Centre for International
Economic Studies

Discussion Paper
No. 0301

Protectionist Harmonization of Food Safety Policies in the Asia-Pacific Region

Lee Ann Jackson

January 2003

University of Adelaide
Adelaide 5005 Australia

CENTRE FOR INTERNATIONAL ECONOMIC STUDIES

The Centre was established in 1989 by the Economics Department of the Adelaide University to strengthen teaching and research in the field of international economics and closely related disciplines. Its specific objectives are:

- to promote individual and group research by scholars within and outside the Adelaide University
- to strengthen undergraduate and post-graduate education in this field
- to provide shorter training programs in Australia and elsewhere
- to conduct seminars, workshops and conferences for academics and for the wider community
- to publish and promote research results
- to provide specialised consulting services
- to improve public understanding of international economic issues, especially among policy makers and shapers

Both theoretical and empirical, policy-oriented studies are emphasised, with a particular focus on developments within, or of relevance to, the Asia-Pacific region. The Centre's Director is Professor Kym Anderson (kym.anderson@adelaide.edu.au).

Further details and a list of publications are available from:

Executive Assistant
CIES
School of Economics
Adelaide University
SA 5005 AUSTRALIA
Telephone: (+61 8) 8303 5672
Facsimile: (+61 8) 8223 1460
Email: cies@adelaide.edu.au

Most publications can be downloaded from our Home page: http://www.adelaide.edu.au/cies/

ISSN 1444-4534 series, electronic publication

CIES DISCUSSION PAPER 0301

Protectionist Harmonization of Food Safety Policies in the Asia-Pacific Region

Lee Ann Jackson

Centre for International Economic Studies and
School of Economics
University of Adelaide

leeann.jackson@adelaide.edu.au

January 2003

INTRODUCTION

The Asia-Pacific region includes countries at both ends of the spectrum of economic development (see Table 1). Australia and Japan are among the wealthier nations in the world, with per capita GDP in 1999 of US$ 23,554 and US$ 42,318 respectively while Viet Nam and Cambodia, two of the poorer countries in the region, have per capita GDP of only US$ 342 and US$ 285 respectively. Although many countries in the region suffered from the Asian financial crisis in the late 1990s, in general the region has experienced dramatic economic improvements over the past decade due to increased global and regional integration.[1] At the same time rapid industrialization and the corresponding movement of resources out of agricultural production, particularly in China, has raised concerns about food production and distribution in the region (Anderson et al 1996).

Typically global integration leads to increased trade and improved income levels. Both of these outcomes influence national food safety regimes. As countries become more integrated into the global economy their exports they may voluntarily adopt higher food safety standards in order to enter foreign markets.[2] At the same time, as consumers' incomes expand they prefer safer foods and increased standards.

This chapter focuses food safety policies in the Asia-Pacific region, with special attention to China, Japan, Australia and New Zealand. The following section discusses the role of agriculture in each country's economy and the general food safety regulatory structure. Next, the beef industry

[1] Not surprisingly, the Asian financial crisis of 1997-1998 had substantial impacts on the region's trade, including trade in agricultural products. Currency devaluation lead to declines in imports in the late 1990s. Imports have gradually recovered but in most countries by 2000 they had not reached pre-1998 levels. In addition, because many countries' exports are concentrated within the region, exports also declined. While the entire region was affected by the financial crisis, the impacts were not distributed evenly. China, for example, experienced steady 8.2percent annual economic growth between 1996 and 2000, while other countries showed negative growth during this period (Huang and Rozelle 2002).

[2] Some developing countries may produce products entirely for export and will invest in management, purchased inputs, monitoring and certification to meet standards of trade partners. Foods that are grown to satisfy export market standards may be unacceptable domestically for cultural or economic reasons. Thus, developing countries may divert

and national regulatory frameworks for controlling Bovine Spongiform Encephalopathy (BSE) are presented. The section following the discussion on BSE policies focuses on production several crops that have been genetically modified (GM) and the types of approaches that the focus countries have implemented to manage the introduction and adoption of genetically modified crops. A section on emerging regulatory harmonization on BSE and GM policies highlights current evidence of policy coordination in the Asia-Pacific region. The chapter concludes with a brief discussion of the challenges for achieving harmonization in this region on these issues and stresses the importance of understanding the distributive impacts of policy harmonization.

NATIONAL AGRICULTURAL PRODUCTION AND FOOD SAFETY POLICIES

Within the region there is a wide variation in trade of food and live animals (See Table 2). In 2000, Australia/New Zealand and China provide more than half of the regions exports of food and live animals, and about 9 percent of the total world value of exports. Because countries in the Asia Pacific region tend to concentrate their trade in agricultural products in the region, the Asian financial crisis lead to a decrease in exports in the late 1990's in the Asia-Pacific region as purchasing power of currency in countries hit by the shock decreased. Agricultural exports from China have recovered to their pre 1998 levels, while Australian exports are recovering more slowly. Japan was the leading importer of these products within the world, representing more than 13 percent of value of world imports of these products in 2000. In contrast in the same year Australia imports represented less than 1 percent of the value of world imports of these products. The trade interactions among these four countries and the smaller trading partners in the region play an important role in the regional economy.

---

resources from domestic food safety controls in order to improve food safety for export products but still experience

Australia-New Zealand

Agricultural sectors in Australia and New Zealand have a strong export focus. Currently 65-70 percent of Australian domestic agricultural production is exported. In the last decade, agricultural exports grew 104 percent in nominal value terms, to exceed $32 billion in 2001-2002 in Australia (DFAT 2001). More than 40 percent of Australian agricultural exports go to regional trade partners including China, Japan, Malaysia, Indonesia, Thailand, the Republic of Korea, and New Zealand. New Zealand's agricultural sector also plays an import role in the country's trade portfolio, accounting for nearly 50 percent of New Zealand's total exports (MAF 2002). Like Australia, a high percentage of New Zealand's agricultural exports go to regional trade partners, especially Japan, Australia, and China. In order to support a reputation as a dependable source of high-quality agricultural products both Australia and New Zealand maintain strict SPS and quarantine measures which can inhibit access of trading partners to their markets.

Australia and New Zealand provide the only example of a supra-national food standards agency, using bilateral approach to harmonization of food standards (Hooker 1999). In 1996 these two countries developed a bi-national food regulatory agency to cover these issues: the Australia New Zealand Food Authority, which was renamed the Food Standards Australia New Zealand (FSANZ) in 2002. However, under the terms of the agreement, Australia and New Zealand continue to have separate food safety systems (Roche 2002). The joint Australia New Zealand Food Standards Code sets composition and labelling standards for the two countries but specifically excludes food hygiene issues from the activities FSANZ undertakes for New Zealand.

