PACIFIC ECONOMIC COOPERATION COUNCIL

PACIFIC FOOD SYSTEM OUTLOOK 2002-2003

MAKING THE REGION'S FOOD SUPPLIES SAFER

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Pacific Food System Outlook

S P O N S O R S

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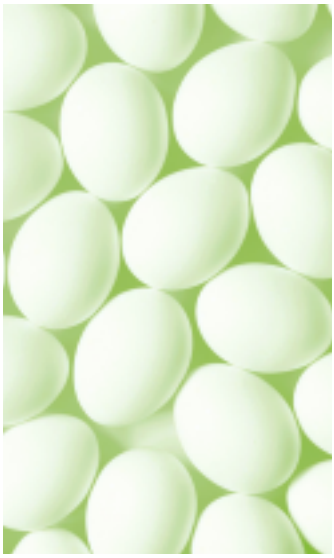


FOREWORD

The Pacific Food System Outlook, brings together food industry experts from the PECC's 22 participating economies once a year to discuss the situation and outlook for the region's food system. We emphasize not just the primary sector but the entire trans-Pacific food system, including issues relating to infrastructure, transportation and distribution, logistics, value-chain management, consumer protection, and other areas. Our report this year focuses on the role of food safety in the region's food system

Recent highly publicized international food safety incidents can have short- and longer-term impacts on consumer perceptions and food purchasing patterns. The world's heightened concern about terrorism also raises concerns about the vulnerabilities of the global food system and the need for a greater public commitment to food supply monitoring and inspection.

According to analysts contributing to this report, much of the current food system outlook hinges on the U.S. recovery. Continued growth in China and stagnation in Japan are also important to the region's economic outlook. Commodity prices remain low relative to the highs of the mid 1990's, but are showing signs of recovery given the impact of drought in several areas. The oilseed market is more dynamic, with rapid growth in production and exports in South America and growing demand in China. The shift from bulk to non bulk commodities, the lengthening of supply chains, and the rising share of perishable food products in trade are raising concerns about food safety, the theme and special focus of this year's meeting and report.

In general, participants viewed data on foodborne illness as unreliable and expressed concern about using these data to make cross-economy comparisons. While there is some evidence that Hazard Analysis and Critical Control Points (HACCP)-type programs in the United States and other economies in the region are having some success in reducing the incidence of foodborne illness, developing economies have less incentive and resources to implement broadly such programs. Use of Good Agricultural Practices (GAP) by exporters in developing economies, oftentimes driven by requirements in importing countries, can also have benefits in the domestic market.

The detailed food system profiles of each PECC economy will appear on the US PECC website: www.pecc.org/food.

I want to express my sincere gratitude to Mr. Jaime Campos, Chile's Minister of Agriculture, who opened our meeting, April 16-18. Chile's strong dependence on exports of fresh fruit has given it a keen interest in the importance of food safety in developing and maintaining overseas markets.

Special thanks also go to the efforts of Dr. Eugenia Muchnik and her colleagues at the Fundación Chile for

achieving a very high standard of excellence in the arrangements for this important meeting and to the leadership of Dr. Manfred Wilhelmy, Executive Director of the Fundación Chilena del Pacifico. The meeting was made possible through the generous support of the Fundación Chilena del Pacifico and Fundación Chile and three other sponsors (Association of Chilean Exporters, the National Society of Agriculture, and Chile's Ministry of Agriculture).

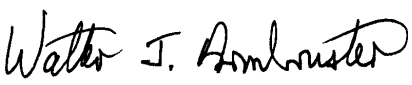
I want to express my thanks to two private sector participants: Thierry Woller, Trans World Quality Systems Consultant Group, and Ronald S. Bown, Chairman of the Association of Chilean Exporters, for their participation.

We are most grateful to the individual economists representing 16 economies in the PECC region for their dedication to and support of this unique multinational project, now in its sixth year. Dr. Jinap Selamat, Professor, Department of Food Science, Universiti Putra Malaysia played an important role in developing the food safety theme presented in this report. A special thanks goes to William Coyle (ERS, USDA) and Constanza Valdes (ERS, USDA) for their continued leadership in producing this report. We also appreciate the financial support of the Economic Research Service (ERS), and the special interest and support of Praveen Dixit and Neil Conklin, both of ERS.

Thanks are due Mark Borthwick, executive director of the US National Committee for Pacific Economic Cooperation, for his continued support; Agnes Prentice of ERS, USDA, for statistical support; Carol O'Hallaron for editorial services; Joseph Yacinski and Carol Hardy of Yacinski Design for design and production; and Liz Hughes of Beach Brothers Printing.

I am grateful to the PECC member committees and the PECC International Secretariat for their continued help in supporting and guiding this important project.

Finally, I wish to acknowledge Farm Foundation's financial support for this project.



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October 2002

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MAKING THE REGION'S FOOD SUPPLIES SAFER

As income increases for individuals in the PECC (Pacific Economic Cooperation Council) economies, consumers sharpen their focus on food safety. This new awareness is related to dietary changes associated with more disposable income and urban growth. Better off consumers move beyond meeting basic dietary needs to a keener interest in selecting food for attributes such as freshness, quality, healthfulness, and convenience. Even lower income consumers are demanding more healthful foods and cleaner water. In many economies, this dietary turn means that people purchase more processed products as well as meat and a greater variety of fruits and vegetables - foods that tend to be perishable, subject to spoilage, and conducive to the transmission of disease.

Crowding in cities can raise the potential for the spread of foodborne disease as well, particularly if clean water supplies, sanitation, and other infrastructure are inadequate. Demographers project that PECC's urban population will nearly double to 2 billion by 2025. This is a rate twice as fast as the overall population growth. Today, city dwellers find it convenient to eat more food prepared outside the home. Sixty percent of foodborne illness, according to one estimate, arises from the food service sector: restaurants, schools, other institutions, and large catered gatherings.

These shifts in both the PECC's diet and locus of meal preparation require production, processing, and delivery of food through a complex food supply system and sometimes long supply chains that increase the time and opportunity for spoilage and growth of pathogenic bacteria as well as contamination of foods by viruses, parasites, fungi, and their toxins. A few decades ago growers could drive to a neighboring city's farmers' market either minutes or a few hours away and meet consumer needs for vegetables and fruits that were in season. But today, city dwellers not only want more food diversity, they want their fresh tomatoes and mangoes in the winter too, and it may be that only farmers in another hemisphere can provide them.

For these specialized food demands, the PECC economies depend on a food system involving trade between economies, long-distance trucking, air freight, and oceanic shipping. Trade reform as well as improved shipping, refrigeration, and logistics have made meeting these year-round demands possible. Still, extending a supply chain and thus the time from farm to market, restaurant, or school cafeteria increases opportunities for a pathogen to grow and contaminate the food.

A pathogen can find its way into food at almost any link in the supply chain. But some links have greater potential for contamination than others. Food production and food-processing enterprises in modern economies tend to grow larger and fewer in number to achieve economies of scale, keep costs down, and remain competitive. While these large producers and processors are highly conscious of food safety issues, any problem that develops is more likely to spread an undetected pathogen or other contaminant to a large segment of the population distributed over a wide area. Recent incidents, in both Japan and the United States, resulted in the spread of pathogens, affecting hundreds or thousands of people (Table 1).

