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POTENTIAL IMPACT OF SANITARY AND PHYTOSANITARY BARRIERS ON TRADE FOR THE AMERICAS

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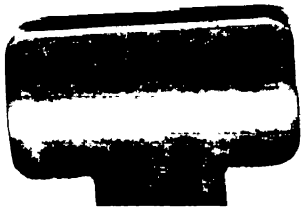

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POTENTIAL IMPACT OF SANITARY AND PHYTOSANITARY BARRIERS ON TRADE FOR THE AMERICAS

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"In the last twenty-five years governments, commercial traders, economic and political analysts have come to recognize that non-tariff barriers present a far greater obstacle to the flow of goods and services than tariffs, which have actually been reduced to very low levels." Hillman (1991: 9)

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This paper is part of a larger hemispheric effort carried out by the Technical Management Unit of IICA, under the direction of Lizardo de las Casas. The purpose is to gain a fuller understanding of the nature and prospects of agricultural trade, policies and integration in the Americas to better assist in the debate among member countries.

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INTRODUCTION

Recent agreements to liberalize trade have resulted in tariff reductions, the conversion of quotas to tariffs, and the re-orientation of trade policies in many countries. Since agriculture plays such an important role in the economies of Latin America and Caribbean countries, trade liberalization creates opportunities for these countries to gain from others desiring access to high value-added commodities produced in these regions.[1] Several factors such as favorable climate, low labor costs, and complementary growing seasons in the Caribbean and South America could result in an increasing movement of commodities, including new or non-traditional products from these countries to countries in the north (APHIS Trade Support Team 1995).

There may be limits to the potential benefits from the reduction of these trade barriers. While trade barriers have been declining and becoming more transparent, many governments have discovered that they can continue to reap short-term political gains from less visible trade barriers such as technical measures that include regulations governing health, safety, or the environmental characteristics of products, product content, and product labeling (Kotschwar, et al. 1993). Kroehle et al. (1994) suggest that there are two reasons for this. First, embargoes and quotas which have worked in the past as de facto disease controls will no longer be allowed. This may result in many countries tightening sanitary and phytosanitary standards in an effort to achieve the indirect pest control results of previously held embargoes or quotas. Second, it is highly likely that many countries will increasingly turn towards standards and regulations to impede the free flow of trade and thus protect their agricultural sectors as tariffs, subsidies, and quantitative restrictions are reduced. By disguising trade restrictions as sanitary and phytosanitary (SPS) barriers, countries may appear to remain in compliance with international obligations under the General Agreement on Trade and Tariffs (GATT). Despite this effort to protect domestic producers, the effort may be done at the expense of consumers and overall economic welfare (Petrey and Johnson 1993). If kept in place, in the long run these non-tariff barriers may constrain future trade by inducing changes in the patterns of trade and by aggravating friction amongst agricultural trading countries (Lynham 1988).

This report investigates the prospects countries in the Americas have in their efforts to meet the SPS mandates of the World Trade Organization (WTO). It identifies several trends that appear to be occurring as countries attempt to meet obligations under the WTO. An understanding of these trends is important considering that many of the SPS policy issues have evolved relatively quickly and haphazardly over the past few years with little opportunity for analysis or reflection. Since these measures are continuing to evolve at a rapid pace, our policy recommendations consider the success of several short-term actions and then focus on the long-term needs and objectives based on today's environment. The issue of compliance with WTO obligations is important because it marks the first occasion where SPS has been brought formally into the dialogue concerning trade barriers.[2]

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1 It has been reported that in some cases agriculture contributes to more than 30% of the GDP and 75% of the foreign exchange to protect animal or plant earnings in the Latin American countries (Thiermann 1997).

2 Prior to the completion of the GATT Uruguay Round, SPS issues were addressed in an ad hoc fashion.

Following this introduction, this paper addresses seven main aspects of the topic. The second section sets the background context in which countries will meet compliance with WTO. The third section identifies actions that have been used to circumvent SPS measures such as participation in a form of triangular trade, the use of seasonal SPS measures and linkages between commodities associated with SPS measures. Most of this information is based on anecdotal evidence; the difficulties in documenting these events is also commented on. The fourth section describes several case studies where there is evidence to aid in understanding the impact of changes in the SPS situation have on trade. The fifth section discusses the importance of sound *in situ* institutional support surrounding disease and pest elimination in agriculture and how the lack of such support may affect trade. The sixth section looks at decreased trade associated with food safety, quality and labeling. The seventh section considers the SPS issues in an institutional economics framework. The paper concludes with a discussion on policy implications given our current knowledge of the SPS issues and proposes several areas where future research needs to focus so as to empirically answer some of the questions posed throughout this paper.

BACKGROUND

The ability of Latin America to gain from the newly liberalized trade environment depends largely on its capacity to overcome the remaining non-tariff trade barriers and other measures that have been established for quality, packaging, and labeling of products (Orden and Roberts 1997). This is because the use of sanitary and phytosanitary regulations has been growing since the Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) was formed. This agreement was part of the final act of GATT which included a series of understandings as to how SPS measures would be established, adopted, and enforced by individual countries. The key provisions of the agreement are: 1) the use of scientifically-based measures (i.e., risk assessment); 2) the recognition of pest- and disease-free areas and areas of low pest or disease prevalence and allowing trade from those regions; 3) participation in the international standards setting organizations and, wherever possible, basing import requirements on international standards; 4) recognizing equivalent treatments and quarantine practices to facilitate trade; and 5) dispute settlement process which begins with technical consultations and proceeds, if necessary, to the use of a formal dispute settlement system (Hillman 1997).

It is hoped that adherence to this agreement will improve the competitive environment for trade in agricultural commodities by minimizing the adverse effects that sanitary and phytosanitary barriers have on trade through the elimination of all direct and indirect subsidies and other trade-affecting distorting measures (Miller 1986). For instance, countries such as Australia, Brazil, and Argentina, which have substantial comparative advantages in free-range beef production, are likely to experience increases in exports of non-grain fed beef if trade barriers are eliminated (Lynham 1988).[3] Likewise, many Latin American countries with tropical or otherwise favorable temperate climates could provide the US and other temperate regions with specialty crops, thereby taking advantage of their ability to provide such products in the off-seasons of the more developed countries.

Advances in transportation and storage technologies, along with the eradication of plant and animal diseases, have enabled many countries to access markets that have not been reachable traditionally. With the liberalization of trade through GATT, it is likely that the future will bring considerable changes to existing trade flows, particularly as new countries enter the international market. This process may or may not increase competition with domestic producers (i.e., if entry occurs in a season when the product was not formerly available, consumer demand, even for domestic products may be strengthened by having it available for a longer time period). Alternatively, this phenomenon may lead to domestic producers or the government investing in foreign production capacity or cooperating through market alliances to assure greater product presence throughout the year (Haley 1997). For instance, the Dutch have aided Colombian flower producers in the eradication of diseases. Also, the US Animal and Plant Health Inspection Service (APHIS) implemented in Belize in 1987 a Medfly Project that has provided financial support for the eradication of the pest through ground spraying and quarantine check points as well as the continuous training of staff and providing transportation to various regions. Because of this effort, in 1996 USDA declared part of the Stann Creek region Medfly-free (IICA-Belize 1997).

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[3] Theoretically the US market would also be open to them. Their exact ability to access the US market may depend on the whether the US chooses to "hide" a form of non-tariff barrier in their licensing of processing plants. Some feel that it will be difficult for the countries, even those free of foot and mouth disease to ever be able to gain access into the US in terms of prime cuts.

Multinational corporations (Dole, etc.) that have augmented their existing networks by investing in these countries, have helped them to expand into non-traditional export products in a highly competitive manner. In Costa Rica, foreign investors have dominated in the production of flowers, ornamental plants, citrus, and macadamia nuts. Specifically, of the fourteen largest flower growers, only two are Costa Rican with one U.S. company, American Flowers, producing half of the country's flower exports (Thrupp 1995). In some cases these multinationals were directly responsible for the eradication or minimization of diseases which was necessary to access markets in some of the more industrialized countries. Much of this technology can readily be transferred by these multinational and individuals in the private sector to countries with favorable climates for produce and livestock. The success of these companies indicates that access to inputs may remain a major constraint to increased production and trade after the initial settling of trade disputes including SPS issues. If this is the case, then countries having ample access to inputs, successful methods for disease control, low labor costs, and efficient production units would have a competitive edge in these newly emerging markets. Because of this potential, it is important that these countries be proactive in responding to the many changes that will occur in the newly liberalized environment. This includes the proper environment which would entice private investment, particularly in cases where a firm has already shown proficiency elsewhere in disease and pest eradication.

To ensure all countries benefit from this newly liberalized environment, member countries of the WTO are encouraged to harmonize trading standards within international guidelines. The concept of harmonization presupposes that: 1) the purpose of such measures must be to contribute to a legitimate domestic objective, and 2) equivalent regulations must be applied to domestically produced products and inputs (Petrey and Johnson 1993). In cases where domestic standards differ, member countries are required to justify such deviation from the standards and make them transparent. This step was taken because it was felt provisions should be made to allow countries to invoke higher standards to protect the health of their agriculture as long as they were: 1) scientifically based measures that were in response to a sequence of risk assessments; 2) non-discriminatory between its goods and like goods of another party; and 3) transparent in the way the measure was developed and implemented. In response to this requirement for notification within the first year over two hundred notifications were circulated and by 1996 almost four hundred notifications had been received from thirty-one members (APHIS Technical Support Team 1996). It should be recognized that some countries such as Canada, Mexico and the US already have established reliable notification systems to make laws transparent and risk assessments available. They are able to do this because they have the necessary resources. It is possible that the proximity, history of cooperation, and large trade volumes between these countries have something to do with them having reliable notification systems. Reliable notification systems is not the case with many other countries, particular those with small economies whose governments lack much of the needed resources and competence (Thiermann and Greifer 1995).

Since the WTO Agreement, international efforts have been underway to coordinate individual policies under one negotiating system and to develop internationally accepted standards in a way that would level the playing field. To define clearly these science-based standards, GATT sought the advice of three international scientific organizations. The International Plant Protection Convention (IPPC) provides information concerning plant health measures; the Office International des Epizootics (OIE) makes recommendations on animal health measures; and the Codex Alimentarius Commission (CODEX) makes recommendations regarding food safety. Table 1 indicates that most Latin American countries are members of the WTO and the IPPC, but fewer are members of the OIE and the CODEX. The countries that are not members tend to come from the smaller economies in the Caribbean.

Table1: Membership to International Standard Setting Organizations.

Country	IPPC	OIE	CODEX	WTO
Antigua and Barbuda	x	x		x
Argentina	x	x	x	x
Barbados	x			x
Belize	x			x
Bolivia	x	x	x	x
Brazil	x	x	x	x
Canada	x	x	x	x
Chile	x	x	x	x
Colombia	x	x	x	x
Costa Rica	x	x		x
Cuba	x	x		x
Dominica				x
Dominican Republic	x			x
Ecuador	x	x		x
El Salvador	x			x
Grenada	x			x
Guatemala	x			x
Guyana	x			x
Haiti	x	x		x
Honduras		x	x	x
Jamaica	x			x
Mexico	x	x	x	x
Nicaragua	x		x	x
Panama	x	x		x
Paraguay	x	x		x
Peru	x	x		x
St. Kitts and Nevis	x			x
St. Lucia				x
St. Vincent				x
Suriname	x			
Trinidad and Tobago	x			
United States of America	x	x	x	x
Uruguay	x	x	x	x
Venezuela	x	x		x

Source: Compiled from WTO, IPPC, OIE, and CODEX Websites 1997.

It is expected that these organizations would aid in the settlement of sanitary and phytosanitary disputes through the promotion of a rule-based system which may affect international trade flows and thereby help to interpret the rules of the game (Thiermann 1997). In doing so costs associated with arbitrary legislation and inconsistent enforcement by customs will be reduced. This is important as delays at port of entry are extremely costly for many commodities. For instance, the beef industry relies on refrigerated transportation which is extremely costly but nonetheless desirable as chilled beef commands higher prices than frozen beef. Given that there is a finite amount of time in which beef can be chilled before it needs to be frozen, there is only a short time window for inspection of meat at customs and shipment to the final destination (Lynham 1988). Membership however is not free and many of the smaller economies lack such resources.

Though smaller economies may not be able to afford membership or participate fully in the meetings, it is important that they try or work with regional organizations so that their voice is heard. This is because currently these organizations are in the process of drafting standards and this

incomplete process creates opportunities for developing countries, in particular those in Latin America, that are members of these organizations to participate in the standards setting process. This is because the average process to develop a new standard is approximately three years. Thus there is still time and perhaps some unforeseen opportunities available to developing countries in the standard setting process. In doing so it should be recognized that the establishment of these standards will not be an easy feat given the difficulties in discerning technical standards applied to trade for legitimate health and safety reasons from ones that are really designed to be a non-tariff barrier. Likewise if the process is difficult for developed countries to discern, it is important to recognize that it will be equally difficult for developing countries lacking in many cases the equivalent technical expertise and infrastructure.

Once the standards have been set, member countries need to meet obligations under this agreement. Most members of the WTO, including the most developed countries, are concerned about their ability to meet WTO obligations, particularly with respect to SPS. It is increasingly clear that it will be extremely difficult or impossible for some countries in the Americas as well as trading partners in other regions of the world to comply fully. To date, the countries that have made the greatest progress toward compliance include the US, Canada, Mexico, Brazil, Chile, Colombia, and Argentina. A key element for the successful implementation of SPS obligations is the resources needed to fund essential activities. In the U.S. and some other countries, there is relatively strong public support for the agencies charged with meeting SPS obligations. In such cases, tax monies and other public funding supplement user fees and cost recovery programs that support essential SPS functions. In many other countries, the ability of the government to provide needed resources is weak and there are few well developed programs for funding relevant SPS activities from monies other than those traditionally provided by government. In addition these countries have fewer resources to draw on to establish new procedures and/or fewer trained personnel to administer new standards. There is a critical need for the development and implementation of innovative programs that bring resources into the relevant agencies, particularly from those who benefit most from the services. For instance the success of the removal of hog cholera in certain areas of Mexico largely with the aid of producers may be an approach other countries can learn from.[4]

The WTO Agreement recognizes that developing countries may have a problem meeting international SPS regulations because of limited resources. The SPS Agreement contains language which suggests countries that have the necessary resources should provide technical assistance to the less developed countries for food processing technology, research and infrastructure, including establishment of national regulatory bodies, advice, credits, donations, grants, technical expertise, training, and equipment. This is to allow the less developed countries time to adjust to and comply with SPS measures so they may reach the level of SPS protection necessary to access export markets. Since it is recognized that less developed countries may need some time to meet WTO obligations in terms of SPS measures, special and differential treatment is given to developing countries. Specifically, with the exception of notification, requirements are to be phased in over a six-year period for developing countries facing technical or resource limitations, and over a ten-year period for the least developed countries. The exempted countries are not required to provide a scientific justification for sanitary or phytosanitary requirements before the end of the phase-in period. Despite the grace period, it is unclear whether developing countries will have the resources needed to meet WTO obligations in the time allocated to them.

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[4] In some states the producers contributed funds that were in excess of or matched the funds supplied by the government (Mexico, Dirección General de Salud Animal).

REACTIONS TO SANITARY AND PHYTOSANITARY CONCERNS

With the above background in mind attention is turned to how countries have reacted to sanitary and phytosanitary concerns. Some empirical and some anecdotal evidence illustrates: a) the beneficial use of the concept of disease-free zones or regions with low risk to facilitate export trade; b) increased interceptions at port of entry associated with increased trade and the role of methyl bromide and its potential use as a trade barrier; c) attempts to circumvent SPS measures by: participating in triangular trade; creating linkages between commodities associated with SPS measures; implementing seasonal SPS measures to retard competition; or restricting trade because of evidence indicating politically-based SPS measures; and d) the rationale of bringing discrepancies to dispute settlement panels.

Expansion of the Use of Disease-Free Zones and Regions of Low Risk

With growth in world trade it has been recognized that there is a need to re-conceptualize the animal health and plant health situation. This is because a large amount of trade may be lost because of small pest or disease infestations in one part of a country which could hinder exports from another as much of the international community has historically considered the whole market to be infected. For instance Japan used the existence of the golden potato nematode (found only in New York State potato production areas) and potato wart disease (found only in western Maryland) to prevent Maine and Idaho potatoes from being imported (Vogt 1992). This restriction in effect would constitute a major trade barrier for large countries with diverse ecosystems (and numerous backyard farm producers) who may have difficulties in eradicating disease or pest infestations everywhere within their territories. Thus one of the most basic concepts introduced by the WTO was the concept of regionalization (i.e., recognizing pest - and disease - free zones, or areas of low pest or disease incidence for trade purposes). This concept specifically suggests that countries should have the opportunity to export from areas which are demonstrated to be free from particular diseases or in which the prevalence of the disease was low even though the disease or pest of concern may exist elsewhere within the national territory.