---

few domestic food safety spill-overs (IFPRI 2001).

China

The Chinese economy has undergone dramatic changes since the country initiated economic liberalization and structural changes in the late 1970s. While China continues to be the world's largest producer and consumer of agricultural products, growth in the agricultural sector lags behind growth in the industrial and service sectors. Over the past two decades the share of agriculture in the Chinese economy has declined, from 30 percent in 1980 to 16 percent in 2000 (Huang and Rozelle 2002). Agricultural trade has also experienced large changes. The share of food exports in total exports fell from 17 percent in 1980 to 5 percent in 2000 and imports fell from 15 percent to 2 percent (Huang and Rozelle 2002). Rapid growth in China's non-agricultural economy will influence food supply and demand in China. Increasing incomes, particularly in urban areas, lead to rising demand for meat, fruits, vegetables and other high-value commodities. Agricultural production patterns are shifting to address these changing demands.

The "Food Hygiene Law of the People's Republic of China" governs Chinese food safety. The Ministry of Health and local governments are primarily responsible for ensuring that food safety regulations are followed. For some issues, special meetings are conducted to obtain advice and comments from industry but the regulatory system is primarily dominated by government agencies.

Japan

Japan is the world's largest food importer, from 1995-2001 annual imports averaged US$ 40 billion. In 2000 Japan individually represented over 65 percent of the total value of regional imports of these products and more than 13 percent of the total value of world imports of these products. The next largest importer in the region, China, imported only one tenth of the value imported by Japan. Japanese dependence upon food imports means that their regulatory system

must focus on defending against the introduction of products that pose health and environmental threats and may be one reason why Japan is the only country in the region that has reported cases of BSE (see discussion below).

In Japan the Department of Food Safety within the Organization of the Ministry of Health, Labour and Welfare is primarily responsible for food safety under the Food Sanitation Law. The law covers foods and drinks, also additives such as flavouring agents and equipment used for handling, manufacturing, processing or delivering food. The Ministry of Health, Labour, and Welfare can establish standards on specific foods without revising the law. According to the Food Sanitation Law Food manufacturers and processors establish sanitary control methods based upon Hazard Analysis and Critical Control Points (HACCP) system, then the Ministry confirms whether these methods achieve the appropriate standards. Local governments have the authority to monitor businesses to ensure they meet appropriate standards (Ushio 2002). Recently, in response to the first domestic case of BSE, Japanese food safety regulators began promoting farm to table food safety control systems, however the complex system of actors creates unique challenges to tracking food safety characteristics through Japanese food production and distribution channels(Ushio 2002).

BEEF INDUSTRY AND BSE REGULATION

The first reported case of BSE in the Asia-Pacific region occurred in Japan in 2001 (OIE 2002). Since then four additional Japanese cases have been confirmed. At the same time two countries in the region, Australia and New Zealand, are two of only five countries in the world that are recognised as BSE-free. While the rest of the region has not yet reported any cases, rapidly changing regional demand and production in the livestock industry could introduce new risks of disease introduction. National governments in the region are developing regulations to protect from

their countries from the introduction of this disease, however regional cooperation on BSE policies is minimal.

Production and Consumption Trends

Table 3 provides an overview of the sources of domestic supply and domestic absorption of bovine meat in Australia, China, Japan and New Zealand. In addition the table provides an indication of the change in self-sufficiency, the ratio of domestic production to total domestic supply, in these products over the 1990s. Higher self-sufficiency index ratios indicate a larger proportion of domestic production being exported.

Australia-New Zealand

Australia is the world's largest exporter of grass-fed beef, but has recently begun expanding its grain-fed herd (USDA 2002b). Because periodic drought decreases the availability of forage for Australia's primarily grass fed herd, annual bovine beef production is highly variable. In 1997 Australia's beef production represented only 5 percent of total world production. Nevertheless Australia's beef and veal exports represent 24 percent of total world exports of these products in the same year (ABARE Australian Commodity Statistics).

By the mid 1990s exports to Asia represented about 60 percent of all Australian beef exports compared to a 25 percent in the late 1980s (CCA 2000). Japan is Australia's primary market for beef in the region. From 1995 to 2001, beef exports from Australia to Japan steadily rose. This regional export concentration made the Australian beef industry particularly sensitive to the Asian financial crisis. Nevertheless, while the Asian crisis impacted beef exports, the industry experienced smaller impacts than other industries. Continued recovery of Asian economies is expected to continue to lead to further increases in Australian beef prices. New Zealand's small

increase in total annual supply from 1990 to 2000 masks the fact that both production and exports of bovine meat increased by 19 and 46 percent respectively.

Domestic consumption accounts for 31-35 percent of annual beef production in Australian beef. Australia ranked fourth in the world for beef consumption per person in 2001 behind Argentina, Uruguay and the US. (Meat and Livestock Australia 2003). Australian annual beef and veal consumption decreased in 2000, coinciding with the first case of BSE in the Asia Pacific region, but consumption in 2003 is forecast to exceed 1999 levels (FAS, 2002b).

China

According to the FAO figures, China experienced the largest change in annual bovine meat supply, estimated to be an increase of 360 percent from 1990 to 2000. While pork and poultry are a much larger proportion of total meat production in China the share of beef in total meat production in China increased 150 percent between 1983 and 1993 (Delgado et al 1998). Beef production and consumption have increased proportionately faster than all other meats over the last two decades (Brown, Longworth and Waldron 2002). In the future these trends are expected to continue as a result of China's integration into the world economy and continued growing population and increased affluence. Currently China is self reliant for beef, but imports are increasing.

Small farmers produce the vast majority of beef cattle. In 1996, farms with greater the 100 head of cattle accounted for less than 1 percent of the total beef herd in China (Bingsheng 2002). The Chinese government has actively promoted beef cattle industry as a means of raising incomes for poor farm households and as an efficient use of crop and grain residues (Brown et al 2002). The sector has been protected, but since its accession to the WTO China has initiated tariff reductions on fresh/chilled beef and frozen beef cuts. Household slaughtering accounts for around 90 percent of

all slaughtering but produces low quality beef under conditions of extremely variable hygiene (Brown et al 2002).