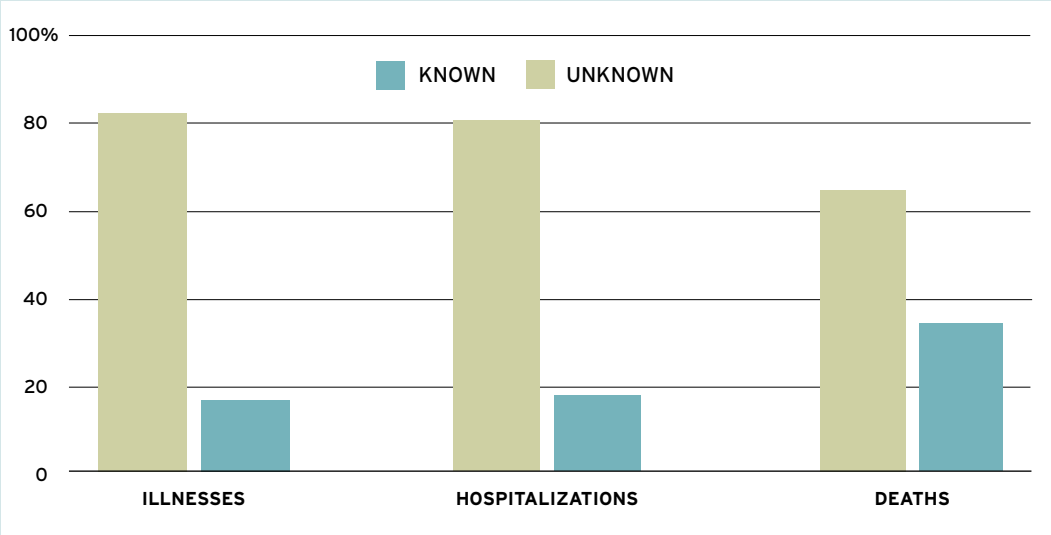
"Foods contaminated with unacceptable levels of pathogens and chemical contaminants or having other hazardous characteristics, impose substantial health risks to consumers and severe economic burdens on individual communities and nations." –World Health Organization (http://www.who.int/fsf/fctshtfs.htm)

Investigating Indeterminate Risks

Lack of data, underreporting of cases, and epidemiological difficul-

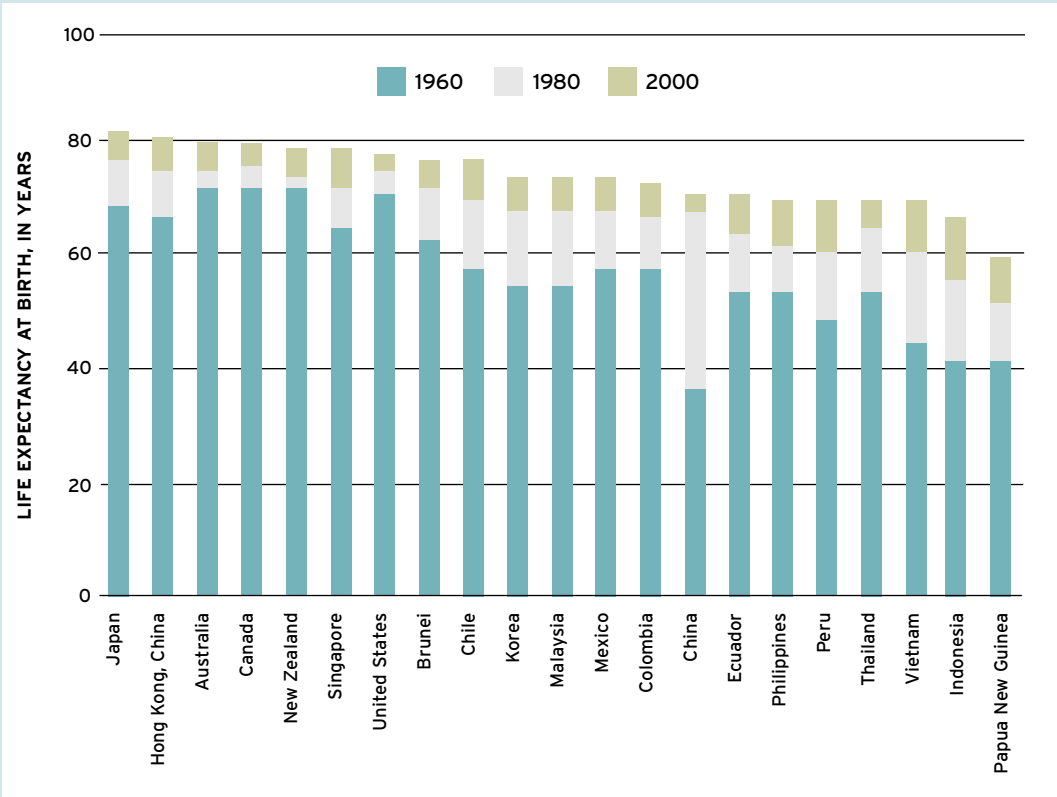
This summary is based on contributions from the Pacific Food System Outlook's forecasting panel that met in Santiago, Chile, April 16-18, 2002. Special thanks to Mark Denbaly and Jean Buzby for their significant contributions. Also thanks to Dr. Jinap Selamat, Professor, Department of Food Science, Universiti Putra Malaysia for her leadership in developing the outline on which this paper is based.

Figure 1 **Most Foodborne Cases in US Caused by Unknown Pathogens**



Source: Mead, Paul S., Laurence Slutsker, Vance Dietz, et. al. "Food-Related Illness and Death in the United States." US Center for Disease Control and Prevention, 1999

Figure 2 **Life Expectancy Rising in All PECC Economies**



Source: Pacific Food System Outlook: World Bank Development Indicators, 2002

ties in tying disease to food consumption hamper understanding the risk and trends of foodborne illness in the PECC region. Although underreporting is most serious in regions where public resources are limited, even researchers working with data on the United States make large adjustments to foodborne morbidity and mortality data to account for underreporting.

Researchers in some economies, such as China, Chinese Taipei, Korea, and New Zealand, report the incidence of foodborne illness is rising in their respective economies. Yet investigators in Malaysia have reported a drop in the last few years of food poisoning, cholera, and typhoid cases, while Australia and the Philippines report data-related difficulties in making judgments one way or the other. According to the US Center for Disease Control and Prevention (CDC), the incidence of seven common foodborne bacterial diseases in the United States dropped 23 percent between 1996 and 2001. But new pathogens, such as *E. coli* O157 and *Cyclospora*, are always emerging. The lack of consistent and comprehensive data makes it difficult to establish trends about the regional incidence of foodborne illness over time.

Putting Foodborne Illness Fatalities in Perspective

Compared to other causes of death, the best estimates suggest that foodborne illness ranks low (Table 2). World Health Organization (WHO) statistics show infectious diseases, of which many foodborne diseases are a subset, rank well below heart disease, cancer, and accidents as a cause of death world-

Table 1 **Selected Outbreaks of Foodborne**

Country	Date	Disease/contaminant
Australia	1997	*Listeria monocytogenes*
Australia	1997	*Salmonella*
Australia	1999	*Salmonella*
Australia	2001	Norwalk like virus
Canada (Saskatchewan)	2002	Creutzfeldt-Jakob (human form of BSE)
Canada	2002	Chloramphenicol
Canada	2002	*Listeria monocytogenes*
Chile	1989	Cyanide
Chile	1999	*Salmonella*
Chile	2002	*E. coli bacteria* 0-157
China	2002	Antibiotics
Chinese Taipei (Central Region)	2000-2001	Cadmium or mercury contamination
Chinese Taipei (Taipei City)	2001	Water pollution caused by typhoon
Japan (32 Prefectures)	1996	*E. coli bacteria* 0-157
Japan	2000	*Staphylococcus aureus*
Japan	2001-02	BSE
Japan (Chiba and others)	2001	*E. coli bacteria* 0-157
Japan	2002	High levels of pesticide
Korea	1996	*Vibrio*
Korea	1999	*Salmonella*
Korea	2001	*E. coli bacteria* 0-157
Malaysia	1999	Dioxin
Malaysia	2001	Excessive levels of 3-MCPD, genotoxic carcinogen
New Zealand	1999	Norwalk-like virus
New Zealand	2000	*Salmonella*
New Zealand	2001	*Salmonella*
US (Washington State)	1992-93	*E. coli bacteria* 0-157
US (41 states)	1994	*Salmonella*
US	1996	*E. coli bacteria* 0-157
US	1996	*Cyclospora cayetanensis*
US	1997	*E. coli bacteria* 0-157
US (Michigan)	1997	Hepatitis A
US	1998-99	*Listeria monocytogenes*
US (13 states)	1999	*Salmonella*
US (14 states)	2001	*Salmonella*
US (Washington State)	2002	*E. coli bacteria* 0-157
US (21 states)	June 2002	*E. coli bacteria* 0-157

na– not available/not applicable

Sources: Pacific Food System Outlook papers from April 16-18, 2002 meeting in Santiago, Chile; various

