Clearly, urbanization, changing food marketing systems, and shrinking fresh water supplies all present challenges to prevention of food and water-borne disease in developing countries. Investments in basic sanitation or health education for food preparers are examples of public efforts that would address these challenges. There are two issues for the Bank strategy: The first is the degree of emphasis on such efforts relative to other development goals. The second related issue is the potential for complementarity between public investments in other areas and improved food safety. For example, will greater sanitation and food safety assurance in exports have a positive impact on the safety of domestic food? Will greater investments in water supply lead to lower costs of improving food safety for both domestic and export markets? These are difficult questions, but are crucial to obtaining positive long run benefits for human health in client countries.

3.6 *Investments in Research to Improve Food Safety or Animal and Plant Health*

Annex B indicates that the public sector has assumed a major responsibility for developing technologies to improve animal and plant health and the safety of animal food products. For many developed countries the private sector is an increasingly important part of the research system that develops new technology for animal production. Private incentives for plant and animal health research are strongest where markets for improved technology are large, technical advances can be made relatively easily and quickly, and where intellectual property can be protected. Further private R&D in these areas tends to concentrate on projects that are likely to result in market applications in the near future. However, the smallholder nature of agriculture production in many of our client countries constrains private sector interest. *The Bank strategy needs to recognize that our clients currently have very different capacities for producing their own research results with regards to plant and animal health and food safety and attracting private sector investment and propose a balanced approach.*

Improving food safety and animal and plant health solely by the public sector does not occur without a cost. If the public sector is to take on the research responsibility, they may need to reallocate their resources away from other research issues. In some cases this may not be politically feasible for countries that are attempting to promote non-economic objectives, such as increasing production in low-income areas

[14] Kaferstein, F. and M. Abdussalam. 1998. "Food Safety in the Twenty-first Century", Proceedings of the 4th World Congress on Foodborne Infections and Intoxications", Berlin, Germany, June.

or helping certain groups of producers, such as small farmers. *The Bank strategy needs to recognize that client countries have differing political objectives in developing their research agenda.*

Though some developed countries may discuss the need to increase research efforts towards food safety, little research is being devoted to this area, according to data on the research and development percentages devoted to different livestock research areas.[15] For instance in the United States there appears to have been little proportional increase in research budgets allocated to food safety. Most publicly-supported livestock research in the United States is devoted to improving biological efficiency (basic and applied research on breeding and animal genetics) or protection and maintenance (disease control, nutrition management and feed efficiency). The exception to this is poultry food safety research where there has been a substantial increase between 1984 and 1996. *Thus the Strategy needs to recognize that with regard to food safety (1) developed countries have been unable to allocate significant resources to food safety, though the amount is starting to increase; (2) developing countries have relied on the research spillovers from developed countries for improving productivity in the past, and this is likely to also be true in food safety and animal/plant health; and (3) developing countries' reliance on research spillovers from developed countries may be problematic as both risks and preferences for food safety are likely to be different for developing country consumers.*

Nevertheless, there is potential for significant research spillovers. In the area of food safety and plant and animal health there should be significant opportunities for regional spillovers as the effects of improved animal and plant health and processing technologies often are directly transferable across geographic boundaries. Spillovers from developed countries generally occur in the area of basic and strategic research and chemicals. At the same time, most applied biological technology is developed in developing countries. There are also significant spillovers of some technologies, especially varieties, from the International Agricultural Research Centers (IARCs) and other developing countries. *The Bank strategy should recognize the Bank's continued participation in the CGIAR, which can play a role in facilitating research efficiency, especially where the spillover potential is high, in animal and plant health and food safety.*

Historically, agricultural research policy has followed a model of the public sector investing in areas where private sector incentives are weak, due to market failures. Large regional spillovers in food safety thus would imply a larger role for public supported research to overcome "free rider" problems. Despite this, it may be that much of the change necessary to improve food safety entails only adaptive research requiring little

[15] Fuglie, K.; C. Narrod, C Neumeyer 1999. "Public and Private Livestock Research in the United States," Public-Private Collaboration in Agricultural Research: New Institutional Arrangements and Economic Implications Iowa State University Press, Ames.

additional expense. Thus though it can be argued that there are strong market failures in plant and animal health and food safety research, it may also be the case that there are insufficient incentives for the private sector to adapt already developed technologies. It thus would follow that in the absence of regulations or other non-market incentives, the private sector is not likely to devote sufficient attention to these issues. Given the declining amount of money available to the public sector, private incentives for research may be enhanced by the development of stronger institutions to regulate safety for the domestic market or to certify safety for exports. *The strategy needs to consider how to enhance current Bank efforts to build client capacity for addressing ways to increase these private incentives to conduct research.*

4. World Bank Activities

Animal and plant health, food safety and quality control are addressed in many Bank projects dealing with annual crops, livestock, aquaculture, agroindustry and marketing, agricultural service modernization, research, and extension. However, very few projects have animal and plant health or food safety as a major focus. Usually such components are part of efforts to achieve larger goals. An internal database is being developed of the Bank's projects that include animal and plant health, food safety, and/or quality control components[16]. This database, currently lists 59 Bank projects, with total loan amounts exceeding $2.8 billion. It includes information on the nature of the component, the contribution of animal and plant health and food safety to the overall project goals, the type of implementing institution, the level of investment, and any lessons learned.

4.1 *Proposals for Bank Involvement*

As discussed above, many issues remain to be answered, before the role of the Bank is clear. Possible areas could be:

Non-lending

- Participation, coordination, or sponsorship of international, national or regional technical conferences – Cooperation with national, regional, or international actors.