Rising incomes and increasing population are driving increases in demand for bovine meat in China. In the 1990s, Chinese demand for beef increased nearly 300 percent, from 1.1 kg/capita to 4 kg/capita (Bingsheng 2002). While a small sub-segment of the consumer market is willing to pay a premium for beef that is perceived to be safe, the vast majority of the beef sold in china is low price and low value (Brown et al 2002). Meat sold in urban State stores and larger supermarkets often carries labels indicating that the meat was processed under government supervision and inspected and was thus a higher quality product(Brown et al 2002). FAO forecasts that demand for met is likely to continue increase at an annual growth rate of three to four percent due to population growth, urbanization and income improvements (Bingsheng 2002).

Japan

During the 1990s Japanese consumers chose increasingly western diets including increased consumption of beef (14 percent increase from 1990 to 2000). In the first half of the 1990s, Japanese production of beef grew but since the mid-1990s consumption has stagnated and production has steadily declined. Imports, therefore, are playing an increasing role in satisfying domestic demand and currently account for about two thirds of beef consumption in Japan (USDA 2002b). The drop in demand for beef was exacerbated by the discovery of the first case of BSE in 2001 in domestic dairy cattle.

Australia-New Zealand

In the 1990s co-regulation of the Australian beef industry, a system in which industry self-regulates through approved programs with strong legislative underpinning, gained acceptance and government moved from uniform regulatory approaches to more industry lead approaches such as product certification systems. While the national framework for food safety is moving towards co-regulation, states and territories maintain the right to develop more prescriptive approaches to food safety.

In January 2001, in response to the increased risk of BSE introduction through trade, the Australian government temporarily suspended imports of beef and beef products from thirty European countries. ANZFA has developed a certification regime to replace this import suspension while continuing to ensure that imports of beef and beef products are safe for human consumption. Currently Australia and New Zealand are following the European Commission's risk categorization of countries exporting beef products, known as the Geographical BSE Risk (GBR) assessment. Australia and New Zealand classify countries into 4 categories of risk:

Category A: Negligible risk, certification required. Country has been classified by GBR as level 1 or II or a risk analysis has been conducted by Australia and determined that all potential risk factors for BSE have been addressed

Category B: Negligible risk, certification required. No BSE cases exist but the country does not meet the criteria for categories A, C and D.

Category C: Considerable exposure to BSE risk materials, certification required. The country has been classified by GBR as level III or one or more BSE cases have been reported but Australia has satisfied itself that appropriate safety measures have been implemented.

Category D: Highest level of risk, imports from these countries denied entry to Australia. The country has been classified by GBR as level IV or III and has had one or more cases of BSE.

China

Meat distribution channels have diversified rapidly in the last decade and create challenges for policy makers seeking to effectively control hygiene and cleanliness in these distribution channels (Brown et al 2002). The Chinese government has instituted regulations in response to public concerns about the safety of meat products sourced from non-inspected slaughter premises but monitoring and enforcement are variable and have been unevenly implemented by local governments.

The 1992 Rules and Regulations of Livestock and Poultry Epidemic Prevention issued by the Ministry of Agriculture sought to prohibit the sale of uninspected meat but the provisions of this regulation were largely ignored. In 1997 in response to growing consumer concerns about meat safety, the government adopted the Animal Epidemic Prevention Law of the People's Republic of China. The law established requirements for veterinary and health quarantine inspection of meat and restricted slaughter activities to specified slaughter points (Brown et al 2002). The Industry Commerce and Administration Bureau monitors the registration of beef processors and cattle slaughter-houses, however in many cases checks are not made (Brown et al 2002).

Japan

After the first case of BSE was found in Japan, the Japanese Ministry of Health issued a directive to food manufacturers to stop using animal parts such as brain, spinal cord, eyes and small intestines. While the directive does not entail a legal obligation to cease using these products, the Ministry plans to publicize list of violators. In response to the first case of BSE in Japan, the Japanese government (Ministry of Agriculture, Forestry, and Fishery) ordered on-site inspection of all 146,000 dairy and beef cattle farms (USDA 2002b). Regardless of the Japanese government's action to allay consumer fears beef consumption declined by nearly 50 percent. Four additional

cases have been confirmed. Japanese imports of beef in 2003 are forecast at 860,000 tons, reflecting a return in consumer confidence in beef safety.

In December 2001, the Japanese Ministry of Agriculture introduced a voluntary scheme to slaughter more than 5000 animals that had been fed animal products that typically carry the disease (BSE Review 2002). Farmers who voluntarily destroyed their cattle were compensated for this loss. In 2002, following this initial action, Japan adopted a new set of regulations including testing and feeding requirements to control BSE in the domestic beef. Testing will be implemented on all beef cattle over the age of 24 months that die of disease or injuries. In addition, regulations introduce a ban on feeding meat and bone meal feed to cattle. Finally, an identity preservation system including tagging and recording cattle movements are planned(Meat News 2002)

GENETICALLY MODIFIED CROPS AND LABELLING

In the past two decades several governments in the Asia-Pacific region have devoted significant financial and human resources to develop new agricultural biotechnologies. The range of products varies from commodity crops like rice and maize to high value, specialized crops like vanilla and orchids. Although GM food crops have been approved in several countries, only the Philippines has publicly announced intention to product GM food.[3] The delayed marketing is related to a concern over maintaining access to global food markets. Those countries that are dependent upon their export markets for national income will carefully consider the trade-offs between enhanced production and potentially decreased market access. Some governments, like Australia are promoting identity preservation along the entire food supply chain in order to ensure that products will meet the standards of food importers. These large scale solutions are costly and the benefits depend upon shifting global consumer preferences for differentiated products.

Production and Consumption Trends

The following analysis focuses on the rice, maize and wheat agricultural sectors since these crops include GM varieties that either have already been adopted or have are likely to be adopted in the near future. Tables 4-6 show the changes in supply sources and demand composition for wheat, maize, and rice during the 1990s in Australia, New Zealand, China and Japan. In general, in these four countries, wheat was consumed as human food while maize was used as livestock feed.

Australia-New Zealand

Australian wheat and maize annual production increased during the 1990s but annual production of both commodities was highly variable primarily due to weather events, such as drought. Average annual Australian wheat production over the last 5 years was 21.1m tonnes (about 4 percent of world output). Most wheat production was exported and more than 40 percent of wheat exports in 2000 went to regional trading partners, like Indonesia, Japan and Korea. Australia is the third main world exporter of wheat behind the US and Canada (AFFA 2002). Maize and rice are produced in much smaller amounts than wheat.[4] New Zealand exhibits a similar pattern of production with wheat production surpassing maize and rice production throughout the 1990s.