Disease and Contamination in the PECC Region

Vector	No. of people affected	Hospitalized	Deaths
Cross contaminated fruit salad at nursing home	9	na	6
Pork rolls	808	79	na
Unpasteurized orange juice	533	na	na
Ill foodhandler	56	na	na
Meat from cattle infected with BSE; likely consumed meat in UK	na	na	1
Imported honey and honey products	na	na	na
Large hypermarket in Western Canada, smoked salmon cream cheese	na	na	na
Several grapes thought to be contaminated	na	na	na
Mayonnaise	na	na	na
Suspected that source is fast food outlet in Santiago	na	na	na
Exports of prawns, honey and rabbit meat to EU	na	na	na
Rice	Unknown	na	na
Prepared box lunches	na	120	0
Several items suspected in school lunches, including radish sprouts from a single producer in the Osaka area	13,000	na	13
Leading dairy company produced milk using unhygienic production-line valve	14,555	165	na
Five cases confirmed since Sept. 2001	0	0	0
Meat company	90	5	na
Imported green soybeans	na	na	na
Seafood (clams)	116	43	0
Pork and beef	198	na	2
Pork cutlets	91	6	0
Imported dairy and meat products	na	na	na
Imported savory foods; soups, prepared meals, snacks, and gravy mixes	na	na	na
Oysters	86	na	na
Raw eggs	na	na	1
Mayonnaise	70	na	na
Fast food restaurant chain in Washington State, undercooked hamburger	732	na	4
Ice cream company in Minnesota; truck carrying ice cream mix contaminated with infected liquid egg	224,000	na	na
West coast juice manufacturer; unpasteurized apple juice	66	na	1
Imported raspberries	1465	na	na
Large midwestern food company; ground beef	15	na	na
Imported strawberries; point of contamination unknown	20	na	na
Large food company; hot dogs and deli meats	101	80	21 (6 miscarriages)
Imported mangoes	79	15	2
Imported cantaloupes	Numerous cases	na	2
Romaine lettuce served at girls camp	29	1	na
Large midwestern company; ground beef	28	7	0

other sources on the Internet and newspapers.

wide, even in less developed regions. Non-communicable diseases, including heart disease, cancer, and diabetes, are responsible for more than 50 percent of all deaths globally, according to the *Global Burden of Disease*. And with the graying of the world's population, better contraception and medical care, and more children surviving to adulthood, researchers project that by 2020 the share of non-communicable disease as the cause of death will increase to over 70 percent.

The CDC estimates 5,000 people die each year from microbial pathogens in the United States. While the number of deaths from foodborne pathogens is relatively small, the incidence of illness and hospitalization appears quite significant. The CDC calculates 76 million cases of foodborne illnesses (one case for every four in the population) occur each year in the United States and 325,000 associated hospitalizations. The young, the elderly, and those with auto-immune deficiencies are the most prone. Reflective of the problems of data gathering and disease identification in this field, the agency reports unknown pathogens account for more than two-thirds of the cited totals (Figure 1).

Note that some experts, despite the poor data and difficulties in establishing epidemiological linkages, claim food and water borne pathogens are responsible for a large percentage of the world's 1.5 billion cases of diarrhea in children under five years old that result in 3 million deaths each year.

In addition to acute illness caused by pathogens, there are other widely recognized food safety risks, including:

- Sequelae *or longer-term after effects (e.g., neurological, cardiac and kidney diseases and rheumatoid syndrome) associated with most acute foodborne illnesses*
- *Environmental toxins (e.g., lead and mercury) and persistent organic pollutants (e.g., dioxin)*
- *Prions associated with bovine spongiform encephalopathy (BSE, also known as "mad cow" disease)*
- *Transmission of disease through food from animals to humans (e.g., tuberculosis)*

There are also some perceived food safety risks that are more debatable:

- *Irradiated foods or animal products produced with growth hormones and antibiotics*
- *Pesticide residues and food additives*

Food safety concerns can also hinder international food trade and are intertwined with questions about the health consequences of food produced using biotechnology, the labeling of these foods, and the uncertainty of their long-term impact on the environment.

Notwithstanding the threat of foodborne and other diseases, evidence suggests that people in most parts of the world are living longer. According to data reported in 2000, average life expectancy at birth across the PECC region is now 60 to 80 years. The bar graph in Figure 2 represents life spans for 20 of the PECC countries and shows that developing economies such as China, Indonesia, and Vietnam have progressed rapidly in the last 40 years in extending life expectancy of their citizens.

Ranking Food Pathogens by Region

Although cultures and diets across the PECC are highly diverse and levels of development vary, some commonality surfaces when ranking specific pathogens that are found in food. Ten of eleven economies report *Salmonella* as a leading cause of foodborne illness (Table 3). The ubiquity of *Salmonella* is associated with the widespread rise in consumption of many perishable products across the region. *Vibrios* and Norwalk-type viruses are important hazards associated with consumption of fish and shellfish, common in Korea, Chinese Taipei, the United States and Canada.

While *Salmonella*, *Staphylococcus*, and *Campylobacter* appear to be the more common causes of foodborne illnesses, other pathogens such as *Listeria* and *botulism* are less common but more deadly.

"We cannot open, penetrate, and consolidate markets if we are not able to guarantee that we are offering a product which is up to the highest standards of health and safety demanded by our customers abroad."

Honorable Jaime Campos, Chile's Minister of Agriculture; address to the Pacific Food System Outlook meeting, April 16, 2002, Santiago, Chile

Table 2 **Leading Cause of Death by Region**

Rank	Asia	Pacific	North America	Europe	Post-Soviet Europe
1	Circulatory diseases	Circulatory diseases	Circulatory diseases	Circulatory diseases	Circulatory diseases
2	Cancers	Cancers	Cancers	Cancers	External causes
3	Respiratory diseases	External causes	External causes	External causes	Cancers
4	External causes *	Respiratory diseases	Respiratory diseases	Respiratory diseases	Respiratory diseases
5	Digestive diseases	Digestive diseases	Digestive diseases	Digestive diseases	Digestive diseases
6	Infectious diseases	Liver diseases	Liver diseases	Liver diseases	Infectious diseases
7	Liver diseases	Infectious diseases	Infectious diseases	Infectious diseases	NA

* Injuries that are intentional (suicide) and unintentional (accidents)
Source: WHO; Research Group on the Global Future; www.cap.uni-muenchen.de/fgz/statistics/statistics05.htm

Table 3 **Leading Foodborne Pathogens, Selected PECC Economies**

Economy	Pathogen
Australia	*Salmonella*, Hepatitus A., *E. coli*
Canada	Norwalk-like viruses, *Campylobacter, Salmonella*
Chile	*Salmonella, Hepatitus, E. coli*
Ecuador	*Cholera, Salmonella, Typhoid*
Korea	*Salmonella, Vibrio, Staphylococcus*
Malaysia	*Staphylococcus, Salmonella*
New Zealand	*Campylobacter, Salmonella*
Peru	*Salmonella, Vibrio cholerae*
Philippines	*Salmonella, Campylobacter, E.coli*
Chinese Taipei	*Vibrio parahaemolyticus, Staphylococcus aureus, Bacillus cereus*
United States	Norwalk-like viruses, *Campylobacter, Salmonella*

Source: Pacific Food System Outlook, economy write-ups, April 2002.

Examining Outbreaks of Foodborne Disease and Contamination

Table 1 documents a sampling of food-related outbreaks of disease in the PECC region in the last decade or so. Most commonly involved in these outbreaks are processed foods, fresh horticultural products, and meats — those foods that are enjoying increased popularity consistent with income and urban growth. Although most outbreaks affect few people and are localized, some affect thousands and are much broader in scope: for example, the *E. coli* infection of radish sprouts in 1996 and dairy products contaminated by *Staphylococcus* in 2000 in Japan; and the *Salmonella*-ice cream (1994) and *Cyclospora*-raspberry (1996) cases in the United States. While some of these cases are widely publicized, other cases that are more deadly are less noticed, such as the *Listeria*-processed meats case in the United States in 1998.