- Public-private sector dialogue/consensus-building – Leadership in bringing together task forces, roundtables, local government-business meetings centering on opportunities/constraints and appropriate public/private roles. Aiding in the

[16] Bank Staff may view the projects database by going to http://esdtest.worldbank.org/coredb/ and selecting the Agricultural Health, Food Safety and Quality Control Perspective. A summary of the projects database as of March 22, 1999 is provided in Annex C.

establishment of national contact points to facilitate dialogue with government, industry, and consumers.

- Sub-sector Analyses and Action Plans – Work to encourage industry or public/private groups to conduct sub-sector animal and plant health and food safety analysis and action plans.

- Match-making, investor, or strategic partnership fora – Bank sponsorship of efforts to bridge information and risk assessment gaps (e.g. food processors' conference).

- In cooperation with other regional institutions promoting regional networks among agro-enterprises and professionals, along commodity or technical lines (e.g. regional horticultural exporters network).

- Dissemination of 'good practice' experience – Educate clients regarding institutional and other innovations in animal and plant health and food safety.

Lending

- Identification of policy packages – Appropriate agricultural and food safety policy development. Capacity building for identification of policies to promote animal and plant health and food safety, for trade negotiations to challenge unfair sanitary restrictions, for identification of policies which promote inappropriate use of chemical inputs (pesticide, and fertilizer subsidies), or those which constrain private sector development (unfair competition of public services with private services providers, lack of mechanisms of subcontracting private providers for public sector tasks).

- Support for legal reform and institutional restructuring – (inspection, disease control, information systems, grades, standards, and quality assurance); promotion of frameworks for industry self regulation; training in risk assessment and cost/benefit analysis.

- Investments in public infrastructure – inspection laboratories; surveillance systems, database and information system development; investments in cleaner water and basic sanitation.

- Support for research – detection, prevention, control of harmful organisms and residues, low pesticide and pharmaceutical input systems; or adaptation of such innovations for use in client countries.

- Support for Integrated Pest Management and Integrated Vector Control Extension Programs for plant and animal pests – greater support for extension that would lead to elimination of unnecessary pesticide use through IPM and better selection of pesticides where chemical control is still justified.

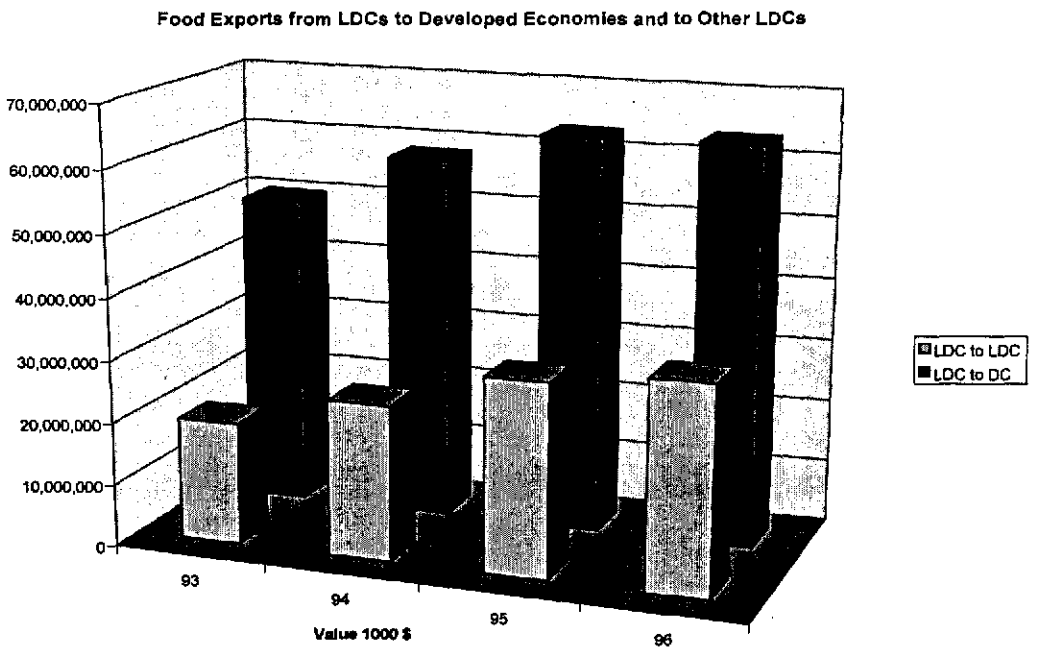
- Human Capital Development – management training, education, extension – on farm and post-harvest technical training, consulting services, training for inspectors.

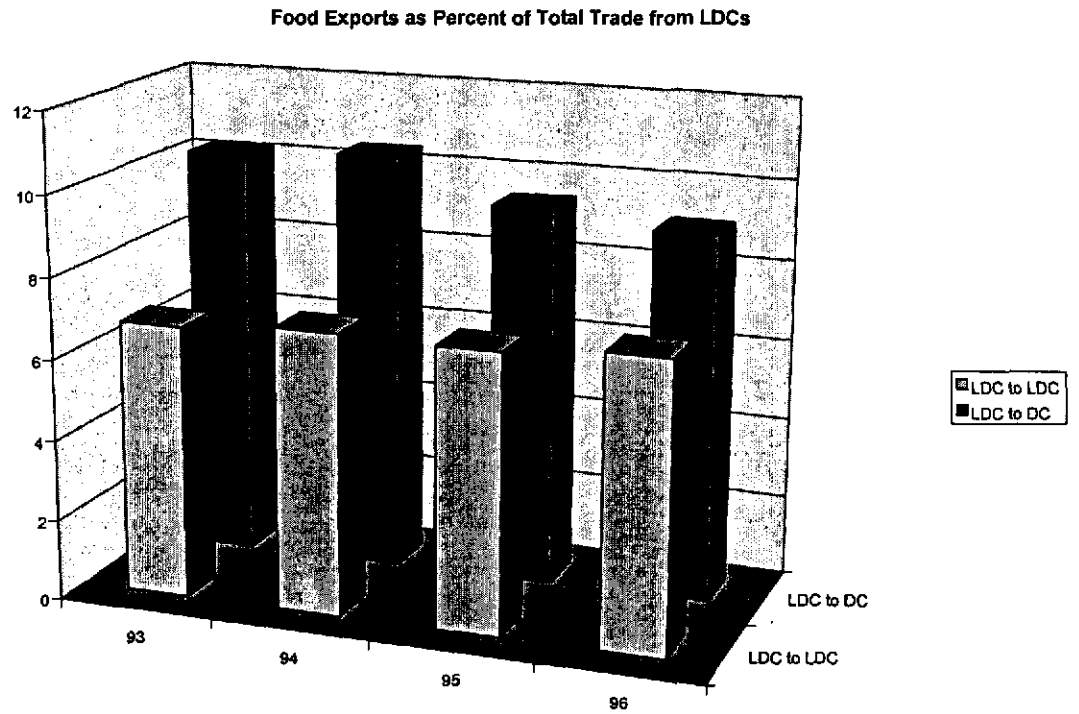
- Export promotion, through the development of product diversification, support for promotional activities, etc.