---

[3] Philippine farmers are expected to begin commercially planting GM maize in 2003 (Crop Biotech Update 2002). The Philippine Agriculture Secretary emphasized the objective of using GM technologies to help low income farmers.
[4]Recently public debate within Australia increased when Australia accepted a shipment of US maize intended for animal feed, which contained GM product. This decision was criticized as being a move towards giving up Australia's GM free status which would lead to a decrease in Australia's reputation for high quality agricultural products. Currently animal feed is not subject to the labelling regulations, although feed companies may adopt voluntary labels to identify their products as GM-free (Bullock and Desquilbet 2001)

Australia produces only 0.2 percent of world rice but accounts for about 3 percent of international trade in rice. Major export markets for Australian rice include Papua New Guinea Japan, Hong Kong, the Middle East and Pacific countries such as New Zealand and Fiji. (AFFA 2002b).

Australian wheat consumption steadily increased during the 1990's but the primary consumption destination shifted from domestic food to livestock feed in the late 1990s. Maize consumption also increased over the 1990s, peaking in 1997, then dropping to lower levels. Livestock feed was the primary use for maize in Australia and during this decade the use of maize as livestock feed increased during the first part of the decade, then fell as export demand for livestock in Asia decreased due to the Asian financial crisis. New Zealand maize and wheat consumption remained fairly constant throughout the 1990s. Wheat was primarily consumed as a source of food, while maize was primarily consumed as livestock feed.

China

The Chinese grain sector, like the beef sector, is still characterized by small farms and labor-intensive management methods (Rozelle 2001). For example, the average corn farmer cultivates about one-half hectare using very high amounts of labor and relatively high amounts of fertilizer. Chinese farmers however also work within unique political constraints. Insecure property rights and national procurement policies alter the incentives that farmers face in cultivating their land and marketing their surplus grains.

China produced more than 120,000 MT of rice per year in the 1990s. Most of this crop was consumed as food by the domestic population, although rice exports increased throughout the decade. In 2000 rice accounted for 37 percent of all cereals produced in China, while wheat and Maize combined accounted for 60 percent of the volume of cereal produced.

In the 1990s Chinese maize production has increased more than the production of rice and wheat. Maize production increased 12 percent from 99 million metric tons to 111 million metric tons. Maize production in the 1990s exceeded aggregate wheat production and maize now ranks second only to rice in total agricultural production. Wheat imports decreased steadily over the decade, accounting for 2 percent of domestic absorption on average. In contrast, imports of maize remained relatively flat during the decade, and accounted for on average 4 percent of domestic absorption.

Chinese wheat consumption has remained fairly constant throughout the 1990s, with most of the wheat supply consumed as food. Over the decade the share of domestic wheat consumption accounted for by food increased. On average, food consumption of wheat accounted for 88 percent of total domestic consumption. In contrast maize consumption increased dramatically in the latter part of the decade and most of the increase was due to increased use of maize for livestock feed. As mentioned previously, in China the demand for maize increased in conjunction with rapid increases in meat production.

Japan

In contrast to the beef industry which has become increasingly liberalized in the 1990s, Japanese grain and rice sectors are still heavily protected. Japanese farmers have not increased production despite high levels of protection. The state is heavily involved in trading agricultural commodities which constrains industry evolution and a total supply-chain approach (Trewin and Drysdale 2000).

Japanese agricultural production is dominated by rice, however production of rice decreased during the 1990s. Japan produced only small volumes of wheat and maize during the 1990s,

supplementing domestic production of these commodities with imports predominantly from Australia. Both wheat and maize production also decreased during the 1990s.

Japanese wheat and maize consumption remained fairly constant during the 1990s. The share of wheat consumption in livestock feed and food also remained relatively constant, averaging 8 and 86 percent respectively over the decade. Similarly, the share of maize consumption in livestock feed and food also remained relatively constant, averaging 76 and 8 percent respectively during the 1990s. Rice consumption decreased by 20 percent from 1990 to 2000 (FAS 1999).

GM Regulations

National decisions about regulatory approaches are influenced by whether GM products are perceived as categorically new products or as extensions of conventional products. Achieving harmonized approaches for GM products will require regulatory strategies that can adapt to either of these attitudes. In addition, because GM regulatory systems must address both consumption and food safety of GM foods and the environmental impacts of introducing GM crops into natural systems, national systems governing these products tend to include multiple agencies with overlapping jurisdictions. The following discussion emphasizes food regulations, however the complexity of national regulatory system for GM products also has broad implications for potential harmonization and the desirability of mandated versus voluntary labelling approaches (see Runge and Jackson for a discussion mandatory versus voluntary labelling systems).

Australia-New Zealand

The regulatory system for GM technologies has evolved to treat the production and trade of GM products separately from traditional products.[5] In June 2001, Australia adopted a new regulatory regime governed by the Gene Technology Act 2000. The act regulates all research, field trials, manufacturing, production and importation of GM products (E and Y 2001). An independent regulatory office, the Gene Technology Regulator (OGTR), overseas the implementation of the Gene Technology Act, maintains a publicly available record of genetically modified products and licenses any intentional release of a GM organisms into the environment. The Australian Quarantine and Inspection Service (AQIS) also regulates importation into Australia of all animal, plant and biological products that could introduce pests or disease, and hence has jurisdiction over possible GM imports. Prospective importers of plant products are required to include a statement about the GM content of that product.

The Australian government is considering implementing a traceable and auditable identity preservation system and testing regime to allow for the segregation of products containing GM material from those certified "GM-free.". As in the beef industry, the agricultural industry works with government agencies to develop and implement a policy of coexistence of GM, conventional and organic crops(AFFA 2001). This type of identity preservation system would enhance the effectiveness of national labelling policies.

A separate agency, the Food Standards Australia New Zealand (FSANZ), controls the labelling of GM products. From December 2001, FSANZ required labelling of all food and food ingredients where

- Novel DNA or novel protein are present in the final food; and

[5] Australia is currently producing GM carnations and cotton for commercial market and conducting field trials on seventeen other crops, including canola and cotton varieties. Commercialization for some of these crops is expected over the next five years (AFFA 2002). By 2002 the food safety regulatory agency had approved seventeen applications for GM foods, including corn, canola, soybeans and potatoes, food manufacturers have avoided using these products as ingredients (AFFA 2001).

- The food nutritional or allergenicity characteristics that differ from the conventional food counterpart.

Foods that are exempt from the labelling include

- Highly refined foods that do not contain novel DNA or proteins
- Food additives and processing aids
- Flavours that are present in a concentration no more than 1g/kg in the final food and
- Food prepared at point of sale.