Only 1,000 to 2,000 cases of *Listeria* are reported annually in the United States, but the percentage of people who die from the illness is much higher than from most other foodborne illness-causing microorganisms. *Listeria* is more dangerous because the pathogens it produces can cross from the gastrointestinal system into the bloodstream and from there into other tissue, such as the brain, or into a fetus. The bacterium can also survive both freezing temperatures and relatively high temperatures. To kill the pathogen in chicken, for example, it must be cooked higher than the recommended 160 degrees for destroying less hardy pathogens.

In the United States, at least 100 illnesses and 21 deaths, including six miscarriages, were linked to the spread of *Listeria* in 1998-99. In this outbreak, hot dogs and deli meats, produced under a number of brands by one manufacturer, transmitted the *Listeria*-based disease over 13 states. The outbreak strain was isolated by testing opened and unopened packages of hot dogs manufactured at a company plant in Michigan as well as an unopened package of deli meats produced at the same plant. The company involved recalled the potentially contaminated lots of hot dogs and deli meats. Although *Listeria* is most commonly found in processed meats, these pathogens can also live in soft cheeses, raw meat, and in milk that has not been pasteurized.

In 2000, Japan's largest dairy company generated the economy's biggest food poisoning outbreak since the government began recording such cases in 1975. *Staphylococcus aureus* contaminated several types of milk as well as a yogurt beverage in a production line valve at a large processing

plant in Osaka. Not usually fatal, this pathogen from the dairy plant spread from Osaka through eight Western Prefectures, making 14,000 people ill and hospitalizing 150 of them. Local authorities ordered the company to recall all contaminated products. Unable to identify the contaminated batches precisely, the company was forced to withdraw all of its products from retailer shelves and shut down 21 plants for 40 days.

The foodborne pathogen not only infected individuals but also struck the food industry. In the aftermath of the dairy plant incident, the Japanese company's stock price dropped 40 percent, and its president and seven other top executives resigned. The company reportedly took out a US$250 million emergency line of credit to compensate consumers made ill in the incident and help the sales outlets that had suffered large losses. Some Japanese school cafeterias quit using any of the company's products, including those not implicated in the food poisoning case, such as cheese. China temporarily banned imports of the company's products. Ultimately, the outbreak affected the entire dairy products industry in Japan as consumers cut back on milk consumption.

In another example that started in late 1992 and ended in early 1993, undercooked hamburger at a leading fast food chain in the US Northwest caused an outbreak of *E. coli* O157:H7, causing 700 people to become ill and 4 children to die. Sales of the chain dropped 80 percent and it took six months for sales to return to pre-outbreak levels. Settlements through litigation amounted to over $13 million.

The company responded by hiring a food safety expert a week after the incident, who later became the chain's director of quality assurance. After switching meat suppliers and requiring new suppliers to have their products subject to microbial testing, the company implemented a Hazard Analysis and Critical Control Points (HACCP) system in all its restaurants. Up to that point, HACCP had been a tool used primarily in food-manufacturing plants.

Estimating Economic Costs

The examples cited above elucidate a portion of the general economic costs posed by foodborne illness. In general, foodborne illness entails cost to:

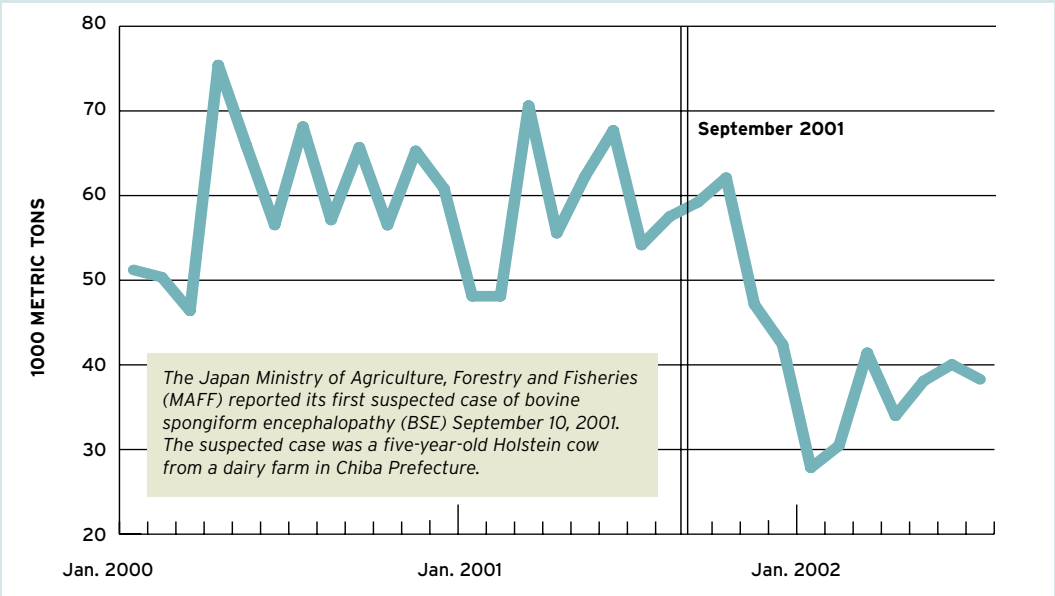
- *Individuals/households (e.g., medical care, loss of work, and premature death)*
- *Industry (e.g., lost business and trade, product liability suits, additional cost from applying systems/techniques to boost food safety)*
- *The regulatory and public health sectors (e.g., disease surveillance, outbreak investigations).*

Estimating these costs is difficult. Most calculations are partial, focusing on the direct cost of healthcare and losses to individual productivity, not the costs to business and the public sector. Researchers in Australia, which has a GDP of $445.8 billion (2000), estimated these costs of foodborne illness at $1.7 billion in 1999. In South Korea, with a GDP of $764.6 billion (2000), researchers recently appraised the direct cost of food poisoning from meats alone to be $16 to $28 million per year, including $7 to $15 million in medical costs and $9 to $13 million for lost productivity. They claim the Korean economy could achieve a long-term cost benefit within 20 years of $167-290 million if foodborne illness was reduced. And in the United States, where the GDP is $9,963 billion (2000), five foodborne pathogens cause health care costs and lost productivity of $6.9 billion each year. These costs are low relative to each economy's GDP and reflect their partial nature and the fairly low incidence of serious sickness and death from foodborne causes.

Reacting to Publicity on Foodborne Disease

Since consumers usually have many choices about the foods they consume and where they consume them, news of tainted food can induce strong consumer reaction, sometimes out of proportion to the real risk of adverse health consequences. If, for example, *E. coli* O157:H7 were discovered in a local supply of ground beef, many consumers might respond by thinking, "Why should I run any risk, I'll just turn to chicken or away from meat all together for the time being." This response can have a devastating impact on a firm in the food industry and its employees or even more broadly on an entire industry's reputation, sales revenue, and trade if this type of response is general. A company involved in the spread of a foodborne pathogen can also face penalties imposed by courts or government agencies, including fines, product recalls, and temporary or permanent plant closures as well as large liability settlements and associated legal costs. Potential market and liability losses are strong incentives for food firms to ensure the food supply is as safe as possible.

Figure 3 **Japan's Beef Imports Drop in Aftermath of First BSE Case**



Source: World Trade Atlas

Two cases from different economies in the PECC illustrate the strong consumer reaction to events related to the food industry. In September 2001, *Bovine spongiform encephalopathy* (BSE) was detected in a five-year old Holstein cow in Japan's Chiba Prefecture, the first case discovered in Asia. Authorities discovered four more infected animals in November and December of 2001 and in May and August 2002. BSE is a brain-wasting disease caused by prions and is linked to a human variant, Creutzfeldt-Jakob disease, which killed one person in Canada in August 2002 and approximately 100 people in Great Britain, where BSE is most often found.