5. World Bank Strategy

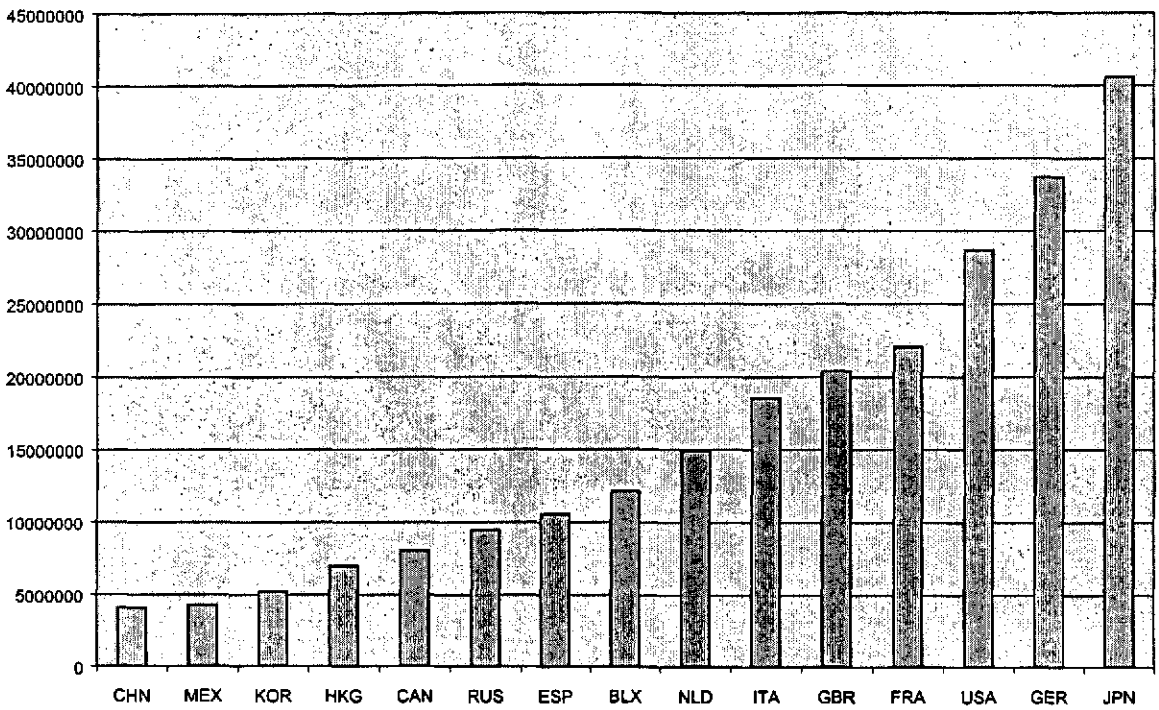
A World Bank strategy paper will be completed by June 30, 1999. This paper will review (a) the importance of food safety issues to developing country trade and to developing country populations; (b) the economics of regulating food quality and safety for export markets and for domestic health improvement purposes, including evaluation of public investments; (c) Bank experiences in projects with a food safety component; and (d) Bank strategy for investments and policy dialogue, distinguishing between the needs of low income countries with enclave food export production and middle income countries with a rapidly modernizing food sector; and (e) potential partnerships to facilitate carrying out the strategy.