Labels for single ingredient products that are genetically modified must include the phrase "genetically modified" and the name of the product. Packaging of multi-ingredient foods must identify which ingredients are genetically modified ingredient by including the phrase "genetically modified" immediately after any ingredient that requires a label (E and Y 2001)

In New Zealand two agencies have mandates relating to genetically modified crops. Food Standards Australia New Zealand is responsible for developing genetically modified food standards. The Environmental Risk Management Authority (ERMA) controls the genetic modification of plants, animals and other living things under the Hazardous Substances and New Organisms Act of 1996. In 2001 New Zealand's Royal Commission on Genetic Modification implemented a two year constraint period during which the ERMA will not accept applications for the release of GMOS except those with direct human or animal health benefits (Ministry for the Environment 2001). The law exempts several types of products including medicines that are or contain live GMOs for human use, veterinary medicines that are or contain approved live GMOs, and GMOs approved under the Hazardous Substances and New Organisms Act of 1996 (BRIDGES August 2002). Since the law focuses on GMOs intended for release into the environment it does not relate to GM foods and ingredients. Nevertheless, it has distinct implications for New Zealand exporters, who can claim GM-free status and thus access international markets for GM-free products. The

government commentary on this law stresses the importance of "preserving opportunities" within the context of the economic impacts of GM crop releases (Ministry for the Environment 2001b).

China

China has rapidly built up scientific programs for agricultural biotechnology over the past fifteen years and in November 2002, the Chinese government announced the intention of quintupling government agricultural biotechnology research funding by 2005 (CropBiotech Update 2002).[6] These investments have supported rapid advances in the development of genomic studies transformation technologies.

A national committee established in 1996 accepts applications twice a year for biosafety evaluation of genetically improved crop plants, farm animals, and microorganisms (ADB 2001).[7] Despite the many new seed varieties that are available in China, the Chinese regulatory agencies have only allowed the widespread planting of Bt Cotton (Kahn 2002). Official regulatory restrictions on the planting of other GM crops may mask the true adoption of these crops as rural farmers often use informal marketing channels to acquire seed. Bt cotton, which has been available on the market since 1997, is the largest GM crop in China. In 2000 around 3 million Chinese cotton farmers grew Bt cotton, in fields covering 500,000 hectares (ISAAA 2001). Use of toxic pesticides such as organophosphates has plummeted by 80 per cent and pesticide poisonings have decreased. (New Scientist 2002)

While China invests heavily in the development of GM crops, the country maintains strict regulations on trade and labelling of GM foods. In 2001 China adopted restrictive regulations on the import of GM foods, requiring that importers of GM products obtain safety permits. Because

[6] Genetically modified crops being tested in China in the late 1990s included rice, wheat, maize, cotton, tomato, pepper, potato, cucumber, papaya, and tobacco. More than 90 per cent of Chinese field trials target insect and disease resistance, reducing the need for expensive and dangerous pesticides.

China is the largest importer of US soybeans and 70 percent of US soybeans were GM in 2001, these regulations disrupted trade between the two countries. In April of 2002, China began issuing temporary permits that again allowed imports of GM products and removed the temporary trade barrier diffusing the US-China conflict on this issue(Reuters 2002). China has also adopted labelling policies that require that all foods containing GM ingredients will be labelled and processed foods that do not contain detectable modified DNA or proteins must identify that some of the product source is GM (AFFA 2001)

Japan

The Ministry of Health, Labor and Welfare (MHLW) and the Ministry of Agriculture, Forestry, and Fisheries share the jurisdiction of food labelling. The MHLW administers the Food Sanitation Law and the Ministry of Agriculture, Forestry and Fisheries administers the Law concerning Standardization and Proper Quality Labelling of Agricultural and Forestry Products. Both Ministries have imposed labelling requirements for GM foods, including pre-packaged processed foods and food additives, including ingredients (MHLW 2001). Under the Japanese system, only ingredients in which GM DNA or proteins are present, which are one of the top three ingredients in food or which are present at more than five percent by weight are considered for labelling purposes. The labelling system has three broad categories. All foods that have been genetically modified and identity preserved must be labelled "genetically modified." Products that have not been handled in an identity preservation system must be labelled "not segregated from GM product." A non-GM food handled using an identity preservation process may be labelled "not genetically modified." In addition, manufacturers are able to state on the label when government has approved genetically modified ingredient (Asian Food Information Centre 2002).

[7] By mid 1998 the committed had received 75 applications for field testing of transgenic crops and granted permission to 53 for commercial production, environmental release or small-scale field testing (ISAAA 2001)

EMERGING REGIONAL REGULATORY HARMONIZATION AND INSTITUTIONAL CONVERGENCE

National policy frameworks as well as regional groups influence emerging policy harmonization. In the Asia Pacific, regional groups such as APEC and ASEAN contribute to harmonization by facilitating interaction among countries, initiating policy dialogue across national borders and supporting consensus-building activities through workshops and policy discussions. Due to the difficulty in achieving consensus across diverse groups of countries, these types of activities are particularly useful in situations where technology or health concerns are progressing at a modest rate. Both of the food safety issues addressed in this chapter, BSE and GMO crops, are rapidly changing due to technological advances in the case of GMO crops and in terms of potential global health threats, in the case of BSE.

National Policies

Policies to control the spread of BSE include both national beef quality control mechanisms as well as border measures such as quarantine restrictions on the import of beef and feed. These two types of policies involve different types of relationships with other countries and hence harmonization works differently for each type of policy. Since countries desire to set their own internal controls on their production of beef , national food safety policies that monitor and control domestic beef production are less likely to have an international component to them.

The four countries examined in this chapter are not actively seeking to harmonize their approaches to BSE, but this is not surprising given their unique economic and governmental characteristics. Japan, a major importer of beef, has already experienced its first case of BSE therefore current Japanese food safety actions emphasize the control of BSE within national

borders. While China's imports of beef are growing, they represent a small proportion of Chinese imports and hence border policies to control BSE have not been extensively developed. Nevertheless, the growing domestic demand for beef products means that China will need to face this food safety issue in the future. Australia and New Zealand are exporters of beef and also have long traditions of enforcing strict quarantine standards. Australia has looked outside the region to the EU for guidance on how best to structure their trade restrictions in order to control BSE food safety threats.

The country classification system that categorizes countries by what type of food safety threat their beef imports pose has been broadly adopted in the EU and may provide the best mechanism for facilitating harmonized approaches to food safety controls. Under this system countries can apply for "BSE-free" status which provides their trading partners with the necessary information to determine if imports pose a significant threat of contamination to domestic markets. This type of classification system is analogous to food labelling systems – it provides information to food importers that would otherwise be controlled by exporters, allowing them to judge for themselves whether to accept risky imports.