This move toward the recognition of regionalization for many products represents a major departure from past policies for countries practicing zero-risk tolerance. Specifically, many countries used to promote a zero-risk approach towards imports while strongly promoting exports. Now these countries with the signing of the WTO have seen the merits of moving towards a more scientifically based and transparent trade ruling which enabled the exportation of products from disease- and pest-free areas. Though this process is currently incomplete several regions have made progress to declaring themselves free of a particular plant pest. Those in the Americas are *Sonora,* Mexico which is free of *Anastrepha ludens, A. fraterculus, A. serpentina, A. obliqua*, and *Ceratitis capitata*; Brazil which is free of *Anastrepha grandia*; Chile which is free of *Ceratitis capitata* except in the northernmost provinces; and Florida, US which is free of the *Carib fly Anastrepha suspensa.* There are also several proposed pest free zones. Those in the Americas are Argentina, and Chihuahua and Baja California in Mexico (APHIS 1995). To get beyond the proposal stage and to be formally declared pest-free, a country requires at least a year of trapping data for analysis. Once this has been collected the burden of proof is on the exporting market to successfully demonstrate to importing countries that its region is either disease- or pest- free or has a low

prevalence for an outbreak associated with a product coming from this region. It should be noted that though there has been a move in this direction, the formal methodology for recognition of disease-free zones has yet to be harmonized. Arguably the concept of regionalization is not new; veterinary services in most countries have been using this concept for a while. Currently there are five types of classifications describing the livestock disease situation: 1) disease free zones without vaccination; 2) disease free zone with vaccination; 3) surveillance zone; 4) buffer zone; 5) infected region.

Part of the reason why this process has been well established in the animal health arena is that there are a known set of diseases that need to be eradicated. This is in contrast to plants, where many of the pests and their life cycles are still unknown, particularly in countries with large tropical areas where it is nearly impossible to eradicate pest and plant pathogens. Table 2 helps illustrate the progress of the Americas toward eradicating these trade threatening diseases. This table shows where the America's are in terms of eradicating list **A** diseases which are classified as having the greatest potential for serious and rapid spread, irrespective of national borders, and are of major importance in international trade of animal and animal products. Further, countries and regions lacking similar status are not able to trade livestock products with countries and regions free of disease. The table indicates that in many cases the diseases have never been reported and many of these countries prohibit the importation of either beef, pork, or poultry meat products from countries having the disease.

Table 2: Where the Americas are in Terms of Eradicating List A Diseases

	FMD - Cattle	FMD - Swine	Vesicular Stomatitis	Swine vesicular Disease	Rinderpes t	Peste des petits ruminants	Contagiou s Bovine pleuropne umonia	Lumpy skin disease	Rift Valley Fever	Blue Tongue	African swine fever	Hog cholera	Fowl plague	New Castle Disease
Antigua & Barbuda	- P *	- P*	-	-	- P *	-	- P *	-	-	-	-	-	-	-
Argentina	1994 Pn Q S te V *	1994 Pn Q S te	1982 Qf te *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 *	0000 P *	+ ( ) Pn V	0000 P *	+ ( ) Pn Qf V
Barbados	0000 P Q	0000 P Q	0000 P Q	0000	0000 P Q	0000	0000	0000	0000	0000 Pn te	0000	1973	0000	1971 P Q V
Belize	0000 P *	0000 P *	++ Q *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 Qf *	0000 P *	1988 Q V *	0000 P *	1988 V *
Bolivia	+++ Pa V	++ * Pn V	- P	0000	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	P * +	0000 P *	++ ( ) Pa *	1991 Pa *	( ) ++ Pa *
Brazil	++ Pn Q Spe V *	+ Pa Q Sp V *	(+) Q *	0000 P Qf *	1921 P Qf *	0000 P Qf *	0000 P Qf *	0000 P Qf *	0000 P Qf *	+? Q te *	1981 P Qf S te *	+ + ( ) Pa Qf te S *	0000 P Qf *	+ ( ) Pa Sp te V *
Canada	1952 Qf *	1952 Qf *	1949 Qf *	0000 Qf *	0000 Qf *	0000 Qf	1876 Qf *	0000 Qf	0000 Qf	1988 Qf *	0000 Qf *	1963 Qf *	0000 Qf *	1973 Qf *
Chile	1987 Qf S te Vp *	1987 Qf S te Vp *	0000 Qf te *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 Qf te *	0000 P *	(+) Pn Q Sp te V *	0000 P *	1975 Qf te V *
Colombia	++ * Pn Q V	+ * Pn Q V	++ Pn Q *	0000 P Qf S *	0000 P* Qf S	0000	0000 P Qf S *	0000 Q Qf S *	0000 Q Qf S *	1975 PQf S *	0000 P Qf S *	+ Pn Q V *	0000 Qf S	+ Pn Q V *
Costa Rica	0000 P *		+ .. *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	+? *	0000 P *	+ ( ) P Pn Q S Vp *	0000 P *	0000 P *
Cuba	0000 P Qf Vp *	0000 P Qf Vp *	0000 P Qf *	0000 P Qf *	0000 P Qf *	0000 P Qf Vp *	0000 P Qf Vp *	0000 P Qf *	0000 P Qf Vp*	0000 P Qf *	1980 P Qf *	++ P Qf V *	0000 P Qf *	1982 P Qf V *
Ecuador	++ Pn Qf V *	1994 Pn Qf *	( ) (+) Pn Qi *	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	? Qf	0000 P Pn Qf *	++ Pn Qf V *	0000 P	+ Pn V *
El Salvador	0000	0000	++ Pn T te *	0000	0000	0000	0000	0000	0000	+? *	0000	++ te V *	0000	... *
Grenada	0000	0000	0000	0000	0000	0000	0000	-	0000	+?	-	-	0000	-
Guayana	Q	Q	.... *	0000 *	0000	0000	0000	0000	0000	0000	0000	0000	0000	+ V
Haiti	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	1984 P	1984 P	- P	+++ V
Honduras	0000	0000	+	0000	0000	0000	0000	0000	0000	+ ?	0000	+ Pa Qf V*	0000	+ Qf V *
Jamaica	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	0000 P	+ ? P	0000 P	0000 P	0000 P	1991 P
Mexico	1954 P te *	0000 P te *	( ) Qi te + P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	? P Qi te *	0000 P te *	+ ( ) P Pn Qi S te V *	+ P Pn Q Qi S te V	1993 P Pn Q te V *
Nicaragua	0000 P *	0000 P *	++)(Qi T *	... P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	+ ?	0000 P *	++ Pa Q V *	0000 P *	++)(V *
Panama	0000		+ T *	0000 P *	0000 P *	0000 P *	0000 P*	0000	0000 P *	+ ? tv	0000 P	1981 P Qf	0000 P	1977 V
Paraguay	1994 Pn Qf V *		-	0000	0000	0000	0000	0000	0000	+ ?	0000	+ Pn V *	0000	+ Pn V *
Peru	+		+		0000	0000	0000	0000	0000	+ ?	0000	+	0000	+
St Kitts and Nevis	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000	0000	0000	0000	+ ?	0000, P *	0000 P *	0000	1971 P V *
Surniame	- P		-	-	0000	0000	-	-	-	-	-	-	-	-
Trinidad & Tobago	0000		0000	0000	0000	0000	0000	0000	0000	+ ?	0000	1974	0000	1994
US	1929 P Q S *	1929 P Q S, *	1986 Qi *	0000 P Q S *	0000 P Q S *	0000 P Q S *	1892 P Q S *	0000 P Q S *	0000 P Q S *	(+) ( ) P Qf tv	0000 P Q S, *	1976 P Q S *	1984 P Q S *	1992 P Q S *
Uruguay	1990 Pn Q S *	1990 *	0000 *	0000 *	0000 *	0000 *	0000 *	0000 *	0000 *	0000 *	0000	1991 Pn Q S *	0000 *	1984 Qf *
Venezuela	++ Pn Q V *	+ ( ) Pa Q V *	++ Qi *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	0000 P *	+ ? Q te *	0000 P *	++ Qi V *	0000 P *	1990 * QV

Key: 0000 = Never reported; - = Not reported; year = Last year of occurrence; ? = Suspected, but not confirmed; (+) = Exceptional occurrence; + = Low sporadic occurrence; ++ = Enzootic; +++ = High occurrence; +? = Serological evidence and/or isolation of causative agent, no clinical disease; ( ) = Confirmed to certain areas;) (= Ubiquitous; P = Prohibition of import from infected countries; Pa = Control program for only some areas of the country or certain types of breeding; Pn = Control program for the whole country; Q = Quarantine, movement control, and other precautions at frontier and inside the country; Qf =Quarantine and other precautions at frontier; Qi = Quarantine measures and movement control; S = Stamping out policy; T = Treatment; te = Testing; tv = Voluntary testing; V = Vaccination; Vp = Vaccination prohibited; * = Notifiable disease;

Source: FAO Animal Health Yearbook 1996.

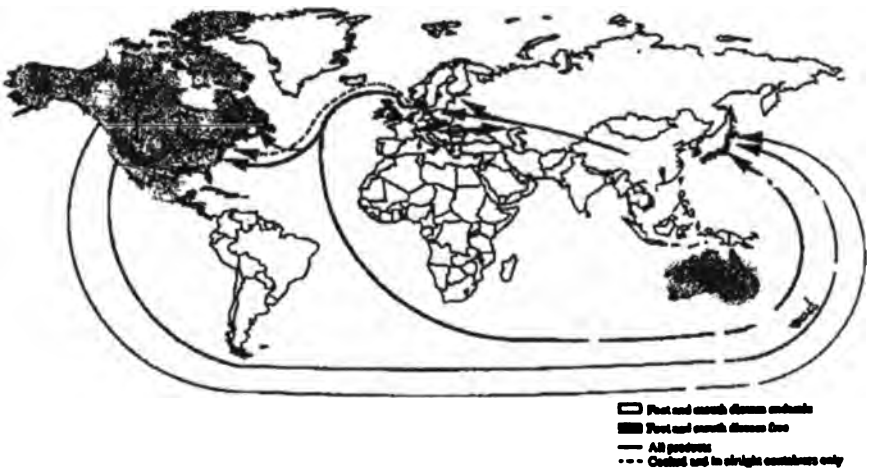
Benefits of Freedom from Foot-and-Mouth Disease

There has been much effort and resources devoted world-wide to the eradication of Foot-and-mouth Disease (FMD) as it is one of the major constraints beef producing countries face in accessing foreign markets. Currently the forty-seven countries have been declared free of FMD without vaccination: Australia, Austria, Belgium, Canada, Chile, Costa Rica, Croatia, Cuba, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Haiti, Honduras, Hungary, Iceland, Indonesia, Ireland, Italy, Japan, Korea, Lithuania, Luxembourg, Madagascar, Malta, Mexico, Netherlands, New Caledonia, New Zealand, Norway, Panama, Poland, Portugal, Romania, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States, Uruguay, and Vanuatu. Further Colombia, Namibia and South Africa have been declared to have a FMD free zone where vaccination is not practiced and Argentina and Paraguay are considered FMD free countries where vaccination is practiced.

Most developing countries do not have the level of technical expertise to combat outbreaks within their own boundaries. Since there is a known set of livestock diseases for which treatment methods have been developed, the provision of support in the control of livestock diseases has been a long-term policy for most countries. The OIE has worked to aid countries in the eradication of many diseases. Since this practice has gone into effect, FMD has been eliminated in the southern region of South America, central areas of Brazil and the north-eastern region of Colombia which contains over half of the cattle herds of South America. For Latin America this is a major accomplishment and it is expected that FMD will be eradicated from the Americas by the year 2009 as small tenant farmers are incorporated into the campaign (OIE 1996).

What does this mean for trade? Each of the above listed countries theoretically has the opportunity to engage in trade with any of the international markets. Whether or not they do may depend on how competitive they are in terms of production, processing, etc. Figure 1 illustrates the major trade flows from countries that are free of FMD. As can be seen most of the pork flows from foot-and-mouth free countries is going to Japan.

Figure 1: Major Pork Trade Flows



Source: ERS 1996.

Failure to maintain disease-free status can result in severe biological and economic losses for a country. The recent outbreaks of foot-and-mouth disease in Taiwan illustrate the devastating effect such outbreaks can have on trade.[5] In March of 1997, a major foot-and-mouth epidemic hit Taiwan, even though they had long been free from this. Though there is no precisely known incident for the cause of the outbreak, it is suspected that animals smuggled from China were the source of this epidemic (Economic Research Service 1997). Prior to the outbreak, Taiwan was the third largest exporter of foot and mouth disease-free pork, with most of their exports going to Japan. On March 20th of the same year, Japan banned further imports from Taiwan to protect their own swine and cattle herds from infection. At the time of this ban, Taiwan was providing 41% of Japan's imports, Denmark 18%, and the US 22% (Economic Research Service, 1997). It is likely that imports will not be allowed until 1998 resulting in either the other trade partners expanding their market share, or other foot-and-mouth free countries gaining a market hold and perhaps forging relationships with Japan that will permanently take away some of Taiwan's market share.

Mexico, recognizing the value of this potential market, has tried to capitalize by increasing in the past year the number of processing plants in disease-free zones dedicated to the Japanese market. Between 1996 and 1997 exports of pork to Japan from disease free regions in Mexico increased over 60% as seen in Table 3. This occurred despite the devaluation of the peso in 1994 which resulted in the selling and slaughtering of a large number of livestock in 1995. The minimal increase in 1996 could be associated with re- building of the herd. The ability of Mexico to access the Japanese market may depend on the quality produced and whether this satisfies current market preference for marbled fresh beef (Lynham, 1988).

Table 3: Exports from Mexico to Other Countries

Country	1992	1993	1994	1995	1996	1997
Japan	3289964	4245705	4721313	8,799,030	9,202,640	13,829,361
US				36		
Greece				253,019	116,758	
Cuba						476,154
Korea						181,081
Total	3,289,964	4,245,705	4,721,313	9,052,085	9,319,398	14,486,596

Source: Mexico Dirección General de Salud Animal.

It is likely that many countries may respond similarly to Mexico to these food safety shocks in export markets due to an outbreak or clearance of a particular disease. In situations where these shocks may be short term, *in situ* infrastructure is necessary for countries to be able to respond rapidly to market opportunities. If a country lacks such capacity, another country is likely to attempt to fill that role, while the country lacking the infrastructure is still in the process of building up its capacity (stock, veterinarians, inputs, etc.). The long term benefits of being able to respond to such food safety shocks is unclear. This is because there are many lagged effects in trade associated with this, that are difficult to analyze in the current trade data. It is expected that many countries will also be trying to capitalize on the recent outbreak of bovine Spongiform Encephalopathy (BSE) in the UK as other countries attempt to protect their cattle and population from this disease.[6] Since the initial outbreak, the European Union (EU) has banned all live animals, beef, offal, related products (from soups to jellies) and animal meals imported from the UK with many other countries following suit (Reco and Mondino 1995). Though the exact etiology of the disease is unknown, the US and

[5] Similarly in 1969 Uruguay was contaminated with foot-and-mouth disease. The disease was present in the bone of red meat; upon verification of the disease the British revoked Uruguay's right to export beef products for Uruguay for the following year; this amounted in a loss of around 33,500 tons of meat for trade (Hillman, 1991).

[6] According to early BSE surveillance information as of March 1, 1996 the total confined case of BSE in Great Britain (England, Scotland, and Wales) are 18,512; total number of affected herds, 33,265; proportion of dairy herds affected 59.%; and the proportion of beef suckler herds affected 15.3% (APHIS 1997).