In the three months following the first BSE case detected in a cow in Japan, consumers there reduced beef consumption 40-60 percent. Figure 3 shows the dramatic decline of beef imports to Japan after September 2001. Sales at McDonald's 3,800 Japanese outlets dropped sharply, despite reassurances that they only used imported beef from three BSE-free economies, the United States, Australia, and Canada. Sales of meat products at other chains, such as Lotteria, also fell. In 2002, beef consumption is anticipated to be much lower in Japan than last year, causing economic losses for both beef cattle and dairy producers. Consumption is likely to recover gradually over time.

In a rapid response to the sharp public reaction to the detection of the first BSE case, Japan's Ministry of Agriculture, Forestry, and Fisheries (MAFF) established a system in October 2001 to restrict the movement of cattle at risk of BSE. The Ministry also introduced a ban on the use of all livestock feed containing meat and bone meal, the suspected vectors of the disease. To ease the effects of the mad cow crisis on the Japanese food industry, the government developed a buyback scheme. Despite these efforts to ameliorate public anxiety, consumer confidence was further shaken when a large Japanese food company falsely relabeled Australian and American beef as Japanese beef to take advantage of the buyback scheme.

Another example of sharp reaction to a food supply problem occurred in the United States with negative outcomes for both the Chilean and US food industries. In March 1989, an anonymous caller to the US Embassy in Santiago, Chile, claimed that Chilean fruit bound for the United States was injected with cyanide. A US Food and Drug Administration (FDA) inspector in Philadelphia, where most Chilean fruit enters the United States, discovered in a shipment two grapes that were punctured and a third that appeared slit. After testing positive for a non-lethal dose of cyanide, the FDA issued an order banning entry of Chilean fruit into the United States and requiring the destruction of all Chilean fruit then in US marketing channels. Consumers, alerted by the media, were encouraged to destroy any Chilean fruit in their possession, and grocers

were instructed to remove all Chilean fruit from their shelves.

Four days later, after Chile adopted certain safety measures and no further contamination was discovered, the United States lifted the ban on Chilean grapes. But in the meantime, the incident affected half of Chile's grape production that season, resulting in the loss of more than 20,000 jobs. The ban adversely affected not only producers, but also all the commercial points along the supply chain of the Chilean fruit export industry, with losses estimated at more than $400 million.

Setting Standards - Public and Private Roles

A major government role in reducing the risk of foodborne illness is to encourage international cooperation and the sharing of data on the subject to enable governments and industry to mitigate risks and the spread of foodborne illnesses quickly. Because the economies in PECC are now more intertwined via trade, tourism, and capital flows, they share a greater community interest in controlling and reducing the risk of foodborne illness. Indeed, many of the outbreaks summarized in Table 1 allegedly arise from imported food. If economies engage in food products trade, consumers need assurances that imported products are safe and meet acceptable standards of quality and healthfulness.

Governments in the PECC region often authorize several public agencies to exercise jurisdiction over food safety, sometimes using extensive regulatory law. In some economies a complicated web of overlapping bureaucratic responsibilities hinders food safety enforcement and implementation. In an effort to consolidate food safety responsibilities under one entity, New Zealand created the New Zealand Food Safety Authority in 2002. State or municipal authorities in New Zealand are responsible for enforcing food safety standards at the retail level. Regulatory responsibilities are shared by agencies focused on production and trade of agricultural and fishery commodities and by those concentrated on downstream issues related to food processing and marketing.

Because of limited public resources and the strong private sector incentives for promoting food safety, some PECC governments are implementing risk management systems that grant businesses flexibility in their performance of operations as long as the required food safety outcomes are achieved. These systems rely on a model that delineates the following sector roles and implementation activities:

- *Government acting as the regulator, setting appropriate sanitary standards*
- *Industry taking full responsibility for producing food products that conform to those standards, using risk-based management plans*
- *Objective auditors verifying compliance with standards.*

Consistent with this model, Hazard Analysis and Critical Control Points (HACCP) is a system increasingly adopted by governments and the food industry that identifies potential sources of food safety hazards and establishes procedures to prevent, eliminate, or reduce these hazards. The HACCP system builds on Good Agricultural Practices (GAP) that ensure a clean and safe working environment for employees while eliminating the potential for food contamination and is often integrated with ISO 9000 practices that are oriented toward meeting customer requirements. HACCP is mandatory in several PECC countries for certain perishable products, some of which are important to export trade: processed fish in Canada; seafood in Malaysia destined for export to the European Union and the United States; meat and poultry processors and slaughterhouses in the United States; all slaughterhouses in South Korea (by 2003); and seafood and dairy products in New Zealand.

In other PECC economies and food sectors, HACCP is encouraged but voluntary. In some instances, food industry organizations may mandate use of a HACCP system by their members, such as the Frozen Seafood Union in Chinese Taipei and the Meat Industry Council in New Zealand. Some export-dependent industries have adopted HACCP voluntarily, including Chile's fruit and Peru's asparagus industries, in an effort to differentiate their products as being safe and to meet the demands of importers. While some spillover benefits accrue to the domestic economy, most are captured by the export sectors. Companies must weigh the payoff from voluntary adoption of a HACCP system against its costs. Demands by foreign buyers regarding certification and such requirements as traceability can be costly and variable, particularly for small and medium-sized firms in less developed economies. For example, regulations imposed by Europe may not be the same as those imposed by the US or Japan.

In the Philippines, adoption of HACCP has been slow and

WHAT IS CODEX ALIMENTARIUS?

The Codex Alimentarius Commission was established by resolutions of the Food and Agricultural Organization (1961) and the World Health Organization (1963). Over the past 40 years it has become the global reference on food standards for consumers, food producers and processors, national food control agencies and the international food trade. More than 160 countries are members.

The Codex system gives countries an opportunity to participate in formulating, assessing and harmonizing food quality and safety standards and ensuring their global implementation. It has encouraged food-related scientific and technological research, raising the world community's general awareness of food safety and related issues. It also has led governments to take legislative action to improve the quality and safety of food and to minimize the hazard of foodborne illness. While the interest in the Codex has grown along with food trade, in practice it is difficult for many countries to accept Codex standards because of differing legal, administrative, and political systems. Nevertheless, an increasing number of countries are aligning their national food standards, or parts of them, with those of the Codex. This is particularly so in the case of additives, contaminants and residues.

The Codex Alimentarius codifies food standards for commodities, hygienic and technological practices, pesticide residues, guidelines for contaminants, and testing and assessment for pesticides, food additives, and veterinary drugs.

Under the Uruguay Round Agreement (1994), the Sanitary and Phytosanitary Measures (SPS) Agreement cites Codex standards, guidelines, and recommendations as the preferred international standards for facilitating international trade in food. Thus, the Codex has become the benchmark against which national food standards and regulations are evaluated within the legal context of the Uruguay Round Agreement.

Source: Excerpted from *Understanding the Codex Alimentarius*; FAO and the World Health Organization; http://www.codexalimentarius.net/

encounters resistance from the local food industry that views the guidelines as restrictive and costly. However, better standards and more effective controls, especially among small and less modern farms, are needed to contain the occasional outbreaks of *Salmonella*, *Camphylobacter*, and *E. coli*.

The use of internationally recognized quality management systems is particularly prevalent in New Zealand's primary industries, such as kiwifruit and apple growing, and sheep, beef, and dairy farming along with their related processing industries. New Zealand exports significant amounts of these food items; the adoption of HACCP has been partly motivated by a desire to differentiate New Zealand's products in the international marketplace as high-quality and safe.

In Canada, 327 establishments are certified as HACCP-compliant, and another 337 plants, mostly meat processing establishments, are operating under HACCP principles and are awaiting recognition. Non-meat industries are encouraged to begin incorporating HACCP principles into processing and food preparation practices in anticipation that compliance will become mandatory.