Typically GM foods undergo more in depth safety evaluations than conventional foods, hence the food safety implications of GM foods are less important than the implications of regulations on international trade. Labelling decisions by countries that primarily produce to meet their domestic demand will have fewer repercussions in the global trade economy and policy makers can focus on the domestic demand for segregated and labelled products in their policy decisions. For countries that produce export crops that may be genetically modified adoption and segregation issues become strategic decisions since in the current global policy environment these choices might limit or facilitate access to particular export markets. Hence the GMO issue is critically different from the beef issue because it has broad implications for the structure of agriculture rather than individual products.

An effective and broadly adopted labelling system would support variable national decisions about segregation and adoption. To date the national food labelling systems are extremely diverse including broad variation in threshold content levels and in the definition of types of products that require labelling. The FSANZ is the only example of a bilateral fully harmonized labelling approach and this agency works because of the close relationship maintained by Australia and New Zealand and depends upon the food safety and trade policy objectives of these two countries. Both countries have long traditions of strict quarantine laws to control the introduction of pests and disease, hence controlling imports of GM material fits into their existing policy priorities of strict control. In addition both of these countries have strong export focus and are eager to maintain access to these export markets. While consumers in these countries have not demonstrated strong aversion to GM products, industry that typically is heavily involved in the development of regulations is very aware that segregation decisions will impact their ability to export their products to external markets.

China and Japan have experimented with different policy approaches for GM technologies. The Chinese have relatively simple labelling systems and have instituted border controls that limit trade in GM products (see discussion above). The growing Chinese population and shift of resources out of agriculture means that China will likely become more dependent upon imports to meet domestic food demands unless agricultural production increases. The Chinese, seeking to improve the productivity of their agricultural systems to meet the needs of a growing populations, are aggressively developing new GM technologies. At the same time they are adopting a conservative approach in the commercialisation and trade of these products. Japan has a detailed labelling law and their import focus mean that these labelling requirements could act as trade barriers for countries wishing to export to the country.

Corporate and Civil Interests

Consumer reaction to GM foods is varied and difficult to measure. According to several surveys, Australian consumers are moderately concerned about the risks associated with GM foods. One survey, conducted by Biotechnology Australia (2002) found that while Australians are concerned about the food safety of GM products, about half of Australian consumers are willing to eat GM foods. Another recent survey by Biotechnology Australia shows that just over half of the consumer surveyed believed that the risks associated with GM crops outweigh the benefits. In the late 1990s Japanese consumers were moderately aware of genetically modified foods and about one in five consumers opposed the use of GM products in agriculture (Hoban 1999). Perhaps a better indication of consumer aversion to GM products in these wealthy countries is whether consumers are willing to pay extra for "non-GM" products. Evidence that price premiums exist for these types of foods is minimal and depends upon where in the marketing chain prices are evaluated. One measure of Japanese price premiums for non-GM products, the Tokyo Grain Exchange, indicated that monthly prices between GM and non-GM soybeans ranged from $18 to $36 per tonne in 2001 (Bullock and Desquilbet 2001).

Countries with lower per capita GDP, like China, may include a small middle-class population that is willing to pay for non-GM products, however the majority of rural and urban poor consumers are likely to accept GM products as cheap alternatives to conventional food. Chinese attitudes are difficult to gage given the government's lack of support for freedom of speech, however one recent survey of 7,000 people reported that most consumers were not aware that GM food was an issue (South China Morning Post 2002).

Multi-national corporations (MNC) have increased their participation in Asian agrifood systems during the 1990s and will probably play an important role in the regions changing agri-food systems (DFAT 2001). Since these corporations act as another type of demand for agricultural

products rather than a source of production, they can influence industry standards through their acceptance or approval of particular products and ingredients (see discussion on industry standards). Several Japanese firms adopted strict labelling systems for their products and some have removed GM ingredients rather than adopting labelling systems (Phillips and Foster 2000). In 2000, several Japanese tofu producers (National Tofu Manufacturers Association) soy sauce producers (Kikkoman and Taihei Company), and breweries (Kirin and Sapporo) announced that they would only use non-GM ingredients in their products (Phillips and Foster 2000). Some firms switched from corn to wheat in the processing facilities in order to avoid the GM controversy.

Regional Institutions

APEC has several committees and sub-committees that conduct work that is relevant to the regional and international harmonization of food safety standards. The APEC sub-committee on Standards and Conformance (SCSC) was established in 1994 with the intent of providing a collaborative arrangement for reducing the negative effects on trade and investment flows in the region due to differing standards and conformance systems in the region (APEC 2002c). Several action areas under the SCSC directly involve food safety regulations, including the APEC MRA on conformity assessment of foods and food which was initiated in 2002. Through the food MRA countries voluntarily minimize food safety inspection controls at the border of importing countries. Official inspection and certification systems provide assurance that imported products have met minimal safety requirements. An umbrella arrangement includes general food safety provisions, and encourages member economies to cooperate on specific sectoral arrangements that provide details of sector specific provisions. While APEC provides guidelines for the development and administration of sectoral arrangements, individual member governments develop sectoral arrangements on a government to government basis.

The smaller countries in the Asia-Pacific region have in general shown a limited interest in developing shared procedures and standards, although these non-tariff barriers represent the largest drag on those countries' trade. Nevertheless, trade between China and these ASEAN countries has increased by 300 percent in the past decade and the smaller countries are eager to reduce their dependence upon exports to other lagging economies by expanding their regional free trade agreement to include China (Economist 2002).

Biotechnology policy has received more specific attention than beef safety policies in the regional trade agreements. In 1996 APEC created the Agricultural Technical Cooperation Experts' Group (ATCEG) to focus on agricultural technical cooperation, including joint activities to enhance extension of agricultural biotechnology. During 2001 and 2002 APEC funded three ATCEG projects two of which were directly related to cooperative activities related to biotechnology: Capacity Building, Safety Assessment, and Communications in Biotechnology and a workshop on Technical Cooperation and Information Exchange on Safety Assessments in Agricultural Biotechnology (APEC 2002b). These are voluntary activities but may serve to promote information exchange and the development of expertise that will support the harmonization of biotechnology policies within the region.

CONCLUSIONS

The ability of countries to achieve affective harmonization of food safety standards will depend upon the national characteristics of regulatory systems, the economic structure of agricultural industry and the nature of interaction among industry and government. Wide variation in regulatory and industry characteristics and interactions within the Asia-Pacific region will lead to challenges in developing harmonized approaches to food safety.