Canada have chosen temporarily to ban the use as feed additives, of animal by-products coming from ruminants. The ban is to remain in effect until more is known about the disease and because of the fear of the potential impact on the industry if even one outbreak were to occur in their country.[7]

Benefits of Mediterranean Fruit Fly Eradication in Chile

Likewise there have been many efforts to eradicate the Mediterranean Fruit Fly (Medfly). As of now Chile is the only major exporting country in the world that is free of Medfly. In 1995 they became free. The process took a long time. In 1963, *Ceratitis capita* was detected in the Arica and Azapa areas near the Peruvian border (FAS 1995). Attempts were made to control the program through chemical and mechanical eradication with limited success. In 1987 it was recognized that the country should embark on a strategy that included the importation of sterile flies. This was because though Chile had made progress towards eradicating Medfly, they were still unable to access certain markets because of continual outbreaks originating from medflies in the Arica region in northern Chile next to Peru. To remove this barrier, in 1990, Chile signed a cooperative agreement with Peru to intensify and coordinate their efforts for eradication. In 1993 a Medfly mass rearing facility was built in Lluta Valley costing 2.3 million US dollars and financed in part by the IDB, FAO, and the International Atomic Energy Commission (FAS 1996). In the mid-1995, these releases were expanded to co-ordinate actions against Medfly in the valleys of southern Peru.[8] These efforts resulted in no detection of Medfly in the Arica province since May 1995 and in December 1995 Chile was formally declared a Mediterranean fruit fly free zone.[9]

Major gains are expected from this investment. The Chilean Minister of Agriculture expects an annual increase of $500 million in fruit exports over the next five years due to the Medfly free status (Atomic Energy Agency General Conference 1995).[10] It is expected that the lack of quarantine and fumigation treatment will be a tremendous cost savings for Chilean exporters. For instance cold treatments currently lengthen the export period twelve to fourteen days, costing around .20 dollars per kilo (FAS 1996). To aid exporters in benefiting more from this status, Chile is in the progress of establishing phytosanitary agreements and protocols with Japan, South Korea, Hong Kong, China, the Philippines, Malaysia, New Zealand, Venezuela, Colombia, and Mexico.[11] Also expansion of exports to the US is also possible, since Chile currently has the most comprehensive preclearance program with USDA/APHIS for fresh fruit. Given the new fresh storage technology they have recently developed, Chilean producers have a huge untapped advantage in their ability to export fresh fruit year round (FAS 1997). Efforts are currently underway to start to improve the quality of produce. The goal is to implement a mandatory quality control program, however the role of the private sector and the government in such programs has still to be worked out and currently is voluntary (FAS 1997).

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7 Though all imports of live ruminants have been banned from the UK into the US, the 496 cattle that were imported from the UK between 1981 and 1989 have been traced, the remaining, 25 cattle still alive in the United States (as of February 26, 1997) have been placed under quarantine since April 1996. APHIS is currently attempting to purchase these cattle for diagnostic research purposes. Thirty-two haven't been traced, but based on their ages, only nine of these are estimated to be still be alive (APHIS 1997).

8 On a weekly basis 16 million sterile fruit flies were to being released over the city of Arica and in the Azapa Valley and 20 million were to be sent to Peru to be released (FAS1996).

9 It was considered free because between the period of May 1995 and December 1995, the Medfly would theoretically have gone through the three life cycles necessary to confirm its eradication.

10 It should also be noted that because of it's free status Chile, is very strict in terms of letting fruits from other countries with Medfly problem.

11 Currently Japan only permits Chilean grapes and kiwis. It is hoped that the prohibited fruits (apple, pears and citrus) will soon be allowed access under this new status enabling Chile to be one of the first countries to gain a foot hold in the Japanese, South Korean, Chinese, and Taiwanese markets.

Both cases illustrate that trade benefits will result if a country or region can be declared free of a disease or pest and maintain this status. To do so countries need good infrastructure, particularly in the area where they are in the process of developing regional zones that are disease or pest free. This is because not only is the verification process lengthy and costly, but ample evidence needs to be provided that assures importing countries that these regions are likely to remain free of a certain disease or pest. In the case of plant pests a year of trapping data is needed once a disease free region has been proposed. US-APHIS upon recognizing the difficulties of this for many countries have worked closely with several countries (Uruguay, Argentina, and Chile) in the development of disease free areas. This is not always for altruistic reasons, but rather from recognition of the benefits and from realization that aid will help minimize unforeseen outbreaks in the US. Table 4 lists the current surveillance and control programs that APHIS has undertaken to aid foreign countries in the eradication on pest and disease in livestock.

Table 4: Surveillance and Control Programs.

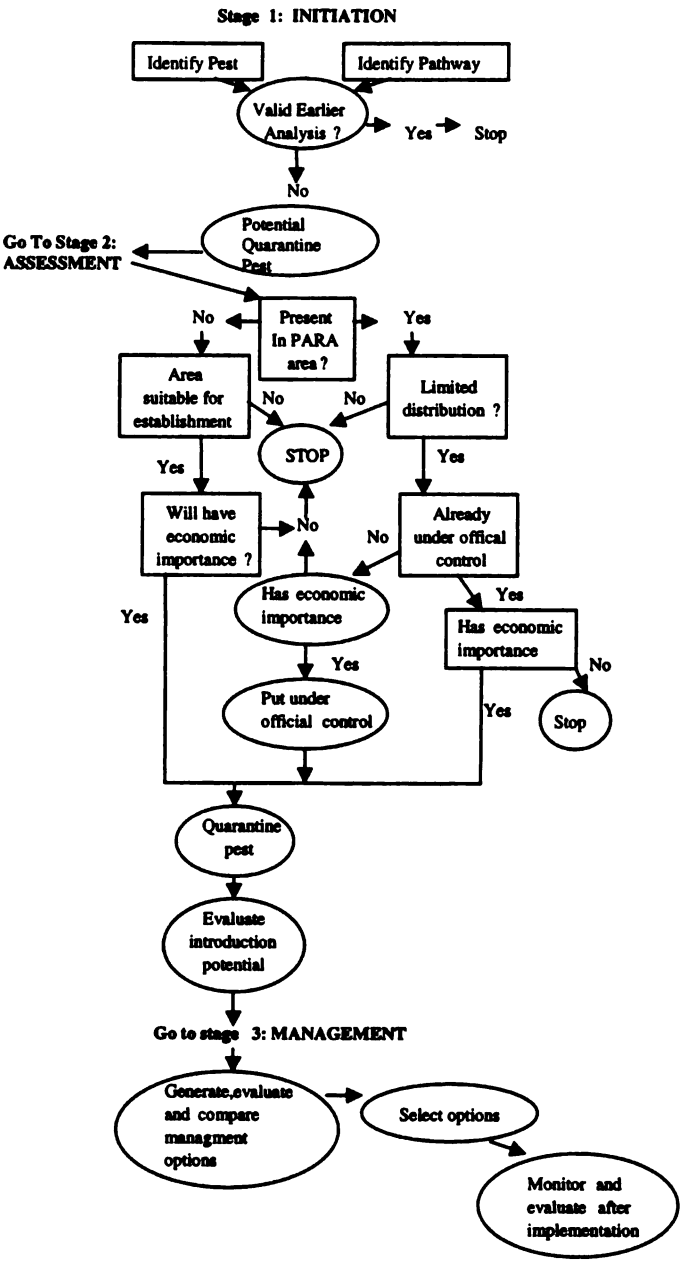
DISEASE OR PEST	PROGRAM ACTIONS	LOCATION
Mediterranean fruit fly	Sterile-fly barrier, surveillance	Mexico, Guatemala
Mexican fruit fly	Surveillance, suppression, quarantine, regulations	Mexico
Boll weevil	Surveillance, control/ eradication	Mexico
Exotic pests	Technical assistance for cooperative surveys	Worldwide
Hydrilla	Release of triploid grass carp	Mexico
Screwworm	Eradication (release of sterile flies, surveillance, quarantine	Mexico, Central America, and Panama
Exotic foreign animal diseases	Prevention (education, quarantine, regulations, surveillance)	Mexico
Foot-and-mouth disease	Prevention (education, quarantine, regulations, surveillance)	Central America and Panama
Foot-and-mouth disease	Eradication (vaccination, surveillance, education, quarantine)	Colombia

Source: APHIS 1997.

Risk Analysis

While recognizing the value of a disease-free production system, there is no way to assure a one hundred percent disease-free environment. To enable trade, governments need to be able to objectively assess the risk associated with the importation of plants and animals and their associated products. Risk analysis is a systematic approach to identify and quantify the factors that need to be assessed. A decision tree illustrating this process for pest management is shown in Figure 2. The idea behind the risk assessment process is to give a market the basis for identifying and quantifying potential risks associated with entry of particular commodities and to be able to pinpoint the specific risks concerns such that quick actions can be implemented to reduce the risk to an acceptable level (Thiermann and Greifer 1995).

Figure 2: Decision Framework for Pest Risk Analysis



Source: IPPC 1997.

Part of the reason why this verification process is required is that there is always a possibility of re-infection from adjacent regions. Because countries know the cost that this entails, many have set up inspection stations between infected regions, regions that require vaccination, and disease free zones requiring no vaccinations. For instance figure 3 illustrates that to protect the disease-free regions countries have set up a large number of inspection stations so as to prevent the spread of disease. Recent outbreaks of Hog Cholera in the Netherlands illustrate why this is such a concern. In the last year it has been necessary to kill over 1.5 million pigs from infested herds and 3 million market weight pigs from clean herds. Similar outbreaks of avian influenza in the US resulted in increased border controls between the states of Delaware and Pennsylvania.

Figure 3: Campaign for Eradication of Hog Cholera in Mexico.

Source: Dirección General de Salud Animal, Mexico 1997.

The fear (rational or otherwise) of the impact of potential outbreaks can result in long delays in the approval process. This is particularly true for countries such as the US which allow an official period for public comment. This period may be drawn out depending on the strength of the lobbyist groups' concern over the issue. They may choose to rent-seek and delay the acceptance of a new product as long as possible which will be discussed in more detail in a later section. Clearly though, if it can be shown that there is minimal concern over a potential outbreak, there exists many trade opportunities associated with regionalization. It should also be recognized that countries with advanced veterinarian and plant health infrastructures such as surveillance systems, quarantine and regional control have a comparative advantage in the establishment of trustworthy and effective pest or disease free zones (Thiermann and Greifer 1995).

Increased Interceptions at Ports of Entry

One way to prevent the spread of disease is to prevent infected products from coming into a country. For many countries, particularly in Latin America, the major difficulty in taking advantage of liberalized trade is penetrating the US market and its quarantine system. This is despite the many measures instituted to aid free trade. Given discussions between governments and private investors, it is unclear in some cases whether or not countries will have the opportunity to enter the US market and what the associated costs are. This is particularly true in cases regarding FMD, and protectionist policies on tomato and avocado markets.

Currently, agricultural products with a quarantine-significant pest can be intercepted at the port of entry. If intercepted they are given one of three options: re-export, surrender for destruction, or fumigation. When re-exported they either go back to the market of origin or to another country which does not have the same concern over the presence of a particular pest (Bailey 1995).[12] If fumigated, methyl bromide is the most often used product. A negative side of using this is that under certain conditions it often reduces the shelf life of products or destroys it. This problem specifically occurs in places where fumigation takes place under hot conditions on tarmac such as Miami, Florida. The differences in temperatures in the cooling process results in the sweating of the product which at times ruins it. If fumigation were to take place under controlled cold temperatures the shelf life of the product would be lengthened. In order to sell the products, producers will drop their prices to below market value just so they will get something for the product before it rots. In addition there is a cost associated with the treatment. One importing company in Florida estimates that they spend around $5,000 a month on fumigation and in many cases the end result of this effort is a hundred percent destruction of the product. The third option is to destroy the product. This is rarely done given the costs involved (i.e., an inspector needs to accompany the product throughout the whole destruction process). Thus it is often considerably cheaper to destroy the product through the fumigation process.

For any of the above described functions that occur at the port of entry, costs usually are borne by the middleman as opposed to the producer. In some ports of entry there are a limited number of fumigators. This leads to a near-monopoly situation which can result in high charges and may create bottlenecks at fumigation sites, given that some sites in Florida fumigate only eight containers at a time. The reduction in shelf life of the product after the fumigation process and the need to reduce its price make this process extremely costly to the shipper.

To determine the implications of such liberalized trade between countries with different regulatory infrastructures and the willingness of countries to accept products from countries with unknown health conditions or those products which they claimed lacked credible certificates, Thiermann and Greifer (1995) analyzed APHIS phytosanitary certificates issued and interceptions of reportable pests between 1991 and 1994. They concluded that while the data required further analysis it did not suggest that within the first year of NAFTA that there was any apparent evidence to indicate that either pest interceptions or seizures of illegal plant and animal material have increased.

Analysis indicates that the majority of products coming into the US are allowed entry once fumigated. Currently methyl bromide is the most common fumigant used at the port of entry when an interception for a quarantine pest of significance is needed. It is most often used for treating apples, apricots, asparagus, avocado, beans, cabbage *-brassica oleraceae-*, cactus *-opuntia-*, cherries, *cipollino, ethrog,* garlic, grape, grapefruit, horseradish, kiwi fruit, lemon, nectarine, okra, orange, peach, pear, peas, pigeon peas, pineapple, plum, quince, roselle, tangerine, thyme, chestnuts (unprocessed or shelled), cirus, (frozen unpeeled or frozen peeled), cucurbit seeds (unprocessed, dried, roasted, or salted), cumin (unprocessed, roasted, or ground), fava bean

[12] For instance many of the products re-exported at the port of entry in the US often go to Canada which does not have the same concerns given they do not have the climate to grow many of the products for which there is a concern of potential infection plus they have the cold winters which kill off many of the offending pests.

(unprocessed), and peppers (dried) as to prevent problems with the pests listed in Table 5 (Bailey 1995).

Table 5: Food and Nonfood Products Requiring Methyl Bromide Fumigation Under Domestic Plant Protection and Quarantine Programs (PPQ)

PPQ PROGRAM	COMMODITY(IES)
Corn Cyst Nematode	Equipment, farm tools, etc that cannot be adequately cleaned of soil by steam or high pressure water
Golden Nematode	Equipment, farm tools, etc that cannot be adequately cleaned of soil by steam or high pressure water
Gypsy Moth	Egg masses on logs, pulpwood, firewood, timber, and timber products
Imported Fire Ant	Alfalfa hay; potting and bench soil
Khapra Beetle	Structures (grain elevators warehouses, etc.)
Mediterranean Fruit Fly	Tomatoes
Pink Bollworm	Cottonseed; cotton ling; linters lint cleaner; waste and motes; cottonseed hulls; gin trash; mechanical cotton picking machinery; picking sacks; used gin and oil mill equipment; green edible okra; okra and kenaf seed
Witchweed	Corn shucks and corn cobmeal; string bean; harvesting equipment; forest products (saw logs, pulpwood, stumpwood, etc.); hay and straw; peanut pickers; boxes, crates, equipment, machinery, and used farm tools that cannot be cleaned of soil; soil; witchweed; herbarium speciems; combines

Source: Robert Bailey, Methyl Bromide Phase Out and Its Impact, AID/LAC/DR/RD, Chemonics International, USDA 1995.

Because methyl bromide is considered to be a contributor to stratospheric ozone depletion, its use may have associated impacts on trade. The use of methyl bromide, however, is to be phased out by 2001, with a longer phase out period (2011) for developing countries. This is because it is considered to be a contributor to stratospheric ozone depletion (Bailey 1995). The two main forces behind the elimination of methyl bromide are: 1) the US Clean Air Act, which establishes methyl bromide as an ozone depleting agent that must to be phased out; and 2) the Montreal Protocol, which freezes production of methyl bromide in 1995 at 1991 levels.[13] The longer phase out period is likely to provide Latin American countries a short window of time in which they may choose to capitalize on the exemption which enables them to continue to fumigate during pre-plant and post harvest times. This may be an effective enticement for private sector involvement in these countries who are attempting to get produce into the developed country markets. Clearly this grace period for the developing countries may greatly effect agricultural trade in the short run. (Bailey 1995).

The developed countries such as the US will work intensively to develop low-cost, effective alternatives. Companies that develop such alternatives are likely to have an innovative advantage over companies that use the existing but soon to be phased out technology. Though there exist several alternatives (pesticide dips, phosphine, controlled atmosphere, vapor heat, hot water dips, forced hot air treatment, cold treatments, polywrapping and coating of commodities, and irradiation) they are not as universal as methyl bromide. Of these, the most effective alternative is irradiation. Currently the major restriction in its widespread use has to do with risk perception of consumers.

[13] The Montreal Protocol however does provide an essential exemption for quarantine purposes and the protocol can consider reduction in production rather than total elimination under international regulations and there is no ban on trade of products treated with methyl bromide under the protocol.

Preclearance Programs

Preclearance programs are an alternative method of bypassing the potential conflicts at the port of entry. The advantage of such a system is that it enables the inspection and treatment of products onsite in exporting countries prior to adding transaction costs in situations where the end result may mean no entry or entry at a loss. An additional benefit from the stand point of the importing country is that it prevents exotic pests and diseases from getting into a country at port of entry. US-APHIS has been working with many Latin American countries to establish such programs so that the federal plant protection service works with the local industry representatives to develop a plan to specify what procedures must be taken to ensure that the commodity for export will not carry pests and diseases. The advantage of having such programs for the exporter is that they expedite the process and also reduce the costs associated with cold storage treatment.