Selected Data on World Food Trade from the UN COMTRADE Database

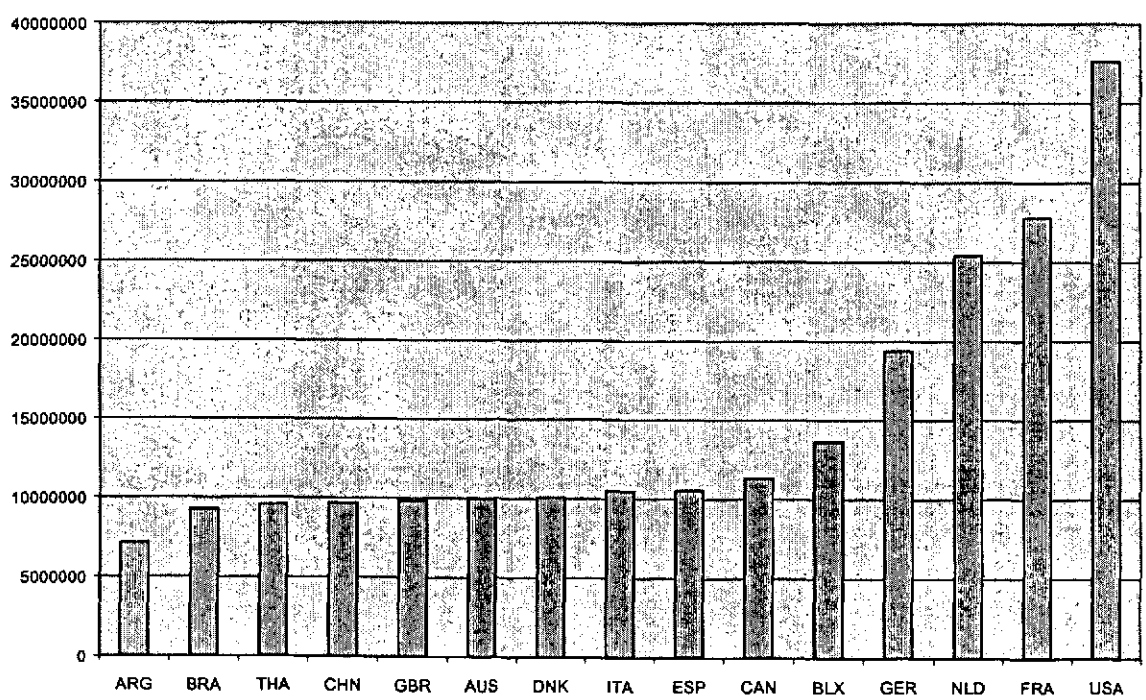




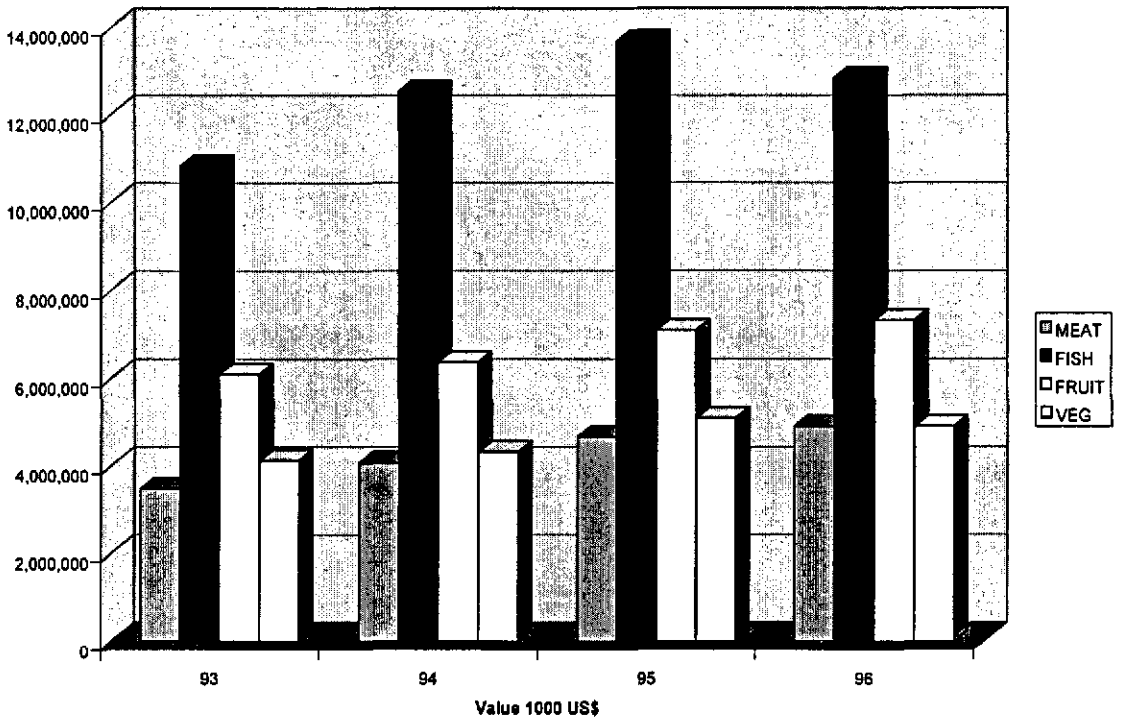
Fifteen Largest Food Import Markets (1000 US$ AVG 94-97)



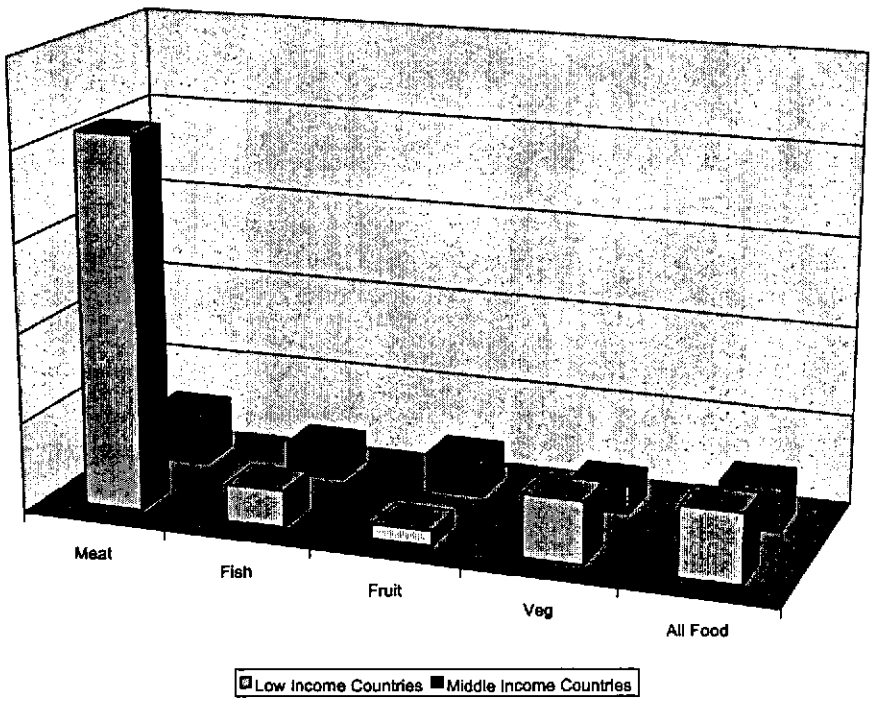
Fifteen Largest Food Exporters (1000 US$ AVG 94-97)