In Malaysia, 85 food firms have applied for certification under the HACCP system, and 55 have successfully obtained certification. The majority of these are from the seafood industry. For large firms (150 full time workers with annual sales more than US$6.6 million), the cost for HACCP certification is US$1,186 for a new application, US$724 for each additional product, and US$26 for certification renewal. Small and medium firms (less than 150 workers with annual sales not more than US$6.6 million) are given discounts of 28 percent for the new application, and seven percent for each additional product. These costs, however, are minor relative to the costs of adopting a HACCP system.

The public sector in the PECC region also has an important role in food safety education, technology development, international cooperation, and data collection and surveillance. Three principal areas of publicly supported food safety training and education programs are covered by member economies: training on HACCP systems, food safety education for handlers in the food service sector, and programs for consumers on how to reduce their risks of foodborne illness in the home.

Training in food hygiene and handling, for example, has increased substantially in Chile during the past few years. The agency channeling public resources to this area reports 403 courses and 14,000 students in 2000. Since 1996, Malaysia's Ministry of Health has administered mandatory training programs for food handlers to ensure greater hygiene in preparation of food for sale. The Ministry of Health has since established the Food Handlers Training Institute, which conducts a compulsory food safety program for all operators of food stalls and restau-

rants. However, only about 100,000 out of two million food operators in Malaysia have attended this program.

In a consolidated effort to reduce foodborne illness, provincial governments across Canada worked with industry associations and consumer, environmental, and health groups to create a program called the "Canadian Partnership for Consumer Food Safety Education." The partnership informs Canadians about safe food-handling techniques to reduce the risk of microbial contamination. The "Thermy the Thermometer" program in the United States is an example of a public campaign to encourage proper meat cooking at home. And New Zealand's Food Safety Partnership promotes four safety actions for consumers: clean hands and utensils, thorough cooking of meats, adequately covering food before and after cooking, and storage of perishables at low temperatures.

International efforts to harmonize food safety standards as well as regional agreements have helped to facilitate trade and instill greater consumer confidence that imported products are at least as safe as domestic products. The need for economies to align their international standards for food safety on the basis of sound science has grown with trade and inspired WHO and the Food and Agricultural Organization to create CODEX some 40 years ago (see box). CODEX is used as a global reference for food standards by many regional organizations in which PECC members participate (i.e., APEC, NAFTA, ASEAN, and CER) (Table 4). These organizations acknowledge the importance of food safety and common standards to facilitate food trade, as shown, for example, in APEC's 1999 Food System Initiative.

Table 4 **PECC Membership in Global and Regional Agreements**

PECC MEMBERS	WTO	CODEX	APEC	ASEAN	NAFTA	CER
Australia	X	X	X			X
Brunei	X		X	X		
Canada	X	X	X		X	
Chile	X	X	X			
China	X	X	X			
Colombia	X	X				
Ecuador	X	X				
Hong Kong China	X		X			
Indonesia	X	X	X	X		
Japan	X	X	X			
Korea	X	X	X			
Malaysia	X	X	X	X		
Mexico	X	X	X		X	
New Zealand	X	X	X			X
Peru	X	X	X			
Philippines	X	X	X	X		
Russia		X	X			
Singapore	X	X	X	X		
Chinese Taipei	X		X			
Thailand	X	X	X	X		
United States	X	X	X		X	
Vietnam		X	X	X		

The ASEAN subcommittee on Food Science and Technology was set up to undertake collaborative R&D on food safety and quality assurance systems, including nutritional quality, improvement of existing technologies, and the development and strengthening of the scientific basis for technology development and innovation. The leading harmonization agreement in the region is the Australia New Zealand Food Authority (ANZFA). ANZFA's key responsibility is the development of food standards for the Australia New Zealand Food Standards Code, the sole food code for both countries.

NAFTA created a committee on sanitary and phytosanitary (SPS) measures to facilitate improvement in food safety and sanitary conditions and to align SPS measures across Mexico, Canada, and the United States.

Sharing Information on Foodborne Illness

Sharing data is an important part of disease surveillance, and several organizations are cooperating in the tracking of foodborne illness, facilitated by use of the Internet. APEC's EINet (Emerging Infections Network) is a global network intended to address containment of infectious diseases, including some foodborne diseases, regionally and globally. WHO, with the participation of 113 countries, has a global surveillance system for some foodborne diseases. PulseNet is a US laboratory-based surveillance system, using DNA fingerprinting, for several foodborne pathogens, including *E. coli* 0157:H7, *Salmonella*, *Shigella*, *Listeria*, *Campylobacter*, *C. perfrin-*

GLOSSARY OF TERMS

BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)—A brain-wasting disease caused by prions; linked to a human variant, Creutzfeldt-Jakob Disease (vCJD).

DIOXIN—A general term describing a group of hundreds of chemicals that are highly persistent in the environment. The most toxic compound is 2,3,7,8-tetrachlorodibenzo-p-dioxin or TCDD. The toxicity of other dioxins and chemicals such as PCBs that act like dioxin are measured in relation to TCDD. Dioxin is a by-product of many industrial processes involving chlorine, including waste incineration, chemical and pesticide manufacturing and pulp and paper production.

EPIDEMIOLOGY—Branch of medicine that investigates the causes and control of epidemics.

GENETICALLY MODIFIED FOOD—Contains a gene or genes which have been artificially inserted instead of the plant acquiring them through pollination. The inserted gene sequence may come from another unrelated plant, or from a completely different species. Transgenic Bt corn, for example, which produces its own insecticide, contains a gene from a bacterium. All crops have been genetically modified from their original wild state by domestication, selection and controlled breeding over long periods of time (http://www.colostate.edu/programs/lifesciences/TransgenicCrops/what.html).

GOOD AGRICULTURAL PRACTICES (GAP)—Guidelines established to ensure a clean and safe working environment for all employees while eliminating the potential for contamination of food products. Some practices focus on worker hygiene, packaging, storage, field sanitation, product transportation, and cooler operations.

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS (HACCP)—A management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement, and handling to manufacturing, distribution, and consumption of the finished product. This system has been adopted by many firms around the world and is mandatory in some sectors in some economies.

ISO 9000—A standard for Quality Management Systems; ISO registration is rapidly becoming mandatory for companies worldwide. The ISO 9000 standard is generic and independent of specific industries or economic sectors. Some of the management principles promoted for improving an organization's performance include customer focus, involvement of employees, continual improvement, factual approach to decision making, and mutually beneficial supplier relationships.

PRIONS—Proteins that occur in the brains of mammals. The normal function of prion proteins is to protect the brain against dementia and other degenerative problems associated with old age. Sometimes, "rogue" prions are produced by genetic mutations. In addition to causing disease through inherited genetic mutations, mutant prions are capable of turning into rogue disease agents. Transmitted from an infected animal or human to a new host, they convert any normal prions they encounter into copies of themselves. This conversion process eventually results in spongiform encephalopathies such as BSE and CJD.

SEQUELA—A diseased condition following, and usually resulting from, a previous disease.

gens, and cholera. The system facilitates prompt identification of outbreaks and timely food product recalls when necessary. PulseNet has an international dimension: Canada joined it in 2000, and scientists from Japan, Hong Kong China, and Chinese Taipei have been trained on it. FoodNet is another US surveillance system for foodborne illness, tracking population-based incidence rates, epidemiological trends, hospitalizations, and deaths from selected pathogens.

An example of how international communication and sharing of data can work in identifying foodborne pathogens and preventing their spread is shown in Jennifer Ackerman's article on PulseNet's detection of the cause for a foodborne illness first detected in Virginia. The PulseNet system matches strains of microbes through DNA fingerprinting enabling epidemiologists to tie together illnesses in different parts of the country and to begin a process of investigation to find a common cause. Ackerman writes:

> In January 2000 public health officials in Virginia noted an unusual cluster of patients sick with food poisoning from one strain of *Salmonella*. Using PulseNet, the CDC identified 79 patients in 13 states who suffered infection from the same strain of the microbe. Fifteen had been hospitalized with severe bloody diarrhea; two had died. The common factor? All had eaten mangoes during the previous November and December.