An important factor that US-APHIS uses to determine if a preclearance program should be used is whether or not the product is high-volume and poses a significant risk. In such circumstances they will work with the local authorities to try to establish a preclearance program or establish an area free from specific pests. Currently, permanent preclearance programs exist for fruits, vegetables, and flower bulbs destined for the United States from Chile, Argentina, and The Netherlands. All of the costs for operating preclearance programs are paid for by exporters through trust fund agreements that the International Service (IS) branch of APHIS sets up in each participating country. Table 6 lists the currently established preclearance programs by the US.

Table 6: Established Horticultural Preclearance Programs with the US

Country	Commodities
Argentina	Apples & pears
Australia	Apples, nashi pears, pears, grapes
Belgium	Bulb inspection
Brazil	Mangoes (hot water treatment)
Chile	Stonefruit, berries, grapes, cut flowers, fruits & vegetables
Colombia	Mangoes (hot water treatment)
Costa Rica	Mangoes (hot water treatment); papaya
Ecuador	Mangoes (hot water treatment); melons (free zone)
France	Apples
Great Britain	Bulb inspection
Guatemala	Mangoes (hot water treatment)
Haiti	Mangoes (hot water treatment)
Ireland	Bulb inspection
Israel	Bulb inspection
Jamaica	Ugli fruit, cut flowers, papaya & 28 other commodities
Japan	Sand pears, Unshu oranges, Fuji apples
Korea	Sand pears, mandarin oranges
Mexico	Mangoes (hot water treatment); citrus (fumigation or from free zone); apples; peaches
New Zealand	Apples, pears, Nashi pears
The Netherlands	Bulb inspection
Nicaragua	Mangoes (hot water treatment)
Scotland	Bulb inspection
South Africa	Apples, pears, plums, grapes
Spain	Lemons, clementines, Valencia oranges
Taiwan	Mangoes (hot water treatment)
Turkey	Bulb inspection
Venezuela	Mangoes (hot water treatment)

Source: APHIS 1997.

Methods Used to Circumvent Trade Restrictions

Governments have acted to circumvent perceived trade barriers in several ways. Much of the following discussion is anecdotal and current efforts are being made to further document some of these described cases. These examples are useful in illustrating ways in which sanitary and phytosanitary regulations are used inappropriately to affect trade in livestock, meat, fruit and vegetables. Specifically, many countries are concerned that as tariffs are negotiated away, there is enormous potential for and perhaps widespread misuse of technical measures as non-transparent obstacles to trade, even when the broad desirability of lowering risks to health and safety is acknowledged and despite the new (and as yet untested) international rules (Orden and Roberts 1997). This concern is not unjust. For instance, USDA has estimated that approximately $434 million US dollars of their market share in Latin America (Central and South America) is currently threatened or denied because of questionable plant health requirements. Also a smaller amount (12 million) of US trade is either threatened or denied because of animal health concerns, and a larger amount ($843 million) due to food safety barriers (Roberts and DeRemer 1997). Other countries are also facing similar concerns.

SPS Measures that Triangular Trade Circumvents

Because of the difficulties in providing enough evidence to demonstrate that a country is disease-free, or has a region from which exports can be traded from that is disease free, it has been suggested that in several instances countries have chosen to participate unofficially in a form of triangular trade. Instead of exporting directly to a country which prohibits the importation of a particular product, a private exporter may first go through a third market and then into the country which prohibits importation from the country of origin. Such claims are difficult to track. It is clear that tropical fruits coming from countries like Canada into the US are likely to have originated elsewhere, but it is unclear for many of the other products. Anecdotal evidence suggests that triangular trade occurs in the following places:

- Rice – Vietnam - (Argentina, Uruguay, or Nicaragua)– Mexico
- Rice – Thailand- (Argentina, Uruguay, or Nicaragua)– Mexico
- Hass Avocados – Mexico – Guatemala- US
- Garlic – China-Guatemala-Mexico

If such type of trade occurs it may be difficult to control disease coming from countries not suspected of having a problem. This may wreak havoc in disease free zones. Currently data analysis does not support the idea that such type of triangular trade occurs.

Linkages Between Commodities Associated with SPS Measures that Appear to be of a tit-for-tat Nature

It has been suggested that some countries may use SPS measures to protect their domestic industries. Thus, though blockages in trade are supposed to be transparent and equivalent, it appears that in some cultures, there are linkages to SPS issues that may not be technically justified (or even closely related). For instance the blockage of sweet cherries in 1992 from the US into Mexico seemed to be closely linked to the decision of whether to import Hass avocados into the US from Mexico.

Until 1992 US sweet cherries entered Mexico under a licensing system which was lifted as a result of Mexico's accession to GATT. At this time *Sanidad Vegetal* in Mexico raised phytosanitary concerns over sweet cherries. They required methyl bromide fumigation to eliminate apple maggot, oriental fruit moth, and plum curculio. APHIS suggested that there was no direct risk of such pests to Mexico since Mexico did not have a large sweet cherry production area. *Sanidad Vegetal*, however claimed that it posed a risk for other horticultural resources such as peaches and plums.

The US has suggested that the delay Mexico has used is due to an apparent link with the proposed ruling on the importation of Mexican Hass avocados from the state of Michoacan into the US.

This is interesting given that Mexican Hass avocados have been prohibited from the US since 1914 when the US plant health officials identified avocado seed weevils in the Mexican orchards as pests of quarantine significance. The basis of the ban, was the likely presence of Medfly and Stem Borer in avocados that would bring harm to US agriculture if introduced. In the early 1970's the Mexican government requested approval for the exportation of avocados from the states of Michoacan and Sinaloa. Between 1990 and 1992, Mexico submitted three different work plans under which avocados grown in Michoacan could be imported into the US, and by July 1993 entry of these avocados was granted under certain conditions. In July of the following year the Mexican government formally requested that Hass avocados be allowed into north-eastern US.

Strollo (1997) suggest that the main reason for the stalling was potential risk of Mexican avocados to domestic avocado growers in the US who currently have a monopoly over the American market. This is because Mexican avocado yields are higher than those grown in California and are about half the price on the world market than those in the US. This is partly because of the better climatic conditions for the growth of avocados. Lower wage costs result in a price differential of $30 a box for California avocados compared to $8 a box for Mexican avocados sold in Canada.

After two years debate and an attempt by the California Avocado Commission to block the rule, the ruling was changed.[14] On July 3 1995 USDA published a proposed rule, which allowed fresh Hass avocados from the Mexican state of Michoacan to be imported into nineteen US states and the District of Columbia under certain conditions. Though public comment officially ended on October 6 1995, APHIS did not publish their rule in a timely manner. In response to this delay the Government of Mexico threatened to take action in the context of either NAFTA or WTO dispute. This in part was because it showed that the US would not be a leader in the eradication of trade barriers and the concern of other industry officials that if this were not to change then Mexico and other countries in the future may adopt similar standards against US wheat, apples, peaches, and cherries.

It is difficult to say if the above represented retaliatory linkages in the precise sense, but somehow it appears to be tied together for some reason -- most likely political. If this is so it should be pointed out that this concept of linking issues can cause numerous problems, making little problems grow beyond their proportions. It is recommended that the promotion (or at least discussion) of a principle on non-linkage might help to dissuade the common tit-for-tat problem solving that seems to be common in SPS.

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Use of Seasonal SPS Measures

It has been suggested that when a crop comes into season some countries implement SPS measures to prevent the importation of a product and reduce competition within their country. This tends to be more of a concern with north to south trade, than the other way around. This is because for countries where the seasons do not coincide, countries benefit from across the hemisphere trade. In these countries there is little concern about such trade for technically there is a lower likelihood that pests can become established in countries with cold winters. For the countries of Latin America there is a much lower demand for out of season produce and thus there may be a larger concern for the reverse type of trade.

Many exporters complain that in times of domestic shortages customs ease importation regulations on products and, in times of high domestic production increase the requirements on the importation of products. Such restrictions act as non-tariff barriers establishing the flow of imports

[14] Until that time only processed avocados were allowed to enter the US from Mexico.

to stabilize the domestic market. Customs agents discourage entry of goods by inspection scheduling, by varying interpretations of the inspection requirements and by delaying or expediting the handling, shipping, and processing of papers. Anecdotal evidence indicates that the US suggested that Mexico's oranges had citrus canker when Veracruz was expecting a bumper crop. It has been suggested that many of the countries in Central America prevent rice from entering under similar conditions. It is difficult and expensive to prove such allegations.

Politically Based SPS Restrictions

The above cases illustrate potential methods which governments may use to circumvent problems associated with SPS concerns. Why is this necessary? As opening up of markets changes patterns of trade these changes cause competition with domestic producers in the more industrialized countries and lobbyists attempt to rent-seek and block entry of foreign producers providing cheaper imports.

Producers in Florida have complained about the importation of tomatoes from Mexico. They claimed that Mexico was dumping tomatoes in the US at less than their cost of production. Florida tomato producers then put pressure on the Clinton administration to impose tariffs on Mexican tomatoes if prices were not raised or quotas agreed on.[15] Franco (1997) suggests that the real problem is that Mexico produces a superior product to the US at a cheaper price because their climate is better for growing tomatoes and because they use more advanced technology than the Florida producers. In 1996 the International Trade Commission ruled that the Florida tomato producers were not being substantially hurt by the Mexican producers. The Mexicans in response chose to set an agreed upon price floor and the US Commerce subsequently dropped their anti-dumping case.

One of the outcomes of the problems with US tomato producers attempting to block Mexican tomatoes was a change in the number of APHIS inspectors at the port of entry. Unofficially it has been suggested that the tomato lobbyists persuaded APHIS to increase the number of inspectors at the main port of entry in Florida. A perhaps unintended consequence of this was that newly trained inspectors noted lepidopterous eggs, a kind of caterpillar in asparagus coming from Peru. Though almost certainly harmless (they are unlikely to germinate) the result has been that thirty percent of the asparagus coming from Peru is fumigated. This reduces the shelf life of asparagus to three to four days. In order to clear the market in this short window of time the price is dropped from around eighteen dollars to four dollars a box.

Historically many countries have protected domestic institutions for political reasons (import-substitution and export subsidies or export enhancement devices). Most countries would be reluctant to admit to the continued use of such practices. In the long run such policies can be devastating to a country interested in following an export oriented growth strategy. Other countries use export subsidies and controls in an attempt to deal with the problems of agricultural surpluses. It has been suggested that Argentina, Peru, Venezuela, and Colombia have protected their local banana producers and implemented phytosanitary regulations against Ecuador, the largest banana producer in the world. These countries claim bananas are a host to fruit flies. However, bananas are not host to fruit flies; it is the leaves that harbor the insects. These regulations tend to be lifted when countries have bad harvests.

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[15] Part of their argument was based on the feeling that the American Marketing Agreement does not extend its packing requirements to imported tomatoes thus Mexico has a comparative advantage in that they are able to put different size tomatoes into a box to prevent damage to vine ripe tomatoes. This is in contrast Florida producers who are required to pack their green tomatoes in bulk to make it easier to fit into a box.

Managing Trade Disputes

If any of the above occurs or is believed to have occurred it is likely to result in a trade dispute. The structure of WTO is arranged so that a formal process can be followed so that complaining parties can demonstrate alternative treatments and practices exist when health requirements seem unnecessary. The process reduces trade distortions and ensures that health regulations of importing countries are met.

Such violations of the WTO can be brought to light through a dispute settlement process within GATT. These dispute settlement panels are set up to consider the allegations of violations of GATT provision and usually consist of three GATT member representatives chosen by consensus of the parties involved in the dispute. Occasionally outside experts may serve on the panel. Emphasis, is placed on resolving technical disputes and for complaints at a technical level, the challenging party has the burden of proof. The panels are considered advisory and if a panel concludes that a SPS measures is in violation, the country has the option of changing the inconsistent measure or keeping the measure while being subject to sanctioned retaliation. As of now only five cases have been brought forth: 1) sweet cherries brought to NAFTA by the US against Mexico; 2) copra brought to IPPC by Pakistan and Seychelles; 3) varietal testing of apples to WTO by US against Japan; 4) New Zealand apples into Japan; and 5) Canada, salmon into New Zealand. Stanton (1997) points out that prior to the formalization of this procedure there were virtually no SPS trade disputes settlements throughout the forty-eight years and the new SPS agreement and dispute settlement understanding may provide more effective dispute settlement resolution mechanics.

Benefits of the dispute settlement process are that it establishes a time frame for each stage of the process, the dispute process points out documentation and authority for complaining parties to retaliate if panel recommendations are not implemented or there is not a mutually satisfactory solution to the dispute. Criticism of the dispute process is that often an acceptable risk level is a decision that cannot be based solely on science and many claim that it should be a public decision. Thus efforts to harmonize towards and internationalize standards often generates criticisms from those who believe that standards should be developed as the floor on which regulatory programs are built. At the same time these same individuals suggest that these standards should not be written to act as ceilings, restricting the ability of countries to limit risk to levels acceptable to their residents.

CASE STUDIES

Eradication of Hog Cholera in Mexico

In Mexico, hogs are second only to beef in livestock production. Part of the reason for its size is is domestic demand, but the main factor is international demand. Currently sixty percent of the production comes from five states - Jalisco (20%), Sonoro (14%), Guanajuato (13%), Pueblo (7%), and Michoacan (7%) (*Dirección General de Salud Animal* 1997). These states produce over 483,500 tons of meat annually. One of the diseases most devastating to the country in the past was classical swine fever. In 1980 Mexico started its program to eradicate this disease. Three types of zones were established to aid in the eradication process: free zones, eradication zones, and control zones. Free zones were those areas free of hog cholera without vaccination. Eradication zones were those free with vaccination. Control zones were those areas where the disease is still present. By 1991 the states of Baja California, California Sur and eleven municipalities in the southern part of Sonoro were declared free of the disease as were the states of Chihuahua and Sinaloa in 1993. The current status of Mexico's zones is shown in Figure 4.

Figure 4: Current Status of Mexico's Hog Cholera Free Zones

Source: Dirección General de Salud Animal, Mexico 1997.

The benefits of having regions declared free-zones are numerous. In 1994 Mexico officially requested that the states of Sonora, Sinaloa, Chihuahu be declared free of hog cholera. Under current rules fresh and frozen pork can enter into the US from Chihuahua, Sonora, Yucatan and Baja California. The eradication of the disease from these states initially came from producers'

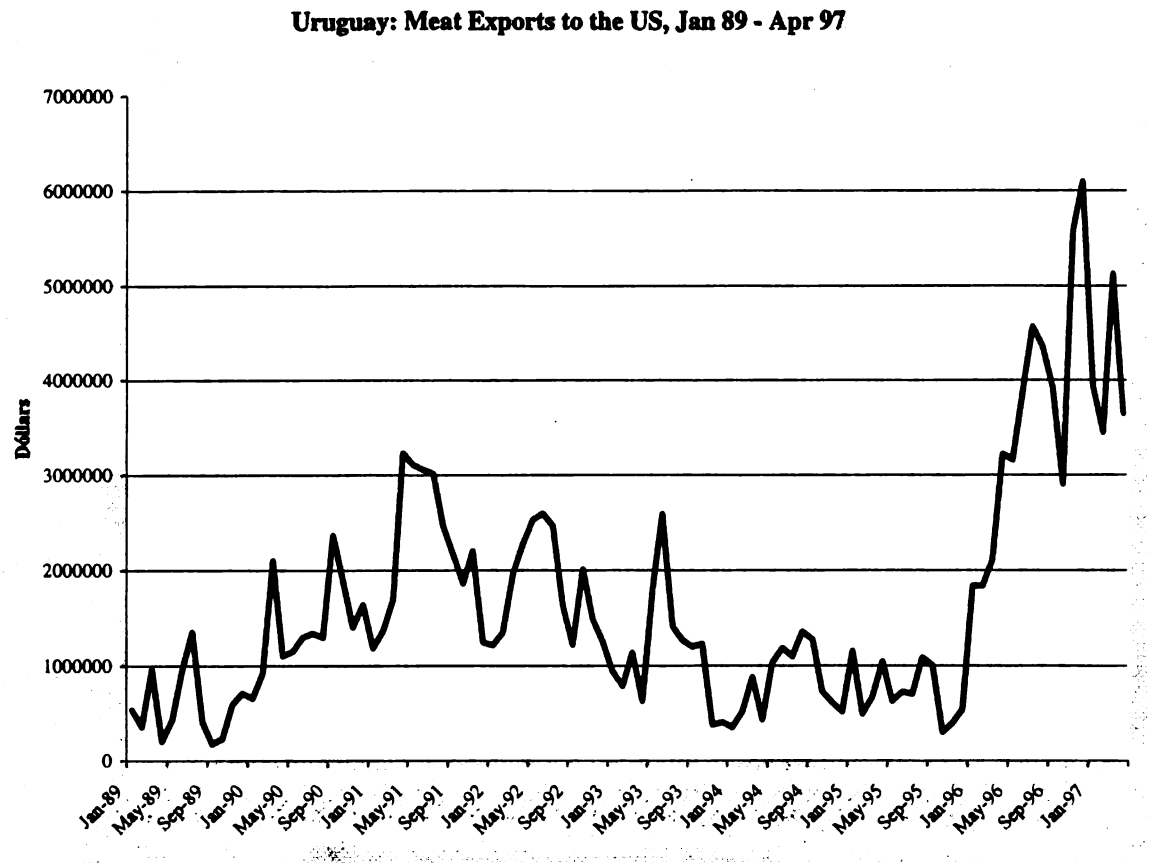
efforts with the aid of government. The classical swine fever campaign in the state of Sonora was financed largely by producer associations which funded epidemiological studies and paid the salaries of accredited veterinarians. Producers in Sinaloa were largely commercial operations that were technically advanced. The Ministry of Agriculture and Water Resources along with the Federal government contributed reagents, provided official veterinarians and gave a course for accreditation in classical swine fever and swine producer to veterinarians. The state government, industrialists involved in swine production, middlemen bringing products into the state and swine producers financed the construction or remodeling of check points for the control of animal movement. The government has become a more active participant and as of 1997 the federal government is matching the funds contributed by the private sector to eradicate hog cholera.[16] The Yucatan case was somewhat different, as there were many small producers. The large producers chose to aid these producers in order to hasten the declaration of the state as free of hog cholera. Currently only pork coming from the Mexican states of Sonora, Baja California, Chichuahua, and the Yucatan are allowed to enter the US under the condition that it is in a leak proof container sealed with a serial number that has been approved by APHIS. It is believed that these shipments pose minimal risk of introducing hog cholera into the US domestic herds.