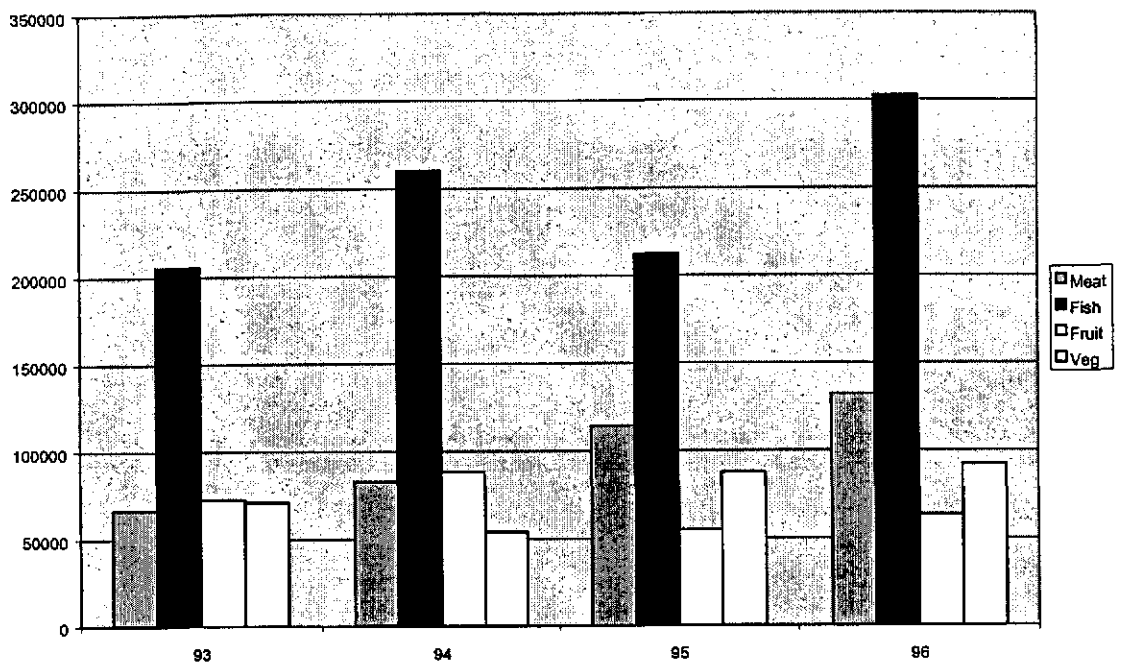
Fresh Food Exports from LDCs to Developed Economies



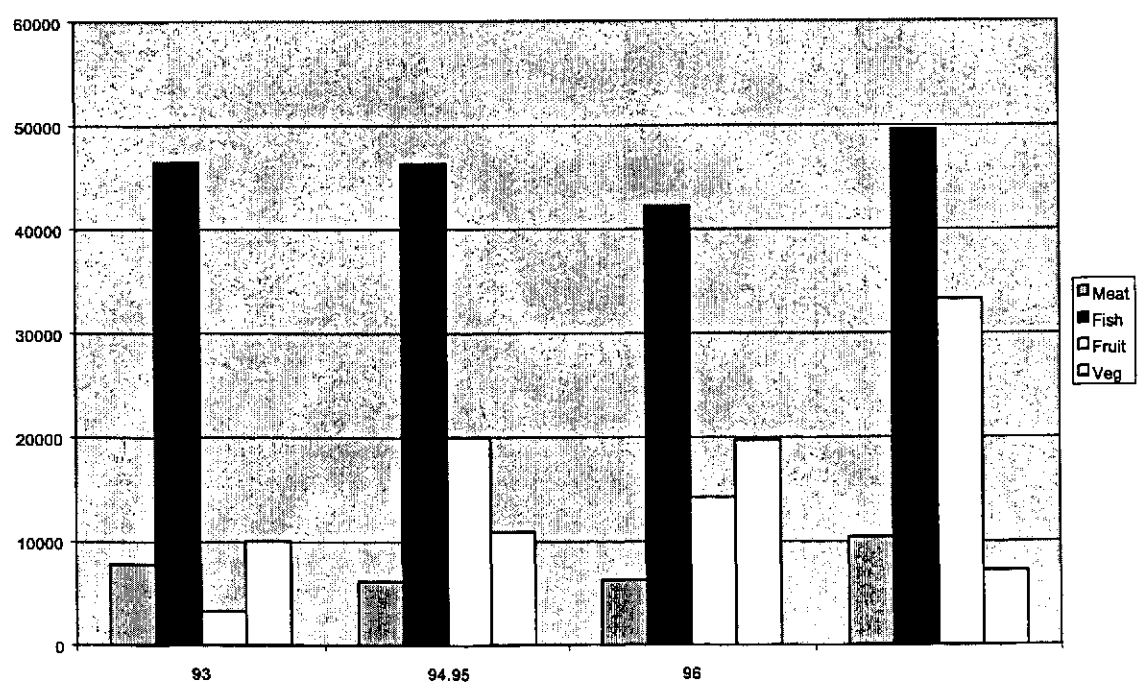
Percentage Change in Fresh Food Exports 93-96