An investigation of the impli-

Table 5 **Some Important Examples of Foodborne Pathogens**

Pathogen	Type	Symptoms
Salmonella	Bacterium	Common mild forms cause diarrhea, cramping, fever, chills and sometimes vomiting
Staphylococcus aureus	Bacterium	Produces a toxin that causes sudden onset of nausea, vomiting and sometimes diarrhea. Usually over in less than one or two days
Campylobacter jejuni	Bacterium	Mild to moderate illness with abdominal cramps, diarrhea, fever, nausea, sometime vomiting
Clostridium perfingens	Bacterium	Produces a toxin that causes sudden acute abdominal pain and diarrhea, usually over in one day or less
Cyclospora cayetanensis	Parasite	Causes watery diarrhea, loss of appetite, weight loss, abdominal bloating and cramping, nausea, fatigue, and low-grade fever.
Clostridium botulinum	Bacterium	Causes double vision, droopy eyelids, trouble with speaking and swallowing and difficulty with breathing. Without treatment death may result from suffocation because nerves can no longer stimulate breathing.
E. coli O157:H7	Bacterium	Can cause a rare illness with severe, bloody diarrhea and kidney failure
Listeria monocytogenes	Bacterium	Can cause a rare illness with fever and diarrhea; in severe cases can lead to meningitis and death
Shigella	Bacterium	Causes mild to severe symptoms, including cramps, fever, chills, and sometimes bloody diarrhea
Toxoplasma gondii	Parasite	A parasite that causes a very sever illness that can produce central nervous system disorders. Chiefly a problem for pregnant women and people with immune disorders
Vibrio vulnificus	Bacterium	Causes a rare illness with vomiting, diarrhea and abdominal pain. Severe cases cause dangerous infection of bloodstream
Norwalk-type	Virus	Causes nausea, vomiting, diarrhea, and abdominal cramps. Headache and low-grade fever may also occur. Persons with this infection usually recover within 2-3 days without serious or long-term health effects.
Yersinia enterocolitica	Bacterium	Causes a mild to moderate illness with vomiting, diarrhea and abdominal pain

Source: Council for Agricultural Science and Technology, Foodborne Pathogens: Risks and Consequences, 1994; "As danger breeds in familiar foods, caution is Cyclospora Infection http://www.cdc.gov/ncidod/dpd/parasites/cyclospora/factsht_cyclospora.htm.

cated fruit led to a single large mango farm in Brazil. When a team of health officials visited the farm, they discovered that tanks used to dip the mangoes in warm water to control fruit fly infestation, and then in cool water to cool the fruit, were open to the air. There were toads and birds around the tanks and feces in the water. It likely was the cold rinse that caused the mangoes to absorb the tank water and the pathogens it contained, including a strain of *Salmonella* (Ackerman, pp. 20-21).

Promoting New Technologies to Enhance Food Safety

Both the public and commercial sectors encourage the development of technologies to complement HACCP management techniques in improving the detection and reduction of foodborne pathogens. Technologies proven to be valuable in keeping food safe, include post-package pasteurization of processed meats, x-ray and electrical beam technology to kill dangerous bacteria on fresh produce and in packaged foods, and ozone sprays for killing pathogens faster than traditional approaches. Sensors and other techniques for rapid detection of microbial contamination can also be used to identify and then contain the spread of *E. coli*, *Salmonella*, and other pathogens. The APEC Food System Initiative calls for the creation of a "food technology culture" in which the benefits of food technology to make the food system safer and more efficient are disseminated throughout the region.

Sources/Vectors	Incubation period
Raw and undercooked eggs, undercooked poultry and meat, dairy products, seafood, fruits and vegetables	6 to 48 hours
High-protein foods; foods handled during preparation; tolerates salty foods (e.g., cooked hams, dairy products)	2 to 7 hours
Associated with raw and undercooked meat and poultry, raw milk, shell fish and untreated water	1 to 7 days
Most outbreaks from meat and poultry products and beans; foods mishandled in food service establishments.	8 to 16 hours
Spread by water or food contaminated with infected stool; outbreaks linked to various types of fresh produce.	1 week
Most illness due to home canned vegetables, meat or fish; occasionally from mishandling in food service.	12 to 36 hours
Meat, especially undercooked or raw hamburger, raw milk and produce	3 to 7 days
Improperly processed meats and dairy products, raw and undercooked meat, poultry, seafood and produce	4 days to several weeks
Thrives in the human intestine and is spread by infected food handlers	1 to 7 days
Meat, primarily pork	Unknown
Raw or undercooked seafood	16 hours
Contaminated shellfish and prepared foods handled by infected workers	1 to 2 days
Infection is most often acquired by eating contaminated food, especially raw or undercooked pork products.	4 to 7 days

the key," The Philadelphia Inquirer, May 31, 1998; Center for Disease Control and Prevention, Fact Sheet,

Recommendations

The PECC needs a strong commitment to generate more comprehensive data on the incidence of foodborne illness and its causes and to share this information around the region. Better data will ameliorate uncertainties and enhance risk analysis to enable more rapid identification, mitigation, and elimination of the threat from an outbreak. Pinning down which pathogens are the major culprits and where in the food supply chain they get their start will reduce the human toll and help reduce uncertainty faced by food suppliers. While deliberate contamination of the region's food supply has been rare, it now needs to be given greater consideration along with other possible means of contamination.

International cooperation is a necessary dimension in data and information development and sharing because of the substantial role of trade in disease outbreaks and in other food safety issues.

Similarly, better data and research will inspire the public's confidence in governments' ability to assess the actual risk of foodborne illness with any given outbreak and to respond accordingly. This will also help the food sector; better information should make the consumer response to foodborne events more consistent with actual risks. Uncertainty about food safety is the enemy of both rational behavior and business investment in the region's food system.

PECC member economies must promote the development of safe technologies that will prevent initial contaminations, disinfect foods more effectively, and detect pathogens and other disease causing food-borne agents more quickly.

Public and private institutions need to work cooperatively to harmonize science-based standards and implement practices aligned with HACCP in food processing and food service. These practices have been shown to be effective in reducing the incidence of some foodborne pathogens in the US. Adoption of HACCP has been voluntary in many export sectors in the PECC because of the strong incentive for these businesses to differentiate their product as being "beyond reproach" from the standpoint of food safety and to establish credibility with buyers. The high cost of implementation of HACCP by mid- and small- sized firms may require public support.

Food safety is a concern of all people regardless of income. Broad educational campaigns on minimizing the consumption of raw animal products, properly cleaning and cooking meat and produce, using refrigeration, and boiling water must be implemented, continued, and expanded to all income groups.

Public and private sectors working together can make the region's food supply safer.

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WEBSITES ON FOOD SAFETY

INTERNATIONAL ORGANIZATIONS:

- **Asian Food Information Center–**http://www.afic.org/
- **APEC Emerging Infections Network (EIN)–**http://www.apec.org/infectious/index.html
- **Codex Alimentarius–**http://www.codexalimentarius.net/
- **The Pan American Health Organization–**http://www.paho.org/
- **World Health Organization–**http://www.who.int/en/
- **Food Safety Programme–**http://www.who.int/fsf/

NATIONAL AND OTHER SOURCES:

- **Canadian Food Inspection Agency–**http://www.inspection.gc.ca/
- **Gateway to Government Food Safety Information–**http://www.foodsafety.gov/
- **Food Standards Australia New Zealand–**http://www.foodstandards.gov.au/
- **Food Quality Control Division, Ministry of Health, Malaysia–** http://dph.gov.my/division/fqc/index.htm
- **Health Canada Food Program–**http://www.hc-sc.gc.ca/food-aliment/e_index.html
- **Hong Kong Food and Environmental Hygiene Department–** http://www.info.gov.hk/fehd/safefood/index.html
- **Japan's Ministry of Health, Labour, and Welfare–**http://www.mhlw.go.jp/english/index.html
- **US Center for Disease Control and Prevention–**http://www.cdc.gov/
  - **Foodborne Diseases Active Surveillance Network (FoodNet)–**http://www.cdc.gov/foodnet/
  - **National Molecular Subtyping Network for Foodborne Disease Surveillance (PulseNet)–** http://www.cdc.gov/ncidod/dbmd/pulsenet/pulsenet.htm
- **USDA, Economic Research Service–**http://www.ers.usda.gov/Emphases/SafeFood/index.htm
- **USDA-FDA: Foodborne Illness Education Center–** http://www.nal.usda.gov/fnic/foodborne/fbindex/008.htm
- **USDA, Food Safety Education and Consumer Information, Food Safety and Inspection Service–** http://www.fsis.usda.gov/OA/consedu.htm
- **University of Maryland, Joint Institute for Food Safety and Applied Nutrition, Food Safety Risk Analysis Clearinghouse–**http://www.foodriskclearinghouse.umd.edu/