Eradication of Foot and Mouth Disease in the Southern Cone of the Americas

Several countries in the Southern Cone of the Americas have programs underway to eliminate the virus responsible for FMD. In 1993 Uruguay and Patagonia declared themselves free of the disease and in May of 1993 the European Community decided to permit the importation of bone-in beef and offal without heat treatment from Argentine territory below the 42nd parallel, which included most of Patagonia. As Hayes (1995) notes, there is a big difference between self-declaration of FMD-free status and acceptance of FMD-free status by zero-tolerance countries such as the US and Japan. Uruguay stopped vaccinating for FMD in 1994 after four years without an outbreak. In 1995 APHIS in the US recognized Uruguay as free of FMD, but because it shares a common land border with Brazil and Argentina which are currently not free of FMD they must meet additional certification requirements to ship fresh or frozen beef to the US. Currently they ship fresh and frozen beef to the US. The US requires a country to go without vaccinating for twelve months before it can petition USDA to export fresh beef to the US. In June of 1995 they were classified as a low-risk region for FMD. Figure 5 below illustrates the growth of Uruguay meat exports to the US from 1989-1997. As can be seen, there has been a tremendous growth in meat products coming from Uruguay since it was declared free of FMD.

[16] The total by the federal government is 5,775 while the producers is 5,268 compared to only 3,553 by the state government (Comisión Nacional de Sanidad Agropecuaria 1997). Further in some states such as Aguas callentes, Guanajuato, Jalisco, Michoacan, Nuevo León, and the Yuctan, the majority of the funds come from the producer organizations.

Figure 5: Growth in Uruguay Meat Exports to the US.



Source: FATUS, 1997

Argentina as of May 29, 1997 was also declared free of FMD with vaccination.[17] The Government of Argentina and the private sector aided in this eradication. It is expected that Argentine's exports of processed beef will drop and chilled and frozen meat products will increase. It is also expected that exports of high quality beef cuts could expand in some of the ninety-four markets where Argentine beef currently is going. However, not all these markets will necessarily accept the meat from Argentine until the country is declared fully FMD-free, as Japan, which has already indicated that their importing policy is one of zero risk.

Certification as FMD-free would allow these southern cone countries to be able to ship fresh, chilled, and frozen beef to countries such as the US and Japan that have historically had zero-tolerance for the disease. Since 1996 it has been possible for countries with low-risk regions to be eligible to export to the US. Under the GATT agreement with the US, these countries are able to ship 20,000 metric tons of tariff-free beef to the US (Hayes and Clemens 1995). It has been suggested that freedom of FMD does not necessarily mean that the US will automatically allow countries without outbreaks of FMD to export fresh, chilled or frozen meats to the US. Meat products can be shipped into this market if they have been commercially heat processed or cured according to APHIS standards however.

[17] There had been no report of the disease in the last three years and if in three more years no outbreaks occur the country can be declared free without vaccination Some regions such as Mesopotamia, which is surrounded be rivers may be able quit vaccination before then (APHIS 1997).

Screwworm Eradication

The screwworm eradication program is one of the most successful disease eradication programs that illustrates the importance of cooperation. This program started in the US using a sterile-insect technique which has spread down to the southern border of Panama with the aid of US-APHIS and other countries in between. In 1966 screwworm populations were eliminated from the US (APHIS 1997). Soon afterwards a barrier zone of sterile flies was set up along the 2,000-mile-long U.S.-Mexican border to prevent reinfestation from Mexico. In 1972 the United States-Mexico Joint Commission was formed between Mexico and the United States with the goal of eliminating the pest from Mexico. This was accomplished in 1991 and pushed the barrier to the Isthmus of *Tehuantepec*, just north of Guatemala. In 1994 it was eliminated from Belize and from Guatemala and El Salvador in 1995. In addition, Honduras is considered technically free, with no pest detections since January 1995. The current goal is to aid the rest of Central American countries in eradicating the fly.

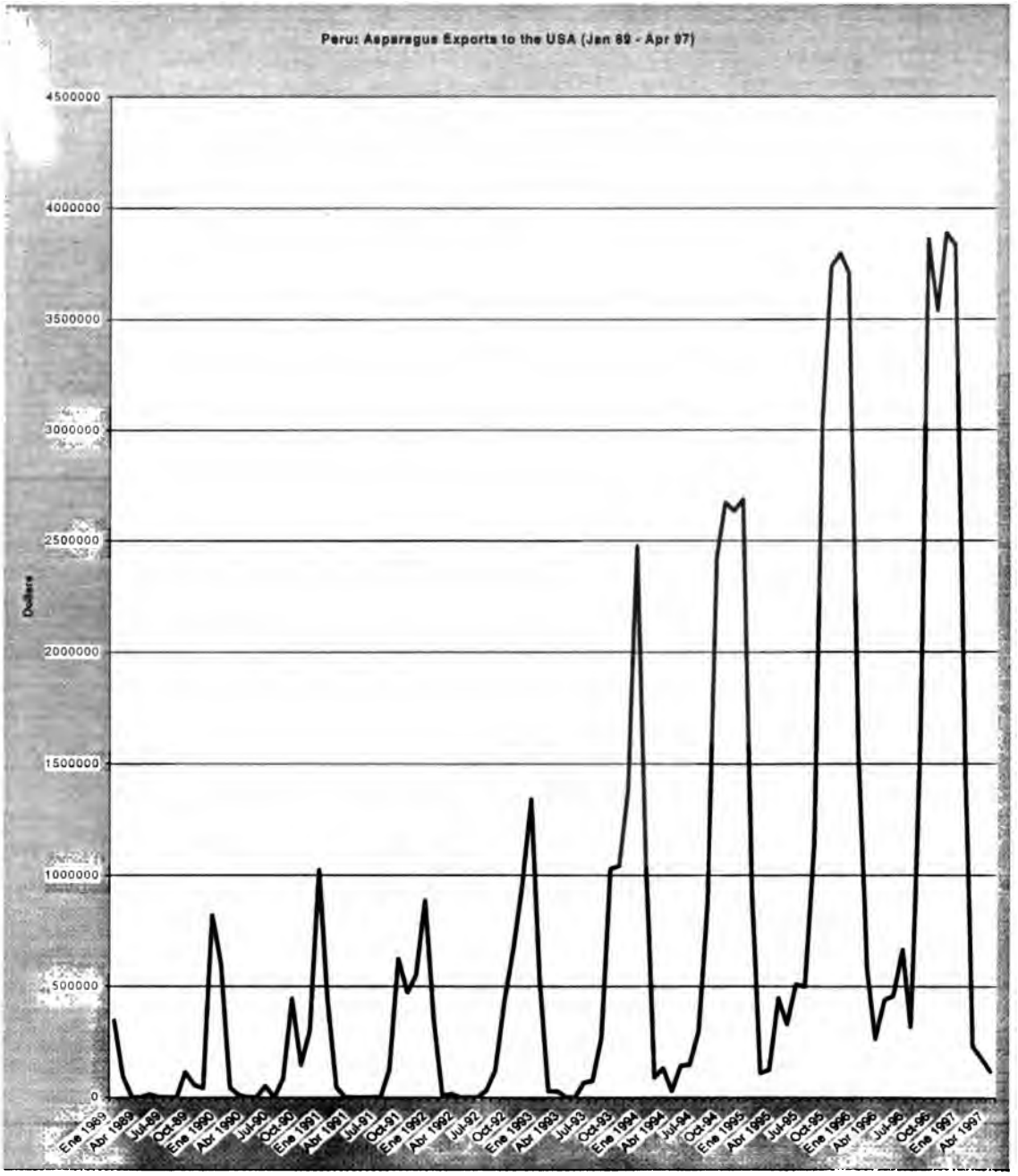
Screwworm larvae, which are native to the tropical and sub-tropical areas of North, South, and Central America, cause great damage by entering open wounds and feeding on the flesh of livestock and other warm-blooded animals, including humans. Currently millions of sterile screwworm flies are raised in a production plant located in southern Mexican State of *Chiapas*. The introduction of sterile flies results in unsuccessful matings and eventual extinction of the species. The benefits of the eradication in terms of exports is yet to be determined.

Peruvian Asparagus

The last case we would like to comment on is a case when an importing country may also impose sanitary and phytosanitary standards, due at least in part to a lack of technical understanding. For instance, a country may prohibit entry of a shipment if an unknown pest is found at the port of entry. (For example recent rejections of caterpillar eggs requiring fumigation). This pest might not be an economically significant threat, however if inspectors can not prove or disprove this the products will not be allowed entry or entry only with fumigation [Kroehle 1994 #32].

Asparagus currently is the second largest Peruvian export, rising from approximately 4,000 metric tons of canned asparagus in the early 1980s to 127,6000 metric tons in 1997 and fresh asparagus to attain 180,000 metric tons (FAS Attache Reports 1997). Part of the reason that it has been so successful is that the product grows well in the irrigated coastal valleys of Peru can be produced year round. Peru produces asparagus for two different markets. Green asparagus, thirty-five percent of the total production is sent fresh in five kilo boxes to the US. Most of these is produced in the Ica region. White asparagus on the other hand is exported processed in cans or jars to Europe. Most of this is produced in the *La Libertad* region. Recently two cases of botulism caused by the consumption of canned Peruvian asparagus were reported in Spain. Though of concern, the major concern of the future of Peruvian asparagus is over the recent requirements for fumigation of much of the asparagus exports to the US. It is unclear what the impact of these new requirements will be on future growth of the industry Figure 6 illustrates the rapid and seasonal growth in asparagus for Peru since 1989.

Figure 6: Growth in Peru Asparagus Exports to the US.



Source: FATUS

THE NEED FOR ADEQUATE INSTITUTIONAL SUPPORT FOR MONITORING AND ERADICATION OF PLANT AND ANIMAL DISEASE

The examples discussed earlier highlight the importance of institutional support to identify and eradicate diseases and facilitate the acceptance by importing countries that certain regions are indeed disease free zones and can remain so. Institutional support for disease control is necessary as modern technology has increased the threat of international transference of diseases and pests. Much of this growth comes from productivity and changes in the structure of many industries to intensive mono-crop and mono-animal production in many parts of the world. This creates a situation where disease can be highly transferable and devastating if not isolated. This is particularly evident in cases where small farmers and backyard producers fail to eradicate disease and their proximity to larger scale operations creates potential for constant re-infection. (This is a particular problem in less developed countries). There are additional problems for countries lacking storage facilities. This is essential for the export of meat since the chilled or frozen form can provide a medium for the preservation and transport of a wide variety of infective agents. Most developing countries do not have the technical capacity to enable them to combat outbreaks within their own boundaries. Since there is a known set of livestock diseases for which treatment methods have been developed, the provision of support in the control of livestock diseases has been a long-term policy for most countries. Such an approach is not as easy to duplicate for phytosanitary control. This is because less is known about the complete set of plant diseases particularly in the tropical regions of the world such as exsist in many of the Latin American countries.

A suitable infrastructure is necessary to guarantee effective reporting and monitoring in the arena of regional disease eradication. By participating in the standard setting process for regionalization, Latin American countries may be better able to ensure that their producers can export products to previously unexploited markets. This is important as producers may find alternative ways to provide the veterinarian services necessary to supervise and maintain the clinical and epidemiological surveillance and carry out the necessary diagnostic tests with limited resources through the use of internationally accredited veterinarians. Recognition of the need for similar monitoring and control with regard to plants has resulted in the current move to develop standards for accrediting plant inspectors by the North American Plant Protection Organization (NAPPO).

Sound institutional support is crucial as even strict phytosanitary regulations do not ensure that there is no risk of cross-border contamination (i.e., pests and diseases do not recognize national borders). This is because many governments in developing countries have few resources to stop the introduction of pests and diseases because of the large amount of uncontrolled cross-border trade and legal trade of non-seed plant products.[18] Further it is difficult for them to respond effectively to disease outbreaks to prevent the spread of a disease. The lag time without an existing

[18] Even developed countries have problems. For instance in the US many of the custom agents have mistakenly allowed the importation of pitaya fruit from Mexico because many of the inspectors were confusing pitaya with cactus fruit.

control system can be costly especially when the best method for eradicating the disease may be the destruction of the infected animal (e.g., Newcastle disease in birds and BSE in cattle). Further, with livestock, disease may greatly reduce the productivity of the animals.

As mentioned earlier, eradication of disease does not mean automatic access to foreign markets. For instance, many countries fail to address SPS concerns because of poor institutional support. Lack of an effective *in situ* inspection service creates problems as countries with well-developed infrastructures are reluctant to accept products from countries with unknown health conditions or whose products lack credible certification (Thiermann 1997). This is because it is felt that without the existence of institutions that would enable control of sanitary and phytosanitary disease and identification of pest – free or disease-free regions, it is highly unlikely that such countries will be able to participate in this newly liberalized trade climate. Export certificates coming from these countries are often incomplete. For many countries the existence of phytosanitary certificates are of little value. This creates a problem because quarantine agencies have to inspect and treat imported produce not only because it does not meet specifications, but also because of inadequate certification (Ganapathi 1994). This may create delays at the border which in turn may result in spoilage of the product, prior to clearance.

DECREASED TRADE ASSOCIATED WITH FOOD SAFETY CONCERNS, QUALITY, & LABELING

Not all of the concern over SPS measures is related to plant pests and animal diseases. Some is related to pesticides and pesticide residues in/on food. Specifically, certain environmental groups have expressed concerns that the SPS decision agreement, if signed, could weaken the health and safety standards for foods and foodstuffs and they want trade talks to encourage countries to raise their standards and lower risks from pesticides (Vogt 1992). Many countries already have developed a zero-tolerance policy for certain types of pesticides. For instance, much of the European Community wants neither chemical treatment of consignments nor pesticide residues in imported products. They appear to have a higher tolerance for pests (biotic factors) in their imports and are better able to deal with biotic factors than abiotic factors (Ganapathi 1994).

Human health matters usually are concerned with pesticide residues associated with plant material. The issue of pesticides is crucial because many of the major markets are in the developed countries where there are stringent requirements regarding pesticide residues. Also these countries usually have the technical means to detect miniscule amounts. For instance in the US, in the 1980s, the Food and Drug Administration (FDA) raised pesticide concerns to a higher level of concern. This was not triggered by revelations about negative health effects caused by pesticides, but rather by reports that many pesticide chemicals and inert ingredients in pesticides had not been adequately tested using the most up to date methods (Jones 1992). Further, there are increasing numbers of new food pathogens. For example, between 1973 and 1988, bacteria not previously recognized as important causes of food-borne illness-- such as *Escherichia coli* and *Salmonella enteritidis*--became more widespread. There is increasing public awareness and concern about the health effects of chemical contamination of food, for example, the effects of lead on the nervous system. Another important factor is that the size of the food industry has grown tremendously, both in the amount of domestic food manufactured and the number and kinds of foods imported.