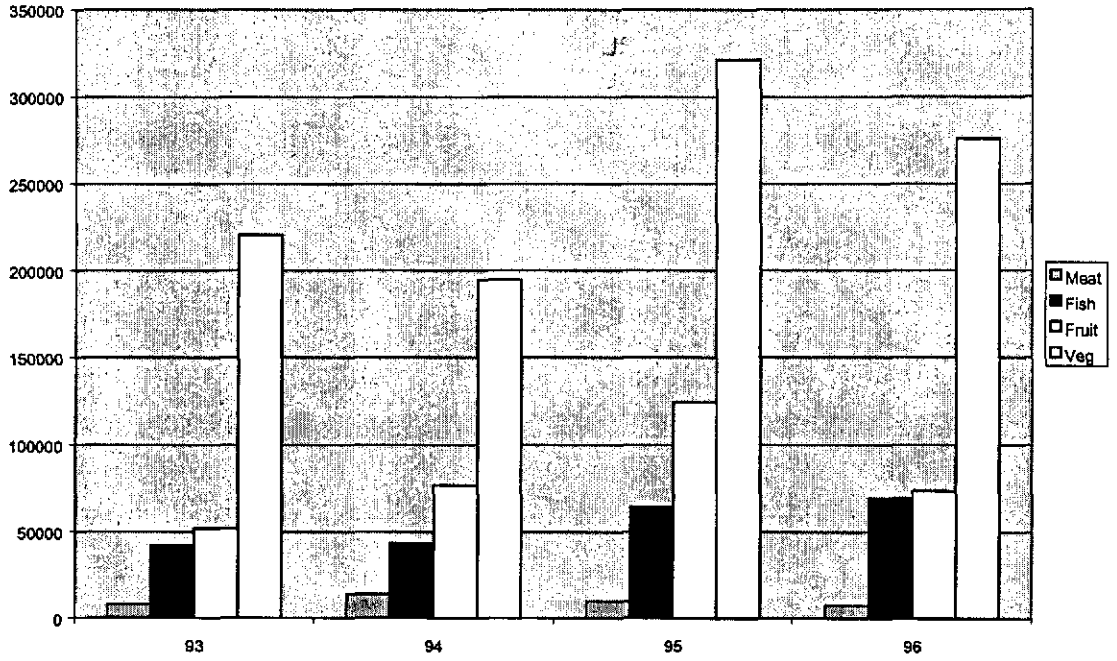
Fresh Food Exports from South Asia to Developed Economies (1000 US$)



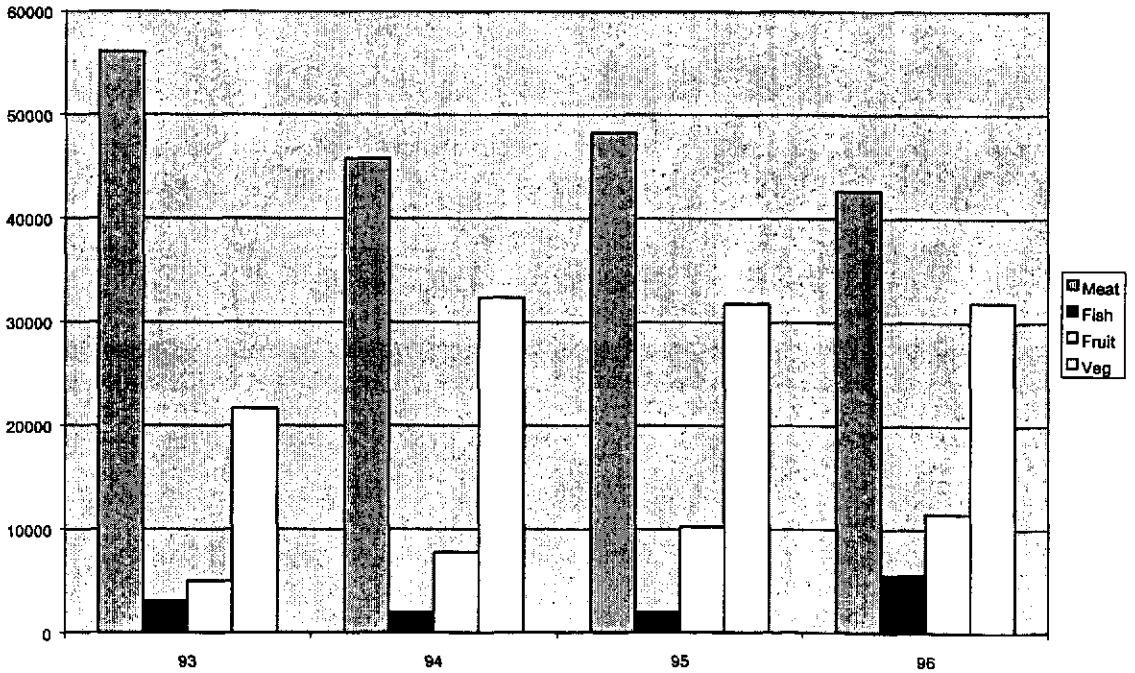
Fresh Food Exports from Sub-Saharan Africa to Developed Economies (1000 US$)