The structure of the regulatory system, particularly the relationship among different levels of government and their assigned regulatory responsibilities will affect the ability of countries to

coordinate food safety standards. This is particularly evident in the regulation of GM crops. Countries have chosen whether to treat these crops as entirely new commodities or to treat them in the same way that traditional commodities are treated. In Australia new laws and regulatory offices have been created to handle GM regulations while in Japan existing regulatory agencies are grappling with GM crops, fitting them into existing food regulations. In addition the level of government that is primarily responsible for standard setting and enforcement differs among the countries. In China, for example, the Ministry of Agriculture takes overall national responsibility but country level agriculture departments and health departments implement and oversee some aspects of national regulations.

Industry structure and land and labor scarcity will influence how policies are implemented. As mentioned above, some countries are exploring the potential of identity preservation system to address consumer concerns over GM crops. If these types of systems are implemented in some but not all countries, harmonization of standards would be more difficult. One type of economy would include highly differentiated sets of products while others would continue to produce generic, homogenized products. In relation to BSE industry structure issues are related to the types of processing facilities that are in place in the various countries. The Chinese beef industry, for example, is still dominated by small holders, whereas large farm holders dominate the Australian beef industry.

Since both regulatory and industry structure are critically important in determining effective food safety regimes, it is not surprising that the relationship between regulators and industry will also play an important role. Again, in the Asia-Pacific region there is a large variation in the ways that industry interacts with regulatory agencies. Australia, for example, stresses the importance of co-regulation where industry works directly with regulators to develop flexible regulatory systems and to analyse the potential trade-offs to promoting identity preservation systems. In contrast, China's communist history has led to a regulatory system in which government tightly controls

industry output and functions. These types of variations have implications for harmonization, since they will determine countries' predisposition to particular approaches to food safety.

Given the difficulty of achieving harmonized food safety approaches even bilaterally, it is appropriate to ask under what situations is harmonization of food safety policy desirable? For the BSE policy case the food safety risks are more immediate and demonstrable therefore it may be desirable to consider harmonized strategies that will support more consistent food safety approaches in the beef industry. The categorization of countries by levels of BSE risk may create incentive for countries to develop effective internationally recognized food safety regimes and to adopt food safety standards that will be recognized as effective by their trading partners.

In contrast, while an in depth analysis of the true scientific risks associated with GM foods is beyond the scope of this chapter, GM foods that reach the commercial approval stage probably pose no greater risk than conventional food products (Gasson and Burke 2001). Even if the food safety benefits of harmonized GM food policies are negligible, harmonized policy approaches may be desirable if they enhance global economic efficiency. Economic efficiency is difficult to measure particularly in the context of global economic system, but in situations where consumers care about product differences and producers incur minimal costs of implementing the policy are small efficiency benefits are likely to arise from harmonization. However in situations where trading partners have widely different attitudes towards GM foods, harmonization may not lead to the most efficient outcome (see Jackson 2002 for a detailed discussion of this issue).

The costs of identity segregation that would allow labelling of GM products throughout the food chain are under examination but no general consensus concerning the economy-wide costs of these approaches and the costs will vary depending upon the existing structures of the agricultural sectors. Sectors that are dominated by smaller farms are likely to experience higher costs of identity preservation, since individual sources of potential GM product would need to be identified and traced through the marketing chain. This type of result has equity implications since it implies

that lower income Asian countries that typically have small farm sizes will incur higher costs in implementing segregation strategies than higher income countries. Lower income countries might refuse to adopt potentially beneficial GM technologies in order to maintain access to export markets rather than adopting labelling and identity segregation systems that may entail excessive costs. If labelling and identity preservation leads to the refusal to adopt GM products by developing countries, the potential productivity benefits from GM adoption will never be realized. These threats are pronounced in the Asia-Pacific region due to the wide diversity of income levels and development in the region and the regional trade concentration.

While the region contains the only example of successful bilateral food safety harmonization in the FSANZ, the diversity of trading strategies and stages of economic development will make it challenging to develop more extensive harmonized approaches to the current contentious food safety issues. Australia and New Zealand will seek to adopt strategies that enhance their market access while maintaining their strict quarantine policies. Agricultural importers, like Japan, will be primarily concerned with the potential introduction of disease and undesirable products into their food chain. China will play a critical role in the region in future years and the decisions made in China in relation to food safety policies are likely to have large impacts on the rest of region both through the way these decisions influence food safety directly but also through Chinese policy choices may influence other national actors in the region. In addition while there are likely to be tangible health and economic benefits from promoting harmonized approaches to BSE regulation, the benefits from harmonized GM policies are less straightforward. The question of who will bear the costs and who will benefit from food safety policy harmonization in the Asia-Pacific region deserves careful consideration.

REFERENCES

Anderson, K., B. Dimaranan, T. Hertel, and W. Martin. 1996. Asia-Pacific Food Markets and Trade in 2005: A Global, Economy-Wide Perspective. Australian Journal of Agricultural and Resource Economics 41(1): 19-44..

APEC (2001). APEC Leaders Endorse Biotechnology. Doi: www.apec-china.org.cn.

APEC (2002). APEC Mutual Recognition Arrangement of Conformity Assessment of Foods and Food Products. Downloaded from the web www.apecsec.org.sg/scse/scsc-food.htm.

APEC (2002b) APEC Food System. Downloaded from the web: www.apecsec.org/.

APEC (2002c) Convenor's Summary Report on Standards and Conformance. Doi: www.apecsec.org

APEC (2002d) Tariff and Non-tariff Measures. Doi. www.apecsec.org.sg.

Asian Development Bank (2001). Agricultural Biotechnology, Poverty Reduction and Food Security. Asian Development Bank: Manila.

Agriculture, Fisheries and Forestry-Australia (2002). Biotechnology Strategy for Agriculture, Food and Fibre. AFFA Science Policy: Canberra.

Agriculture, Fisheries and Forestry-Australia (2002b). The Rice Industry. Doi: www.affa.gov.au.

Agriculture, Fisheries and Forestry-Australia (2001). Report Agricultural Biotechnology Workshop 2001. Commonwealth of Australia: Canberra. Doi: www.affa.gov.au

BRIDGES Weekly Trade News Digest (2002) New Zealand Notifies GMO Law to the WTO. BRIDGES 6(29) August 6, 2002.

Bingsheng, Ke. (2002) Perspectives and Strategies for the Livestock Sector in China Over the Next Three Decades. Livestock Policy Discussion Paper No. 7. Food and Agriculture Organization, Rome.