In part the increased concern over pesticides is in response to the increased concern in the eighties in the US over the health impact of pesticide residues on foods. At this time the US FDA increased its monitoring of food imports. With this increase in monitoring of food, snow peas were found to be Guatemala's most serious violator, leading to automatic detentions. For Guatemala this was extremely difficult as in the last ten years there had been a tremendous investment in the production of snow peas, a non-traditional agricultural product in Guatemala. Most of this increase came from around 8,000 to 10,000 small farmers on farms typically less than two acres (Thrupp 1995). These farmers were organized into associations and cooperatives to share the costs of production and marketing. Through a system known as satellite farming, export companies would advance the seeds, fertilizers and chemicals to the farmer who would pay for them when the crop was harvested selling the crop to the exporter. However the exporter had the option to refuse to purchase the crop on delivery if its quality would cause rejection at the US port of entry. Unfortunately, as indicated by Weinberg (1997), when production was introduced to Guatemala, pesticides were also promoted as a way to ensure a high yield and an unblemished product for the US market. With the increased rejections at the port of entry, large export companies began to

work more with large farmers. In 1992 the FDA set up an automatic detention program for snow pea imports from Guatemala. Under the program Guatemalan growers or exporters were required to present a valid certificate from an independent laboratory at the exporter's expense, showing that the produce met all US pesticide regulations before the product could enter the US. If this procedure is successful for five consecutive shipments the exporter will be able to ship freely, subject to typicallt US periodic sampling tests. Since this law was implemented only eight of the twenty-eight exporters have been exempted from this automatic detention process for snow peas, illustrating that changing pesticide use is not easy. A study done by Hoppin (1991) indicated that the relationship between the exporter and grower was an important determinant of pesticide practices and that growers associated with companies having better resources and extensive US contacts used pesticides in ways less likely to violate US residue limits than did members of cooperatives or more independent growers.

Guatemala is not alone with this rejection of products. In the last twenty years, the volume of imported goods the Agency regulates has tripled from an estimated half million shipments in 1971 to about one and a half million today. Whereas in the mid-1970s an FDA inspector might inspect one or two bulk shipments of rice or coffee beans, today's inspectors might inspect five, ten, fifteen, smaller, shipping containers packed with as many as fifty different finished products (FDA, 1997). The inspectors look for signs of filth, spoilage, contamination, or mislabeling. For instance, in a shipment of canned tuna, they check to see if the manufacturer is registered with FDA; make sure the labels are printed in English and conform with other FDA requirements about weight declaration, contents, and so forth; and spot-check for swollen, leaking or rusty cans, wet cases, or swarms of insects around cases (which may indicate damaged cans). When checking seafood, they look for signs of parasites and for evidence of thawing and decomposition. If a problem is found or suspected, the shipment is held and a sample is collected for analysis.[19] To aid in the inspection process, the FDA also issues alerts to its district offices containing the names and descriptions of products, shippers or importers that have repeatedly been found to violate FDA laws or regulations. The import alerts signal FDA inspectors to pay special attention to a particular product when it arrives in port and, in certain cases, to detain it automatically. The FDA currently has 345 alerts on products and importers (FDA, 1997). For the Americas there are 43 such alerts as listed in Table 7.

[19] To aid in surveillance, FDA has entered into agreements with foreign governments to ensure that their products are manufactured under sanitary conditions, meet U.S. standards for quality, and are tested and sampled in a specific way before leaving the country. Currently, FDA has nine agreements with countries that export shellfish to the United States to ensure that the shellfish are raised, processed, packaged, and shipped properly.

Table 7: Automatic Detentions.

Country	Product	Reason
Argentina	Garlic	Mold
Bolivia	Herbal teas called "Health Inca Tea" and Bolivian herbal tea	Poisonous or deleterious substance; cocaine
Brazil	Black Pepper	Salmonella
	Cocoa Beans	Live Insects
	Honey	Adulteration with corn or cane sugars
Canada	Fava beans	Product contains the undeclared food additive calcium
	Garlic	Mold
	Carbonated Diet Soft Drinks	Essiac and products containing Essiac, such as herbal teas and drinks
	Clenbuterol (All forms)	Unapproved new animal drug may leave residue in food animals
Chile	Frozen Langostinos	Staphylococcus Aureus E. coli/coliforms
	Abalone-like shellfish	Decomposition
Costa Rica	Shark and Tuna, all edible species, fresh or froze filets and steaks;	Methyl Mercury
	Canned Jalapeno Peppers	Clostridium botulinum (botulism)
Dominican Republic	Frozen, raw, and cooked conchmeat;	Decomposition
	Coumarin in vanilla products (Extracts flavorings limitations);	Presence of coumarin, red dye # 2, and labeling and/or standards violations
	Guanabana (soursop) drinks, juices, nectars, etc.	Toxic material from the fruit seeds was incorporated into the finished product during the manufacturing process;
	Raw Agricultural Products	Illegal Pesticide Residues
	Agricultural Products for Pesticides	Illegal Pesticide Residues
	Mahimahi (dolphin) raw, fresh or frozen, including fillets	Decomposition, Histamines
	Shark and Tuna, all edible species, fresh or froze filets and steaks	Methyl Mercury
	Multiple - seafood	Salmonella
El Salvador	Cheese and cheese products (all types)	Escherichia coli; Salmonella; Staphylococci aureus
	Multiple - seafood	Salmonella
	Raw Agricultural Products	Illegal Pesticide Residues
	Processed Foods	Illegal Pesticide Residues
Haiti	Coumarin in vanilla products (Extracts flavorings limitations);	Presence of coumarin, red dye # 2, and labeling and/or standards violations
Honduras	Multiple - seafood	Salmonella
Jamaica	Ackees - all product types including canned, froze raw, dried, etc.	This product appears to contain poisonous and deleterious substances, namely hypoglycin-A and hypoglycin-B, which may render it injurious to health
Mexico	Shark and Tuna, all edible species, fresh or froze filets and steaks	Based on new data on the consumption of shark and the toxicity of methyl mercury
	Multiple - seafood	Salmonella
	Tamarind (fresh and/or processed) and Tamarind Products	Filth (including: insect, rodent, bird, cat/dog, human, mold and ot
	Frozen Guacamole and Avocado Pulp (Paste)	Some lots have contained Listeria monocytogenes, a poisonous deleterious substance, which may render it injurious to health
	Pumpkin seeds and pumpkin see flour Pumpkin seed flour	Aflatoxin
	Dried Peppers (Guajillo, Cascabel, Chili, Arbol, Ancho, Cariba, et al.)	Mold
	Hot Pepper Sauces	Rodent filth, bird filth, and insect filth
	Sesame Seeds	Filth; because of insect adultration
	Coumarin in vanilla products (Extracts flavorings limitations);	Presence of coumarin, red dye # 2, and labeling and/or standards violations
	Guanabana (soursop) drinks, juices, nectars,	Toxic material from the fruit seeds was incorporated into the finis product during the manufacturing process
	Honey	Adulteration with corn or cane sugars
	Mole Paste and Mexican Hot Sauces	Adulteration with rodent filth, cat and dog hair, insect filth, mites and human hair
Peru	Herbal teas called "Health Inca Tea" and Bolivian herbal tea	Poisonous or deleterious substance; cocaine
Venezuela	Frozen clams and frozen oysters	Salmonella; Coliforms
	Shark and Tuna, all edible species, fresh or froze filets and steaks	Methyl Mercury

Source: FDA Website, 1997.

As technological advances are made in the field of microbiology, toxicology, and epidemiology, the enormity of food safety issues has become more apparent (Stenholm and Waggoner 1992). Thus parts of the food industry and the regulatory and scientific community have found it necessary to look to other methods to limit the amount of contamination in foods. In the US, the Hazard Analysis Critical Control Point System (HACCP) is employed (as of 1996) to minimize the chance for contamination or error in the processing of products.[20] This system enables government compliance agencies to focus their increasingly limited resources on those areas or periods, be they geographical, seasonal, class of livestock or protein source, or type of market, where the risks to public health and safety are the greatest. Stenholm and Waggoner (1992) note that although there is mounting agreement that food regulations should be harmonized, there is a natural human reluctance to make changes unless there is some stimulus or some expected benefit. For countries that do not have a HACCP system in place, there still is an incentive for them to meet the requirements of this system as US importers of Latin American products have to assure the FDA in the US that they are importing from parties that have HACCP equivalent programs in place (Bailey 1995).

Other areas closely linked to SPS concerns which impact fair trade are quality and grading standards. These standards are descriptive and have been used largely to provide a uniform language that producers, marketers, exporters, and purchasers can use to communicate the quality and condition of the product being sold. Quality and grading standards usually do not involve significant enforcement. SPS concerns may become more indistinguishable from quality and grading standards as countries place greater emphasis on food safety concerns. Unfortunately, these quality concerns often have been linked to economic and political concerns that also restrict trade based on grading standards (Kroehle and Weinberger 1994). The International Standards Organization (ISO) is charged with establishing voluntary quality standards. In the US, the Agricultural Marketing Service (AMS) provides services for the inspection, grading, and certification of products. By grading and certifying agricultural products, they are responsible for identifying whether or not products meet certain standards and are eligible to be traded. In some cases, grading of a particular commodity is necessary to meet minimum US import requirements. However, for the most part firms importing agricultural products into the United States voluntarily use grading services. This is important as many countries do not have any form of grading standard. Thus, though Mexico currently has no formal national beef grading system, the Government of *Sonora* recognizing (in the seventies) the need for such a grading system so that its producers could access international markets, requires that beef at a retail level be marketed under the state graders system. Similarly in 1995 the state of *Sinaloa* passed a law requiring that beef be graded.

Other countries such as much of the European Union (EU) and Canada have tried to restrict trade based on the use of hormones in the production of livestock. The EU claims that consumers are not interested in buying meat with hormones. One criticism of restricting hormone use as a tool to protect consumers is that European consumers may run greater health risks because of an active black market for hormones that can adversely affect human health (Kotschwar, et al. 1993). In 1988-1989 there was a major confrontation between the US and Europe because of this ban. The main concern of the US was whether this measure was really being used by the European Community to protect the European beef producer from competition. Canada banned the use of the growth stimulant diethyl stilbesterol in the seventies and later banned the use of the hypochlorous

[20] This is a preventive approach used to bring potential dangers to the attention of management early so corrective action can be taken. This system involves the following seven steps: 1) analyze hazards; 2) identify critical control points; 3) establish preventive measures with critical limits for each control point; 4) establish procedures to monitor the control points; 5) establish corrective actions to be taken when monitoring shows that a critical limit has not been met; 6) establish effective record keeping to document the system; and 7) establish procedures to verify that the system is working consistently. It is felt that this system offers a number of advantages over the current system in that it (a) focuses on preventing hazards from contaminating food is based on sound science; (b) permits more efficient and effective government oversight, primarily because the record keeping allows investigators to see how well a firm is complying with food safety laws over a period of time rather than how well it is doing on any given day; (c) places responsibility for ensuring food safety appropriately on the food manufacturer or distributor; and (d) helps food companies compete more effectively in the world market (FDA 1997).

wash of beef carcasses after slaughtering and splitting (a practice that helped to preserve the meat and improve its color). This ban effectively halted the export of US beef to Canada and the slack was taken up by other countries (Lynham 1988).

EVALUATING SPS ISSUES INTO AN INSTITUTIONAL ECONOMICS FRAMEWORK

This report, attempts to describe the many different ways in which countries have responded to the changing environment caused by SPS concerns. Many questions arise out of these concerns. What policies should a country adopt to eradicate plant and animal pests and diseases successfully depleting scarce financial resources or making it necessary to engage in unfair trade practices? Will it be necessary for the government to be the main agent of change, or can the private sector be encouraged to participate? With these questions in mind, the discussion is focussed on placing the aforementioned issues into an institutional economics framework.

When Should Government Intervene?

Historically it has been argued that the government should intervene to protect consumers from human, animal, and environmental health. The current concept of perfectly competitive markets does not address the inclusion of products that pose potential health hazards. Thus there is a divergence between private and socially optimal levels of food safety (Henson and Traill 1993). Government intervention tends more towards cooperation and supplying public goods such as internationally harmonized standards which rest upon a commonly agreed upon scientific basis (Hillman 1997).

The concept of government intervention presupposes market failures resulting from externalities. The government thus intervenes by providing public goods such as inspection services and basic research to aid in the eradication of plant and animal diseases. Because many diseases, particularly those related to livestock, are a consequence of increased production, they are often called an externality and lead to a market failure. Market failure refers to a situation where the market fails to assign a value to a particular good. When the activities of one economic agent affect the technology, consumption set or preference of another such that the cost is borne by a person other than the one who caused it to arise, it is termed an externality (Zilberman and Marra 1994).

Externalities usually are discussed in relation to pollution but also have been discussed in relation to the provision of animal health services in livestock industries (Umali, Feder, and deHaan 1992 and Brito, Sheshinski, and Intriligator 1990). In the case of animal health services, the potential for an externality to exist has to do with the failure to eradicate a disease from a country, as detailed in Umali, et al (1992). This is because vaccination alone does not achieve eradication of a disease (Spradbrow 1987). In such situations, the supply and demand curves of production goods fail to incorporate all the costs or benefits of disease eradication.

Historically when market failures have occurred, the public sector bore most of the cost by instituting corrective measures or by sponsoring research. This is because private firms were reluctant to participate in such research because they were unable to capture returns sufficient to

cover their research costs. The direction of private research was often biased toward research that was more economically valuable to firms than socially valuable to society. In this case, public research output would serve as an input into private sector research companies and other public non-domestic research agencies. Thus the private sector would be willing to conduct research in areas where they could appropriate the returns, such as 'agribusiness' firms involved in agricultural processing, production, and inputs. Multinational companies could transfer their technology to local subsidiaries and foreign companies that export technology.

This situation often resulted in the under-production of public goods from profit motivated research groups, making it necessary for the public sector to address the problem. However, increasing fiscal imbalances have brought into question the sustainability of research in those countries that have research systems which are predominantly in the public sector. Generally it is acknowledged that the private sector invests in research in areas where it expects the present value of the benefits derived from the research activities to exceed the opportunity cost to generate them. Work done by Pray and Echeverria (1991) indicates that there are cases when the private sector is willing to invest a substantial amount of money in research to develop new technologies for small-farmer subsistence agriculture.[21]

Because many developing countries lack the resources for large-scale public mobilization, there is an increasing need to rely on private sector involvement. This is in contrast to developed countries where there exist established institutions and there is less reliance on the private sector. This is becoming increasingly important as the quality and quantity of trade is increasing for developing countries. Within the livestock arena there exist several accredited veterinarian programs. However, similar programs do not yet exist for plant services. Though not mentioned earlier in this paper some of the regional organizations, the NAPPO, in particular, and the IPPC are trying to be proactive and develop a method for accreditation. Despite little need for their involvement in the accreditation process, several of the developed countries have expressed a desire to participate so that they will be a) satisfied with the outcome; b) assured that they can "trust" the certification process of exports coming from developing countries; and c) involved in the decision making surrounding the type of standards developed for accreditation. Some countries are championing user fees to get individuals or the private sector to bear some of the costs associated with inspection and the granting of phytosanitary certificates.

Market Failures in Relation to Sanitary and Phytosanitary Problems

One of the difficulties in eradicating plant pests and animal diseases is that these problems are often external to the decision making process of the producers (particularly those involved in contract production for large-scale vertically integrated poultry, hog, vegetable or fruit producers) and are rarely incorporated into the operating costs of the production process. In some cases where there are several large producers and many small producers this may also result in a free rider problem in that the small producers may try to benefit from eradication programs sponsored by larger producers. In cases where there are a sizable number of small producers, the few that initially participate may incur significant costs, making it problematic to initiate eradication programs. Identifying SPS-specific externalities and how they effect food safety is difficult. As Swinbank (1992) notes it may be that in certain instances someone may suffer from food-borne disease such that it becomes a health risk for the wider community. This would be a clear case of an externality and market failure and the parallels with the spread of infectious animal disease can be shown. This

[21] In their study of the private seed industry for sorghum and pearl millet in India, they found that private firms spend almost as much on R&D in breeding as the government. Furthermore, there were higher gains in yields from private sector research than the public due in part to the fact that the private sector could focus on regionally specific problems, while the national research centers had to focus on countrywide problems. This broader agenda made it more difficult for the public sector to develop technologies that were regionally specific. This left the private sector a niche which they found profitable to put their own research money into. Because their seeds had higher yields than the public sector they were able to charge higher prices.

section discusses the concept of market failures in relation to sanitary and phytosanitary problems and why governments might choose to intervene to correct this situation.