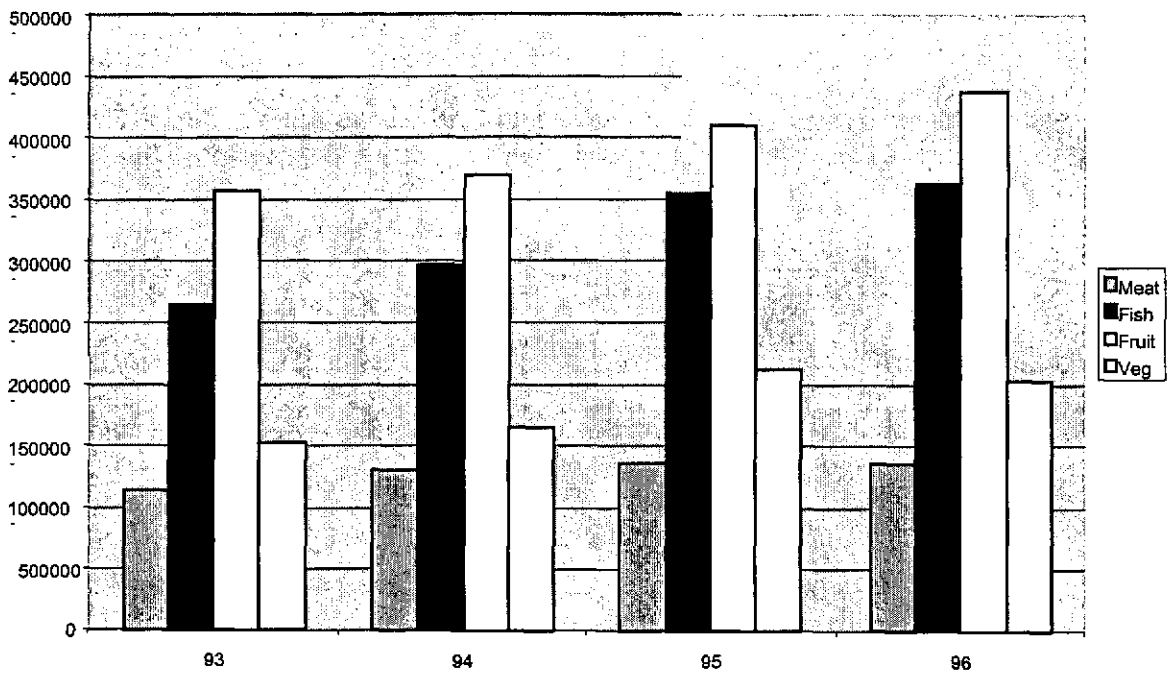
Fresh Food Exports from North Africa and Middle East to Developed Economies (1000 US$)



Fresh Food Exports from Eastern Europe to Developed Economies



Fresh Food Product Exports From Latin America & Caribbean to Developed Economies (1000 US$)



Roles of the Public and Private Sectors in Animal and Plant Health, and in Food Safety

Area	Private sector[17]	Public sector[1]
Research in areas of Plant and Animal Breeding and genetics	** Applied breeding for disease resistance where technology can be protected through trade secrets (hybridization), market structure (eg. Large market share), or patents on genetically modified animals; Applied breeding for reduced incidence of foodborne hazards where market incentives exist (eg mycotoxins)	*** Basic studies in animal and plant genetics, physiology, and biological efficiency; Applied breeding in disease resistance where private incentives are weak; Development of plant and livestock genetic improvement and management schemes for producers, including reduced incidence of foodborne hazards
Research in areas of animal disease protection and prevention and nutrition	*** Applied research on products that can be patented or protected through trade secrets (e.g., pesticides, herbicides, veterinary pharmaceuticals and compound feeds); in vertically integrated systems, applied research on management systems for disease control and nutrient management	*** Basic research on animal and plant pathology, nutrition, and metabolism; Applied research on management systems to control diseases and improve feed efficiency; Identification of risk factors;
Preventive plant and animal health measures	** Provision of diagnostic support, vaccines, and herbicides; Production and distribution of veterinary supplies; in developed countries the provision of clinical care particularly where there are large operations; When it effects the private sectors ability to market products	*** Surveillance and monitoring of disease, drug quality and consequences for food supply tends to be provided by the public sector; Identification of risk factors; Monitoring of plant and animal imports
Provision of curative medicines and health care for animals	*** Provision of vaccines and veterinary drugs and supplies; may be subcontracted by the public sector in cases where effectiveness of vaccination campaigns and vector programs may be jeopardized by non-compliance;	** When effectiveness of vaccination campaigns and vector control programs are jeopardized by non-compliance thus government intervention is necessary to raise farmers investment in services to socially optimal levels;

[17] Stars indicate relative emphasis on research by sector:
*** major effort **important but secondary focus * little effort

Area	Private sector[1]	Public sector[1]
Research in areas of foodborne hazards	** Applied research to ensure products have "acceptable" levels for shelf-life and handling; Applied research on pathogenicity; Development of new tests to detect hazards or new equipment/ methods to prevent them where market incentives exist (eg antimicrobial rinses)	*** Basic research on antibiotic drugs, microbial pathogens, pesticides, mycotoxins, parasitic disease, and heavy metals; Research on pathogenicity, epidemiology and ecology of microbial pathogens; Development of risk assessment models for toxins, pesticides, and other hazards; Development of new control methods in agricultural production and processing.
Provision of health care for foodborne disease	*** Provision of diagnosis, treatment, and drugs for acute and chronic illnesses	* Supported through public health insurance
Food Production and Processing Procedures and Standards	*** Establishment of standard operating procedures, good manufacturing practices, and HACCP systems. Use of contract specifications and third party certification to ensure compliance from suppliers.	*** Develop and enforce regulations for product standards or process requirements; Inspect firms to ensure compliance; Certify suppliers as meeting public standards; Monitor food imports
Foodborne Disease Surveillance	* Little involvement unless customers are effected	*** Monitoring and investigation of disease incidence; follow up investigations of outbreaks
Education/Technical Assistance	** Provision of technical service independently or along with sales of a food safety product or vaccine; Industry organizations may provide education to members.	*** Education of consumers, food service workers, industry managers or small firm owners through publicly supported programs.