ABBREVIATIONS USED IN THE PACIFIC FOOD SYSTEM OUTLOOK

ANZFA–Australia New Zealand Food Authority

APEC–Asia Pacific Economic Cooperation Forum

ASEAN–Association of South East Asian Nations

BSE–Bovine spongiform ecephalopathy

CDC–US Center for Disease Control and Prevention

CER–Closer Economic Relations (Australia and New Zealand)

FAO–Food and Agriculture Organization of the United Nations

FDA–US Food and Drug Admistration

GAP–Good Agricultural Practices

GDP–Gross Domestic Product

GMO-Genetically modified organisms

HACCP–Hazard Analysis and Critical Control Points system

ISO–International Standards Organization

NAFTA–North American Free Trade Agreement

PECC–Pacific Economic Cooperation Council

PFSO–Pacific Food System Outlook

SPS–Sanitary and Phytosanitary Measures

WHO–World Health Organization

WTO–World Trade Organization

PECC MEMBERS

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BRUNEI DARUSSALAM

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ECUADOR

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SPONSOR PROFILES

Economic Research Service

http://www.ers.usda.gov

The Economic Research Service (ERS) is the main source of economic information and research in the US Department of Agriculture. ERS economists and social scientists develop and distribute a broad range of economic and other social science information and analysis to inform public and private decision making on agriculture, food, environmental, and rural issues.

The ERS's timely reports are distributed to public and private decision makers to assist them in conducting business, formulating policy, and learning about the farm, rural, and food sectors. ERS publications are available to the public and the news media in both print and electronic form.

The agency 's three divisions—Food and Rural Economics, Market and Trade Economics, and Resource Economics—conduct research, perform commodity market and policy analysis, and develop economic and statistical indicators. The executive and legislative branches of the US federal government use ERS information to help develop, administer, and evaluate farm, food, rural, and resource policies and programs.

In addition to research reports and commodity analyses, ERS publishes several nationally recognized periodicals that communicate the findings of the agency's research program: *Agricultural Outlook, Food Review, Rural Development Perspectives, and Rural Conditions and Trends.*

Farm Foundation

http://www.farmfoundation.org

Farm Foundation is a nonprofit organization founded in 1933 to improve U.S. agriculture and the well being of rural people. Farm Foundation acts as a catalyst to increase knowledge about agricultural and rural issues. Program activities stimulate the research agenda, improve educational programming through extension and other outreach education, and sponsor forums to foster policy dialogue on important issues facing agriculture and rural people. Its linkages to agricultural economists and social scientists bring disciplinary knowledge to bear on its priority areas: globalization, consumer issues, environmental and natural resource issues, new technologies, the role of agricultural institutions, and rural community viability. The Foundation's programs promote the interaction of business and policy leaders, government officials, and educators in exploring strategies and policy options. The results provide a solid basis for informed private and public sector decisions.

Fundación Chile

http://www.fundch.cl

The Foundation contributes to innovation in commodity and factor markets in Chile, through technology transfer that takes account of the nation's comparative advantage in natural resources. As a technology leader, it is recognized internationally for the creation, promotion and development of innovative businesses in the primary sector.

The Foundation uses four modalities in its program of technology transfer and diffusion:

- *Participation in the creation of innovative firms;*
- *Development, adaptation, and sale of technologies to clients in the private and public sectors in Chile and overseas;*
- *Promotion of institutional innovations and new mechanisms for technology transfer; and*
- *Diffusion of new technologies to end users through seminars, specialized journals, and project consultation.*

The Foundation has demonstrated the viability of its approach through sustained contributions to the economy. Examples of the Foundation's successes include:

- *Creation of pilot salmon operations, leading to the takeoff of this industry in Chile;*
- *Development of vacuum packaged meat, leading to the marketing of boxed meat;*
- *Quality control and certification systems for fruit exports;*
- *Introduction of berries in Chilean agriculture.*

Fundación Chilena del Pacífico

http://www.funpacifico.cl

The Chile Pacific Foundation was founded in 1994 as a private nonprofit organization by a group of academic, business, and government representatives. Initially, at the request of the Ministry of Foreign Relations, the Foundation took over the responsibility of coordinating the activities of the Chilean Committee for Economic Cooperation in the Pacific (CHILPEC), the Chilean counterpart of PECC (Pacific Economic Cooperation Council), an important network of academic, business, and government leaders. Chile joined PECC in 1991 in order to participate in regional economic forums and to prepare for its application to join APEC.

Currently, the Foundation is governed by a Board of Directors, composed of 25 academics, business, and government leaders with interests in the Pacific Basin. Internationally, the mission of the Foundation is to provide support for Chile's economic, cultural, and social integration into the Pacific Basin. Toward that end, it promotes better understanding about Chile and its economic development policies by participating in a network of regional and multilateral organizations and forums. Nationally, the Foundation's mission is to disseminate information about Pacific Basin countries and their economic, social, and cultural systems by means of conferences and publications.

PACIFIC ECONOMIC COOPERATION COUNCIL

The Pacific Economic Cooperation Council (PECC) is an independent, policy-oriented organization devoted to promoting economic cooperation in the Pacific Rim. PECC brings together senior government, academic, and business representatives from 22 economies to share perspectives and expertise in search of broad-based answers to economic problems in the Asia Pacific region.

Founded in 1980, PECC now comprises member committees from the economies of Australia; Brunei; Canada; Chile; China; Colombia; Ecuador; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Mexico; New Zealand; Peru; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; the United States; and Viet Nam as well as the Pacific Island Nations. France (Pacific Territories) and Mongolia were admitted as associate members in April 1997 and April 2000, respectively. The Pacific Basin Economic Council (PBEC) and Pacific Trade and Development Conference (PAFTAD) are institutional members of PECC.

PECC's governing body is the Standing Committee, which meets several times a year and consists of the chairs of PECC committees in each member economy. The day-to-day administrative and coordinating functions are carried out by an International Secretariat based in Singapore. Each member committee sends a high-level tripartite delegation from government, business, and academia to the PECC General Meeting held approximately every two years.

In addition, PECC establishes task forces, forums, and working groups to concentrate on particular policy areas. These groups meet periodically, organize seminars and workshops, conduct studies, and publish their conclusions and recommendations for the benefit of the Pacific community. Task force topics include capital and financial markets, fisheries development and cooperation, human resource development, Pacific Island Nations, and science and technology. PECC also supports regional forums on trade policy, food and agriculture, minerals, energy, telecommunications, and transportation and publishes annual editions of *Pacific Economic Outlook and Pacific Food System Outlook*.

At the regional level, PECC's most important link with government is through APEC. PECC is the only nongovernmental organization among the three official APEC observers. PECC representatives attend APEC ministerial meetings, senior officials meetings, and working group meetings. PECC also works with other international organizations such as the World Trade Organization, the Organization for Economic Cooperation and Development, the Asian Development Bank, the World Bank, and United Nations' agencies.

For more information, contact the PECC International Secretariat, 4 Nassim Road, Singapore 258372, Tel: 65-6737 9823, Fax: 65-6737 9824, email: peccsec@pecc.net

The *Pacific Food System Outlook* represents the first regionwide coordinated effort to provide the outlook for the Pacific food system. The food system includes not just production agriculture, but also the whole complex of economic relationships and linkages that tie the region's food consumers to producers. The goal of the *Pacific Food System Outlook* is to help increase knowledge about the diverse components of this vital segment of the global economy.