In the case of sanitary and phytosanitary concerns externalities exist regarding numerous issues. There are four potential externalities in livestock and plant production and processing that, in the absence of regulation, are unlikely to be borne by the producer. The first involves food safety. Specifically the types of pesticides used to ward off harmful pests may result in harmful residues that are damaging to animal and human health. Second, pests and diseases crossing borders in production inputs may spread leading to negative externalities. In some cases, inputs causing externalities remain on import control lists. For instance, some agricultural inputs (e.g., seeds, pesticides, cattle and chickens for breeding, livestock medicines) to introduce externalities and adverse public health impacts. Even countries with liberal import regimes maintain special controls on imports of these items. For such inputs, trade liberalization may involve redesigning import controls to account for externalities. Third, in the case of animal health services, the potential for externalities has to do with the failure to eradicate a disease from a country (Umali, et al. 1992). This is because vaccination alone does not achieve eradication of a disease (Spradbrow 1987). Fourth, there is a chance for the spread of disease from wild animals and tropical forests where it is difficult to control the animal and plant populations. Such difficulties may create chaos in countries which are trying to establish disease free zones.

In principle, governments will intervene in the market when there are externalities to correct for the risk associated with the production of a good which creates a negative effect. An example of this may be when a country is trying to eradicate plant and animal disease from a territory or their whole country. If a country is unable to export their products from a specific region because there are so many backyard producers who do not have funds for disease eradication they may want to intervene. This is because without intervention society bears a cost that may not fully be reflected in the local market price for the agricultural products and inputs used in producing them (Crutchfield et. al 1993). Likewise a government may choose to intervene and vaccinate the whole affected population so that there will be minimal time wasted in reaching disease free-status to enable access to trade. This is especially valid when there are producers that can not or refuse to participate otherwise. When there is a desire for higher levels of food safety, the government may choose to intervene (Kinsey 1993). Swinback (1993) suggests that once income rises beyond a level, capable of sustaining an adequate diet, food safety is likely to show the characteristics of a price-inelastic good (i.e., consumers will be willing to a pay a price premium for a product that they perceive to be safer).

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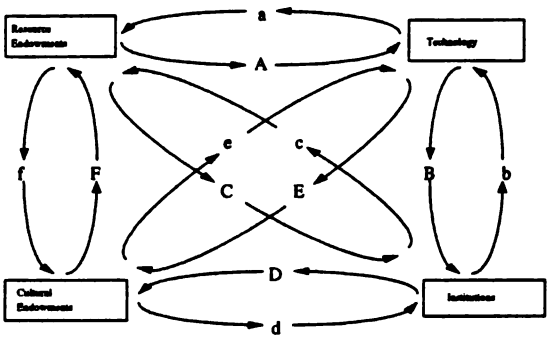
Application of the Induced Institutional Innovation Framework

This section links some of the changes that are occurring in SPS regulations and the induced institutional innovation framework. Many economists have thought that the theories of technology change and transfer tend to treat economic development in a way that forces them to view changes in technology as exogenous to the system (Hicks 1932, Hayami and Ruttan 1985). In the 1960s attempts were made to consider both technical and institutional change as being endogenous to the economic system. Specifically, it was felt that researchers needed to look at technology change as something that was produced by the economic system. Therefore, it became necessary to have a better understanding of the actors involved and the sources of such activities (direct or indirect).

In 1985, Hayami and Ruttan, suggested that the induced innovation hypothesis needed to be altered so that it could interpret shifts in the demand for institutional innovation as also being induced by changes in relative resource endowments and by technical change. The research institutions they examined obtained their resources politically through various buereauctratic mechanisms. In order to understand these mechanisms, they felt that a more complete approach to the theory of induced technical change was necessary. Figure 7 depicts the interrelationships between the important institutional factors.

Figure 7: Interrelationships between Changes in Resource Endowments, Cultural Endowments, Technology, and Institutions.



Source: Hayami and Ruttan (1985) p. 111

The benefit of using this model is that it aids policy makers in conceptualizing the various linkages that they need to be aware of so as to evaluate their continually changing policy options in an informed way. Specifically it explains changes in technology as being predicated on institutional involvement which in turn affects the pattern of agricultural production in different countries. Since the current institutional environment surrounding SPS issues is in flux, it is expected that there will be future technological change associated with plant and animal production, the specifics of which will depend on the producing countries' resource and cultural endowments. It should be noted that because there is constant change there are limits to this model in that it only helps policy makers to identify these linkages, not necessarily to test them (Hayami and Ruttan,1985). For example, the capacity to model and test the relationship between resource endowments and technical change is relatively strong, but the capacity to model and test the relationship between cultural endowments, technical change, and institutional change is weak. Thus when viewing SPS problems with this model, policy makers need to keep this limitation in mind.

This is particularly important as the Hayami-Rittan theory centers around the role market prices play in inducing technological change and fails to include the effect of non-market institutions on economic change. For example, market prices rarely reflect the scarcity of resources due to externalities or other market failures, particularly in the area of environmental quality (Runge, 1987). The existence of market failures suggests that induced institutional innovations can also allow for the relative scarcity of factors to be reflected (Crosson, 1986). Runge (1987) has extended the induced innovation hypothesis to include the possibility that agricultural technology change may affect the quality of factors of production (eg. groundwater and fertility). Thus, the original induced innovation framework needs to be altered to reflect the role of non-market forces such as environmental externalities and regulatory responses resulting in induced institutional change.

The above described framework is useful in conceptualizing the emergence of new sanitary and phytosanitary institutions affecting the production of livestock and horticultural products that are currently being established in many countries as attempts are made to liberalize trade and retard the potential negative SPS consequences. These concerns, since they also affect trade have resulted in attempts to set up uniform institutions through the establishment of primary norms administered through WTO appointed institutions (OIE, IPC, and the CODEX). As to how specific countries implement these norms depends on the current types of technologies they are using, their existing institutions (or institutions that they are members of NAPPO, COSAVE, ORISA, etc.) and their cultural and resource endowments. Because many of the developed countries already have existing institutions the norms at the international level are more likely to reflect the preferences of high-income countries. Many poorer countries do not have the financial resources to implement and enforce regulations. Runge (1994) argues that these different constraints become part of the

production environment, and thus also affect the choices of technology. Thus, in the short run, production may be reduced due to a reduction in economies of scale due to limited technological options.

We suggest a modification of the theory described above. The modification goes beyond looking at innovation in terms of constraints on economic growth being imposed solely by relative factor scarcities. This is needed to aid policy makers in understanding the complex interactions between increased production and sanitary and phytosanitary problems. Given our understanding of some of the institutional mechanisms countries are using to mitigate negative externalities, problems, an alternative multi-stage process of induced institutional innovation put forth by Runge (1987) may be helpful in understanding some of the institutional changes that currently are being implemented to address sanitary and phytosanitary problems. Specifically the changes that have occurred in the livestock and horticultural industries can be looked at in the following stages: (1) the technology change occurred in the various livestock and horticultural industries to meet the increased demand; (2) different countries chose different patterns of growth, expansion of many small producers or intensification; (3) as production expanded market failures in the form of environmental problems and sanitary and phytosanitary problems occured; (4) the effect of these problems, depending on the income of the country, triggers the imposition of regulations and the development of related institutions to mitigate these problems; (5) an effect of these new institutions is the inducement of further change in the development of these industries. The directions that these changes will go in depend on the existing national and international institutions.

Policy Recommendations

A theme of this paper has been that countries may attempt to take short term political gains by implementing barriers to trade disguised as sanitary and phytosanitary concerns. Though this statement may be true it is difficult to document. As noted, only a few cases have been brought to arbitration. If it is true what are the gains? There may be temporary gains achieved by aiding producers. If gains are merely temporary, the question then needs to be asked is why bother attempting to circumvent free trade policies? Theoretically, if producers are efficient then they should be able to compete on the world market in a free trade climate. If they can't compete then they will either be forced to become efficient or go out of business. Thus in the long run, overall consumer welfare is improved under free trade.

Another comment reflects that non-tariff barriers will induce changes in the patterns of trade. This is easier to document. There has been a long history of trade in livestock products coming primarily from countries that are considered free of specific diseases without resorting to vaccination. Only recently with the push for acceptance of products which pose limited risk has this practice changed. Clearly the recent outbreaks of foot-and-mouth disease in Taiwan and bovine spongiform encephalopathy in the United Kingdom have resulted in more trade coming from already established markets trying to take advantage of the misfortunes of these countries. Whether or not this will result in permanent change in these markets is unclear. This in part depends how competitive a country is in terms of not only the productivity of the animal herds, but also the market price, the costs associated with slaughter, transportation, and processing costs to deliver a finished product; government fees and inspection costs; and wage rates throughout the whole process. One country may have an advantage at anyone of these processes so that others are not able to compete.

We also suggested that it is important for countries to comply with WTO requirements as it represents the first occasion SPS has formally been brought into the world trade dialogue. Meeting this goal is questionable given the difficulties countries, especially the developing countries, are going to have in meeting requirements in the necessary time frame. It is conceivable that as long as countries show progress towards meeting the rules that they will be granted a grace period. This grace period may not include receiving the benefits of free trade or the ability to bring discrepancies to successful arbitration. Though perhaps frustrating, having the means to bring such discrepancies to arbitration is also the means for being able to meet compliance. This presents somewhat of a catch-22 situation. Perceived short-term gains from non-compliance may be devastating for Latin American countries as they may lose the potential for forging a marketing position with the major importers to countries who do comply. This is especially true as economic stability and growth in today's world is increasingly dependent on trade; the products that most developing and least developed countries have to trade are primarily agricultural. To successfully trade these products, countries must "play by the (SPS) rules" -- therefore, it is a question of being recognized for a legitimate effort to conform or becoming an outsider.

Another point is that the removal of historical quotas may create a situation where there are more problems in terms of SPS concerns. This is probably true as the sheer quantity of increased imports may create an opportunity for more problems with plant pests and animal diseases being able to cross borders. Prior to the signing of the WTO, many countries imposed low quotas on products allowed in as protective barriers. To be sure that they would get through ports of entry,

survive delays, present an unblemished market image, and command a good market price, the products of the highest quality were most often exported. Though this does not ensure that that these products do not have SPS problems associated with them, it is likely pests and diseases are more prevalent in lower quality products. It is reasonable to believe that increased quantities of lower quality goods may have a higher propensity for pests and disease.

We also mention the benefits of regionalization and disease free zones. In most cases it probably is too early to know if countries will benefit from this practice of recognizing disease or pest free zones. This is particularly true in cases where a trading partner may choose to restrict trade on another basis such as requiring certification of slaughter houses for the exporting of beef. Failure to certify slaughterhouses or processing centers may be another form of non-tariff barrier that would prevent products from disease-free zones from enjoying the benefits of the efforts in eradicating and controlling disease. Clearly there is a potential for countries that historically have followed a zero-tolerance stance for certain Livestock diseases (e.g., US and Japan) to find other ways to discourage imports. Though this is plausible, data needs to be collected to verify this.

Since 1996 it has been possible for countries with low-risk regions to be eligible to export to the US. The question is does the data show increased trade or is there a time lag associated with the impact on trade of low-risk import policies? It is plausible that countries may try to increase the time it takes for a product to clear customs resulting in unnecessary spoilage of fruit or the need to alter the product (such as by freezing). Given its politically sensitive nature it is likely that such data will be difficult to obtain. Clearly has benefited greatly in trade opportunities by being the only country in the world that is free of the Mediterranean fruit fly. It is possible that they may permanently command a larger share of some markets as they establish strong ties with countries to import Chilean produce.

As for increased interceptions, it is difficult to determine if increased interceptions are due to increased trade or related to stricter SPS regulations. Our analysis indicates there indeed is a large number of fumigations occurring. If fumigations result in reduced shelf life and the reduction of the price of the product to clear the market in a timely manner, this can be problematic. Specifically, the reduced price of these products may force the price of untreated product down. Further, depending on how much of the shipment has been treated, the selling price may just cover shipment costs. If there is indeed a problem and it is necessary to treat a product at the port of entry, then it is the middleman, and not the producer, who bears the cost. In this situation the producer is removed from the burden of trying to produce a pest or disease free product.

Though it is difficult at this time to delineate whether certain countries have a higher percentage of rejections of certain products as a whole and from certain production areas (as seen in terms of port for origin) because of data currently only available for several countries. It is hoped that in the future it will be possible to obtain data many countries so that we may be able to identify if certain countries have more institutional problems in terms of getting products past port of entry than others? This may be the only way in which we are able to obtain an accurate understanding of what is happening with plant products. Likewise it is difficult at this time to delineate certain seasonality trends (i.e., increased rejection of products because of phytosanitary concerns appear to occur more often when that same product is coming into season in a traditionally importing country. Informal interviews indicate that this occurs.)

One way to get around such transaction costs is to have the product go through a preclearance process, prior to entry. As discussed earlier preclearance programs tend to benefit the large producers. Their sole use may create equity concerns as small producers may not be able to benefit. This or standards or certification of export could be devised so that countries could gain through the use of accreditation that would enable their products to be subject to lower levels of compliance inspection on arrival at the country of import. This could be a big cost savings.

It is difficult to document situations where countries try to circumvent SPS measures that are preventing them to trade for unjust reasons. Several unofficial interviews have indicated that to get

around SPS concerns some countries may participate in a form of triangular trade. There may however be unforeseen costs associated with such actions (i.e., disease or pest outbreaks associated with the smuggling of goods). It is possible that as more country data is collected we may be able to quantify the amount and perhaps some of the costs associated with triangular trade. It should be recognized that inputs into production that are beneficial in terms of increased productivity, but barred from import into a country, are more than likely to enter in through an unregulated black market. This can be risky as unmonitored use of inputs can be devastating in terms of food safety and animal health.

In terms of institutional needs, it is clear that countries having *in situ* production facilities that are already working at full capacity have the opportunity to react quickly to the short-term disadvantages of these countries. Also it provides countries with the ability to prevent products with foreseen problems from entering their country. This is because they can prove that they do not have a problem with pests; if not they can not prevent a product coming in unless there is an emergency. It is also important that countries can prove when necessary that detections are isolated detections or "regulatory incidents" and not an established infestation, in a way that other countries are willing to agree. If not an outbreak may result in cessation of trade with that country until they can prove to other countries that they are risk free. If they don't have the infrastructure in place to demonstrate that the incident is a regulatory incident it is unclear that they will be able to demonstrate that such a cessation in trade is unnecessary. For instance, the US temporarily lost much of the South American market for fruits and vegetables after Argentina placed a ban on the importation of these products due to the detection of oriental fruit fly. Several countries (Colombia, Brazil, Ecuador) all followed Argentina's example. The US was able to demonstrate that it was a regulatory incidence and since then all but Argentina have dropped their SPS trade barriers after reviewing the US fruit fly program. Demonstration of such an incident does not guarantee that a country will be able to prevent the restriction, but it will aid in the prevention for many countries.

It may be possible in time to collect data to demonstrate the costs of not having proper institutions in place. For instance, it is likely that lack of proper institutions may result in a considerable amount of trade foregone. In the future as we collect more data we able to delineate such costs the amount of foregone trade due to either lack of pest counters or ability to quarantine /eradicate animal disease? A good example of this would be the losses that Ecuador experienced since they lost access to the banana market in China because they failed to have an established plant trapping/surveillance program to prove to the Chinese that bananas were not a host to Medfly. Technically, Ecuador should have had a monitoring system in place.

In addition, it is possible that countries with smaller economies may not have the funds to implement the most effective institutions particularly in cases where market failures occur. Thus, they may need to take into consideration the cost associated with the development of effective institutions and determine whether the public sector or the private sector is the best agent to support change. If it is possible for the private sector to internalize the costs then it may be necessary to determine what role the public sector should play. Such results may point to a framework to aid governments in effectively developing the required institutions necessary for meeting WTO obligations and suggest methods to formally harness the support of the private sector and the developed countries in aiding the least developed countries in meeting WTO obligations. If possible they may be able to evaluate what type of private sector incentives are necessary so as to bring science to resolution or avoidance of disputes or to internalize the cost of some of the SPS monitoring and negative externalities associated with SPS.

We are currently in the process of documenting case studies of successful eradications of a disease or pest problem that have facilitated trade. Of the case studies that we reported on, only one, the Chilean success, may be difficult to duplicate. This is because the environment and geography of Chile provides a unique circumstance which enables them to be successful in the eradication of pests. The ability of other countries to duplicate this experience may be difficult. Exceptions may be regions in countries which have similar environments. An example may be Peru, which shares a border with Chile and similar geography of the coastal area.