[1] Stars indicate relative emphasis on research by sector:
*** major effort ** important but secondary focus * little effort

Current Agricultural Health, Food Safety and Quality Control Portfolio*

	FY	Country	Status	Proj. Name	(m $)
1	1996	ALBANIA	Supervision	AGROPROCESSING DEVEL	6.00
2	1994	ALGERIA	Completed	LOCUST CONTROL	30.00
3	1989	ALGERIA	Completed	LOCUST CONTROL	58.00
4	1991	ARGENTINA	Completion	AG SERVCES&INST DEV	33.50
5	2002	ARGENTINA	Preparation	PROV.AG.DV2	125.00
6	1991	BANGLADESH	Completed	AGRIC. SUPPORT SERVI	35.00
7	1999	BRAZIL	Preparation	ANIMAL&PLANT DIS. CO	44.00
8	1987	BRAZIL	Completed	LVSTK DISEASE CNTL	51.00
9	1989	BURKINA FASO	Completed	AGRIC. SERVICES	42.00
10	1998	BURKINA FASO	Supervision	AG SERVICES II	41.30
11	1995	C.A.R.	Supervision	NAT. LIVESTOCK DEV.	16.60
12	1997	CAMBODIA	Supervision	AGRI.PRODUCT IMP.	27.00
13	1989	CAMEROON	Completed	LIVESTOCK SECTOR DEV	34.60
14	1988	CHAD	Completed	LIVESTOCK	18.60
15	1998	CHINA	Supervision	SUST COAST RES DEV	100.00
16	1991	CHINA	Completed	MID-YANGTZE AG DEV	64.00
17	1992	CHINA	Completion	GUANGDONG AG. DEVT.	162.00
18	1990	CHINA	Completed	HEBEI AGRIC. DEVT.	150.00
19	1996	CHINA	Supervision	SEEDS SECTOR COMMER.	100.00
20	1995	COTE DIVOIRE	Supervision	EXPORT PROMOTION AND	5.80
21	1996	CROATIA	Supervision	FARMER SUPPORT SERVI	17.00
22	1996	ESTONIA	Supervision	AGRICULTURE	15.30
23	1987	ETHIOPIA	Completed	LVSTOCK IV	39.00
24	1995	ETHIOPIA	Supervision	NATIONAL SEEDS PROJE	22.00
25	1993	GHANA	Completion	LIVESTOCK	22.50
26	2000	GHANA	Preparation	AGRIC SERVICES	40.00
27	1988	GUINEA	Completed	AGRIC.SEEDS	9.00
28	1993	GUINEA	Supervision	AGR.EXPORT PROMOTION	20.80
29	1996	GUINEA	Supervision	AGRIC SERVICES	35.00
30	2000	HUNGARY	Preparation	AGRIC. STANDARDS	100.00
31	1988	HUNGARY	Completed	AGROPROCESSING	70.00
32	1990	HUNGARY	Completed	INTEGRATED AG. EXPOR	100.00
33	1988	INDIA	Completed	NATIONAL DAIRY II	360.00
34	1986	INDONESIA	Completed	SMLDR CATTLE DEV.	32.00
35	1987	KENYA	Completed	ANIMAL HEALTH SERV.	15.00
36	2000	KENYA	Preparation	AG.SECT.INVEST PROJ	27.00
37	1993	KENYA	Completed	DROUGHT RECOVERY	20.00
38	1998	KYRGYZ REPUB	Supervision	AGRIC. SUPPORT. SERV	15.00
39	1996	KYRGYZ REPUB	Supervision	SHEEP & WOOL IMPROV.	11.60
40	1996	MACEDONIA, F	Supervision	PRIV. FARMER SUPPORT	7.90
41	1991	MADAGASCAR	Supervision	LIVESTOCK	19.80
42	1993	MADAGASCAR	Completion	FOOD SECURITY & NUTR	21.30
43	1995	MALI	Supervision	AGRO-PROCESSING TRD	6.00

* For Project Details see ESSD Core Database: http://esdtest.worldbank.org/coredb/
Select Agricultural Health, Food Safety and Quality Control Perspective

	FY	Country	Status	Proj. Name	(m $)
44	1996	MOLDOVA	Supervision	AGRICULTURE I	10.00
45	1994	MOROCCO	Completion	ASIL II	121.00
46	1990	NIGERIA	Completed	NATIONAL SEED	14.00
47	1994	PERU	Supervision	BASIC HLTH/NUTRITION	34.00
48	1990	PHILIPPINES	Supervision	COCONUT FARMS DEVT.	121.80
49	1989	RWANDA	Completed	AG.SVC. II	19.90
50	1998	SENEGAL	Supervision	AG.EXPORT PROMOTION	8.00
51	1979	SOMALIA	Completed	CENTRAL RANGELANDS D	8.00
52	1989	SOMALIA	Completed	CNTRL.RANGELNDS.II	19.00
53	1989	SUDAN	Completed	SOUTHERN KASSALA AGR	20.00
54	1994	TUNISIA	Supervision	AGRICULTURAL SEC INV	120.00
55	1991	UGANDA	Completion	LIVESTOCK	21.00
56	1995	UGANDA	Supervision	DISTRICT HEALTH	45.00
57	1995	UKRAINE	Supervision	AGRIC. SEED DEVELOPM	32.00
58	1995	UZBEKISTAN	Supervision	COTTON SUB-SEC IMPRV	66.00
59	1995	ZAMBIA	Supervision	AGRICULTURE SECTOR I	60.00
				TOTAL LOAN AMOUNT	**2890.30**

* For Project Details see ESSD Core Database: http://esdtest.worldbank.org/coredb/
Select Agricultural Health, Food Safety and Quality Control Perspective