Clearly the success of getting the private sector and producer groups involved in the eradication of swine fever in Mexico may be repeated. Producers were convinced of the need to aid the government in establishing that these states were free of the disease to increase exports. *Sinaloa* was perhaps unique in that most of the producers were at a somewhat advanced level of technology. The success of the Yucatan, which has a mixture of mostly small farmers with some medium-sized operations, indicates that there can be success with eradication programs at the small scale level. It also illustrates that large-scale producers are willing to aid small-scale producers in the eradication of disease. Likewise, the success of the private sector working with the government in Argentina to eradicate FMD with vaccines (declared May 29, 1997) points to success of private sector involvement in eradication of disease. With plants, we see the Dutch involvement in the flower industry in Columbia and private sector involvement in Chile.

The food safety discussion illustrates that there is likely to be an increased number of rejections based on food safety concerns. However, in many cases the problems are associated with mold and decomposition of products. It is unclear if this is due to a delay in entry or because the product was shipped that way. For some countries the increases in rejections are associated with pesticides. It is possible that the number of rejections in snow peas coming from Guatemala because of pesticide residues is an indirect cause of increased trade. In order to meet the demand for a perfect product many Guatemalan producers have chosen to increase their use of pesticides. The change in laws in terms of tolerance for pesticide may result in a need to look for alternative crops that require less use of pesticides. In the short run this may be devastating to economies such as Guatemala.

CONCLUSIONS AND FUTURE WORK

The above discussion points to five main policy recommendations.

1) Efforts need to be made to collect empirical data to demonstrate the benefits and costs of SPS measures such as circumventing them.

2) Governments need to change their institutional environment in a way that will encourage the private sector to internalize some of the costs of eradicating diseases or pests from the country.

3) Governments in developing countries should prepare for the increased likelihood of the private sector conducting methyl bromide fumigation in their countries. Given the banning of this fumigation process in many developed countries, it is important that developing countries do not suffer the environmental degradation without getting adequate compensation.

4) Countries that have chosen to increase productivity through the use of pesticides, need to increase their efforts to identify alternative methods of production in order to obtain market access in the developed countries.

5) Increased effort is needed to improve food safety and shipment of products being exported in order to be in compliance with importing countries' regulations such as HACCP in the US.

6) Efforts must be made to ensure expeditious customs clearance and inspection to eliminate unnecessary spoilage and to reduce transaction costs associated with these procedures (e.g., refrigeration). One aspect to be addressed is preclearance of goods through customs by the importing country. This usually requires reciprocal agreements and a telecommunications network. Although it is possible to establish programs for the precertification of inspection as well, this is more costly and may shift greater risk onto the producer (i.e., an exporter will not buy the produce it has failed inspection).

Future research efforts need to be aimed at gathering data on rejections of plant material at the border by importing countries because of SPS and food safety concerns. Access to data by exporting country, date, port of origin, port of entry, quantity, and a description of why it was rejected will allow policy makers to determine the magnitude of problems stemming from plants imported from a particular country as compared to other countries with similar trade. Questions that may be of particular interest are: Do rejections appear to be seasonal in nature? Do some countries have more problems than others in terms of quantities rejected and number of times rejected in relationship to quantities entered? Is this due to inadequate inspection services in the exporting country? Information on the budgets for sanitary and phytosanitary control may give us a better understanding of these problems. Another question of particular interest is whether there are

fewer problems associated with seasonality and SPS measures for crops when the private sector is involved.

Future work also needs to focus on the question of triangular trade. Attempts need to be made to determine when triangular trade flows exist. In addition efforts need to be made to attempt to quantify how much of this is due to SPS regulations and whether there is any evidence that this type of trade is resulting in the spread of disease. Also, it would be interesting to see if this behavior is related to seasonality.

Lastly, efforts need to be made to investigate the long term effects of food safety shocks (e.g., bovine spongiform encephalopathy (BSE) in the U.K. and foot and mouth disease in Taiwan) on export markets. Of particular interest is whether changes in trade flows resulting from these food safety concerns are permanent or transitory. Efforts should be made to determine the value of trade foregone during such occurrences and the length of time required for countries to recover.

REFERENCES

Animal Plant Health Inspection Service (APHIS). 1995. Trade Support Team. "Special Focus: Free Trade Area for the Americas." Riverdale, MD: APHIS.

_____. 1994. Trade Support Team. Analysis of Mexico's Requirement for Fumigation of U.S. Sweet Cherries. August.

_____. 1995. "Free Trade: Implications and Opportunities." Paper presented at the *Workshop on the North American Free Trade Agreement (NAFTA) and General Agreements on Tariffs and Trade* (GATT), Riverdale, Maryland, June 13.

_____. 1997. Website. 1997.

Bailey, Robert. 1995. "Methyl Bromide Phase Out and its Impact." Washington DC: AID/LAC/DR/RD, Chemonics International, USDA.

_____. 1995. "Assessment and Options Strategy for Jamaican Preclearance Program." Washington DC: AID/LAC/DR/RD, Chemonics International, USDA.

Bordman, Robert. 1986. *Pesticides in World Agriculture: The Politics of International Regulation.* London: Macmillan.

Bredahl, Maury E., and Kenneth W. Forsythe. 1989. "Harmonizing Phytosanitary and Sanitary Regulations." *World Economy* 12 (2).

Coase, R. 1960. The Problem of Social Costs. *Journal of Law and Economics.* (3) 1-44.

CODEX. 1997. Website.

Comisión Nacional de Sanidad Agropecuaria. 1997. Mexico City, Information on the Hog Cholera Campaign.

Crosson, P. 1986. Agricultural Development. In *Sustainable Development of the Biosphere,,* edited by T. Mann and W. C. Clark. Cambridge: Cambridge University Press.

Curtis, Jan Lyon. 1994. "When Animal Health Issue Become Non-Tariff Barriers to Trade." Oregon State University.

Davies, G., and R.B. Stevenson. 1992 "Reducing Livestock Trade Barriers: Implications for Controlling Infectious Diseases in Great Britain." *Proceedings Society for Veterinarian Epidemiology and Preventive Medicine*: 60-63.

Dawson, Richard Jr. 1997. "Impact of WTO on CODEX Alimentarius and its Implications for World Trade." Paper presented at the *Understanding Technical Barriers to Agricultural Trade.*

Dirección General de Salud Animal. 1997. Zoosanitary Information to Allow the Importation of Live Animal, Meat Producs and by Producs from Mexico to Jamaica.

_____. 1995. Yucatan Classical Swine Fever and Avian Influenza Free Zone.

_____. 1994. Characterization of the State of Sonora for International Recognition as a Classical Swine Free Zone.

_____. 1994. Supplementary Information for the International Recogntion of Classical Swine Fever - Free Zones in Mexico.

Economic Research Service. 1997. "Taiwan's Foot-and-Mouth Epidemic and Its Impact on U.S. Markets." Washington, DC: Economic Research Service.

Food and Drug Administration (FDA). 1997. Website.

Foreign Agricultural Service Attache Reports. 1994-1997.Various Issues.

Forsythe, Jr., K., W., and Bredahl, E. M. 1991. "Effects of Animal Health Regulations on Market Access for Exports of Livestock Products." *Journal of Agribusiness* 19, no. (2): 41-51.

Forsythe, K.; Lynch, L. 1992. "Effects of a Free Trade Agreement on U.S. and Mexican and Phytosanitary Regulations." Washington DC: Economic Research Service.

Franco, J. 1997. "The Tomato Debate between Mexico and the United States." *Trade Environmental Development Case Study (TED): 400.*

Ganapathi, N. 1994. "Regulations and Quarantine in International Trade." *ACIAR* 50: 50-52.

Gisselquist, D.; Benbrook, C., 1996. "Technology Transfer, Competition, and Trade Liberalization for Low-Risk Pest Management." Washington DC: UNDP-World Bank Trade Expansion Program.

Haley, S., 1997. "Measuring the Effect of Increased Horticultural Imports: An Application to Winter Vegetables." Washington DC: International Agricultural Trade Research Consortium.

Hayes, D.; Clemens, R., 1995. "Argentina, Brazil, and Uruguay: Potential Competitors in FMD-Free Beef Markets?" *U.S. Meat Export Analysis and Trade News* Vol. 3, No. 4, no. April: 3-9.

Hayami, Y.; Ruttan, V., 1985. *Agricultural Development: An International Perspective.* Baltimore.: Johns Hopkins University Press.

Henson, S.; Traill, B., 1993. "The Demand for Food Safety." *Food Safety* 18, no. 2: 152-162.

Hicks, J. 1932. *The Theory of Wages.* London: MacMillan.

Hillman, J. S. 1978. *Nontariff Agricultural Trade Barriers.* Lincoln: University of Nebraska Press.

_____. 1991. *Technical Barriers to Agricultural Trade.* Boulder: Westview Press.

_____. 1997. "Nontariff Agricultural Trade Barriers Revisited." Paper presented at the *Conference of the International Agricultural Trade Research Consortium,* St. Paul, Minnesota.

Hooker, N. H.; Caswell, J.A., 1996. "Trends in Food Quality Regulation: Implications for Processed Food Trade and Foreign Direct Investment." *Agribusiness* 12, no. 5: 411-419.

Hoppin, P., 1991. "Pesticide Use on Four Non-Traditional Crops in Guatemala: Policy and Program Implications, " Doctoral Dissertation, John Hopkins University School of Hygiene and Public Health Baltimore.

Inter-American Institute for Cooperation on Agriculture (IICA)/Belize. 1997. Request for Information on the Screwworm and Medfly eradication programs, Edwin Martinez.

International Plant Protection Convention (IPPC). 1997. Website.

Jones, J., 1992. . *Food Safety.* St. Paul, Minn. Eagan Press.

Kimbrell, E. F. 1985. "International Standards and Non-Tariff Trade Barriers." *Food Technology* July: 70-71.

Kinsey, J., 1993. "GATT and the Economics of Food Safety." *Food Policy* 18, no. 2: 163-176.

Kotschwar, L.; Simon, D.; Wesley, E. F. Peterson. 1993. "Industry Noted: Laws Governing the Use of Technical Standards as Barriers to Trade: The Case of Trade in Livestock Products." *Agribusiness* 9, no. 1.

Kroehle, K. ; Weinberger, J., 1994. "Foreign Concerns: Sanitary and Phytosanitary Issues in Grain Trade." Washington D.C.: Policy and Program Development Animal and Plant Health Inspection Service.

Lynham, M. B., 1988. "Nontariff Trade Barriers in the Beef Industry." Tucson, Arizona: University of Arizona.

MacLaren, D. 1991. "Agriculture in the Uruguay Round: A Perspective from the Political Economy of Protectionism." *Review of Marketing and Agricultural Economics* 59, no. 87-92.

_____. 1995. "The Uruguay Round Agreement on Agriculture: A New World Order for Agricultural Trade." *Review of Marketing and Agricultural Economics* 63, no. 1: 51-63.

Marchant, B.A., 1988. "Reducing Livestock Trade Barriers: Implications for Community Legislation and Disease Control." *Proceedings Society for Veterinarian Epidemiology and Preventive Medicine*: 52-59.

Miller, G., 1986. "The Political Economy of International Agricultural Policy Reform." *Australian Government publishing Service, Canaberra.*

Ndayisenga, F.; Kinsey, J., 1994. "The Structure of Nontariff Trade Measures on Agricultural Products in High-Income Countries." *Agribusiness* 10, no. (4): 275-292.

Nemajovsky, A., 1991. "Pesticide Residues in Food: The Delaney Clause and Global Harmonization of Pesticide Standards." *Agribusiness* 7, no. 3: 187-196.

Nichols, E., 1995. "Status of International Plant Health Standards." Washington DC: Animal and Plant Heaith Inspection Service.

Nielson, N.; Colling, P.; Liu, Y., 1992. "Technical Barriers to Agricultural Trade with the Pacific Rim." *Journal of International Food and Agribusiness Marketing* 3, no. 4: 25-40.

Office of the U.S. Trade Representative. 1994. "Report on U.S. Food Safety and the Uruguay Round - Protecting Consumers and Promoting U.S. Exports."

OIE. 1996. "Eradication of Foot and Mouth Disease in the Americas." *OIE Press Releases*, July 16.

Office International des Epizooties (OIE)., 1997. "Resolution XII - Recognition of the Foot and Mouth Disease Status of Member Countries."

_____. 1997. Website.

Orden, D.; Roberts D., 1997. "Determinants of Technical Barriers to Trade: The Case of US Phytosanitary Restrictions on Mexican Avocados 1972-1995." Paper presented at the *Understanding Technical Barriers to Agricultural Trade.*

_____., 1997. "Understanding Technical Barriers to Agricultural Trade." Paper presented at the Conference of the International Agricultural Trade Research Consortium, St Paul, Minnesota.

Petrey, L. A.; Johnson, R.W. M., 1993. "Agriculture in the Uruguay Round: Sanitary and Phytosanitary Measures." *Review of Marketing and Agricultural Economics* 61, no. 3: 433-442.

Portney, P., 1990. *Public Policies for Environmental Protection.* Resources For The Future.

Pray, C.; Echeverría, R., 1991. Private-Sector Research in Less-Developed Countries. In *Agricultural Research Policy: International Quantitative Perspective*, edited by P. Pardey, J. Roseboom and J. Anderson. Cambridge: Cambridge University Press.

Reco, A.; Mondino, G., 1995. "Towards an Hemisphere Free Trade Area: The Case of Argentina."

Roberts, D.; DeRemer, K., 1997. "Overview of Foreign Technical Barriers to U.S. Agricultural Exports." . Washington DC: Economic Research Service.

Rooson III, C.; Parr, E. D., E., Angel, A.; Segarra, E., 1993. "Free Trade Impacts on US-Mexican Meat Trade." *Agribusiness* 9, no. 2: 159-173.

Runge, C., 1987. Induced Agricultural Innovation and Environmental Quality: The Case of Groundwater Regulation. *Land Economics* 63 (3),: 249-258.

Schramm, R., 1991. "Health, Sanitary, and Phytosanitary Barriers to Free Trade." *Increasing Understanding of Public Problems and Policies*: 13-22.

Stanton, G. H., 1997. "Implications of the WTO Agreement on Sanitary and Phytosanitary Measures." Paper presented at the Understanding Technical Barriers to Agricultural Trade.

Stenholm, C.; Waggoner, D., 1992. "Moving Beyond the Rhetoric of Food Safety and Meeting the Challenge." *Journal of American Veterinary Medicine Association* 201, no. 2: 234-257.

Strollo, M., 1997. "Mexico-US Avocado Trade Dispute." *Trade Environmental Development Case Study (TED): 413*.

Sumner, D.; Hyunok, L., 1995. "Sanitary and Phytosanitary Trade Barriers." Paper presented at the International Agricultural Trade Research Consortium, Tucson, Arizona, December 14-16.

Swinbank, A., 1993. "The Economics of Food Safety." *Food Policy* 18, no. 2: 83-94.

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

_____., 1997. "Implementation of the World Trade Organization's Agreement on Sanitary and Phytosanitary Measures: The US Perspective." Paper presented at the Understanding Technical Barriers to Agricultural Trade, Minneapolis, Minnesota.

Thilmany, D.; Barrett, C.B., 1997. "Regulatory Barriers in an Integrating World Food Market." *Review of Agricultural Economics* 1, no. 19: 3-20.

Thrupp, L. A., 1995. *Bittersweet Harvest for Global Supermarkets: Challenges in Latin America's Agricultural Export Boom.* Washington DC: World Resource Institute.

Thirtle, C.; Ruttan, V., 1987. *The Role of Demand and Supply in the Generation and Diffusion of Technical Change.* Chur, Switzerland: Harwood Academic Press.

Umali, D.; Feder, G.; de Haan, C., 1992. The Balance Between Public and Private Sector Activities in the Delivery of Livestock Services. Washington: World Bank.

Vogt, D., 1992. "Sanitary and Phytosanitary Measures Pertaining to Food in International Trade Negotiations." Washington D.C.: Congressional Research Service Report for Congress.

Walker, K. D.; Ott, S.L., 1992. "Impact of Growing World Trade on the Process of Determining Sanitary and Phytosanitary Standards." *Animal Health Insight*, no. Winter: 6-10.

Weinberg, S., 1997. "Non-Traditional Agricultural Exports and the Pesticide Problem in Guatemala." *Trade Environmental Development Case Study (TED): 416.*

World Trade Organization (WTO)., 1997. Website.

Zilberman, D.; Marra, M., 1993. Agricultural Externalities in Agricultural and Environmental Resource Economics *Agricultural and Environmental Resource Economics.* Ed G. Carlson, D. Zilberman, J. Miranowski. New York, Oxford University Press.

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