Brown, C., J. Longworth, and S. Waldron (2002). Food Safety and Development of the Beef Industry in China. Food Policy 27: 269-284.

BSE Review (2002) Japan Confirms Fifth Case of BSE. BSE Review doi: www.bsereivew.org.uk.

Bullock, D. and M. Desquilbet (2001). The Economics of non-GMO Segregation and Identity Preservation. Food Policy.

CropBiotech Update (2002). China Gears Up for Biotech. International Service for the Acquisition of Agri-biotech Applications. Cornell: Ithaca. Doi: http://www.isaaa.org/.

Delgado, C., M. Rosegrant, H. Steinfeld, S. Ehui, and C. Courbois. 1999a. Livestock to 2020. The Next Food Revolution. Food, Agriculture, and the Environment Discussion Paper 28. International Food Policy Research Institute: Washington, DC.

Delgado, C., C. Courbois, and M. Rosegrant. 1998. Global Food Demand and the Contribution of Livestock as We Enter the New Millennium. MSSD Discussion Paper No. 21. International Food Policy Research Institute: Washington, DC.

Delgado, C., P. Crosson, C. Courbois. 1997. The Impact of Livestock and Fisheries on Food Availability and Demand in 2020. MSSD Discussion Paper No. 19. International Food Policy Research Institute: Washington, DC.

Department of Foreign Affairs and Trade (1999) Trade Outcomes and Objectives Statement. Commonwealth of Australia: Canberra.

Department of Foreign Affairs and Trade (2001) Agrifood Globalisation and Asia. Volume I Agrifood Multinational Corporations in Asia. Commonwealth of Australia: Canberra.

Department of Foreign Affairs and Trade (1999) Trade Outcomes and Objective Statement. Commonwealth of Australia: Canberra.

Economist (2002). Every Man for Himself. Economist Oct 31, 2002.

Ernst and Young, Reehills and the Department of Industry, Science and Resources (2001). Australian Biotechnology Report Ernst and Young: Canberra.

Food Standards Australia New Zealand (2001) Bovine Spongiform Encephalopathy (BSE): Human Health Requirements for the Importation of Beef and Beef Products. Doi: www.foodstandards.gov.au/

Foreign Agricultural Service (2002c). Dairy, Livestock and Poultry Market Report: The Japanese Beef Market. International Agricultural Trade Report. USDA: Washington DC.

Foreign Agricultural Service (2002b). Livestock and Poultry: World Markets and Trade. DL&P 2-02 Circular Series. USDA: Washington DC.

Gasson, M. and D. Burke. (2001) Scientific Perspectives on Regulating the Safety of Genetically Modified Foods. Nature Review vol. 2 (March): 217-222.

Hoban, T. (1999). Consumer Acceptance of Biotechnology in the United States and Japan. Food Technology, May 1999, Vol. 53, no.5, page 50.

Hooker, N (1999). Food Safety Regulation and Trade in Food Products. Food Policy 24: 653-668.

Huang, J. and H. Bouis. 1996. Structural Changes in the Demand for Food in Asia. Food, Agriculture, and the Environment Discussion Paper 11. International Food Policy Research Institute: Washington, DC.

Huang, J. and S. Rozelle (2002) China's Accession to WTO and Shifts in the Agriculture Policy. Department of Agricultural and Resource Economics, University of California Davis, Working Ppaer No. 02-0002.

ISAAA (2001) Agricultural Biotechnology, Poverty Reduction, and Food Security. ISAAA: Ithaca.

Jackson, L. 2002. "Is Regulatory Harmonization Efficient? The Case of Agricultural Biotechnology Labeling", Discussion Paper 206, Centre for International Economic Studies, Adelaide University, March 2002

Kahn, Joseph (2002). "The Science and Politics of Super Rice." New York Times. Business Day October 22, 2002: pp.C1,C12

Loader, R. and J. Hobbs (1999). Strategic Responses to Food Safety Legislation. Food Policy 24: 685-706.

Meat and Livestock Australia (2003). Australian Beef Industry. Doi: http://www.mla.com.au/content.cfm?sid=28.

Meat News (2002) New BSE Regulations in Japan. Meat News doi: www.meatnews.com.

Ministry for the Environment (2001) Royal Commission on Genetic Modification – Summary of Key Government Decisions. Doi: www.mfe.govt.nz.

Ministry for the Environment (2001b) Royal Commission on Genetic Modification: Government Response. Doi: www.mfe.govt.nz.

Ministry of Agriculture and Forestry (2002). International Trade Statistics doi: http://www.maf.govt.nz/statistics/internationaltrade/exports/index.htm

Ministry of Health, Labor and Welfare (2001) Mandatory Labelling of Genetically Modified Foods and Foods Containing Allergens. Doi: www.mhlw.go.jp/English/topics/qa/gm-food/gm4.htm.

New Scientist (2002). Reaping the Rewards. February 2, 2002. [note this is based upon the science article by Rozelle Science 295]

New Zealand Food Safety Authority 2002. Regulation of Food in New Zealand. Available at http://www.nzfsa.govt.nz/policy-law/food-standards/regulation-of-food-in-nz/index.htm

New Zealand Food Safety Authority (2002b) BSE-free status confirmed. NZFSA: Wellington. Available at http://www.nzfsa.govt.nz/policy-law/food-standards/regulation-of-food-in-nz/index.htm

Office International des Epizooties 2002. Number of Reported Cases of Bovoine Spongiform Encephalopathy (BSE) Worldwide. Office International des Epizooties. Available at www.oie.int./eng/info.

Phillips, P. and H. Foster (2000) Labelling for GM Foods: Theory and Practice. ICABR Conference in Ravello, Italy, August 2000.

Reuters (2002). China Issues Temporary GMO permits, Trade Applauds. 18 April 2002.

Roche, G. (2002) The Development and Implementation of the New Australian Food Safety Standards. FAO/WHO Global Forum of Food Safety Regulators, Marrakesh, Morocoo, 28-30 January 2002. Available at www.fao.org/docrep/meeting/004/y2003E.htm.

Rozelle, S. (2001) China's Corn Economy, A Brief Introduction. Report to the National Research Initiative Committee. Doi: http://www.agecon.ucdavis.edu/facultypages/rozelle/

Runge, C.F. and Jackson, L. 2000. "Labeling, Trade and Genetically Modified Organisms (GMOs): A Proposed Solution." *Journal of World Trade* 34(1): 111-122.

South China Morning Post (2002) GM Food Growing Issue on Mainland. South China Morning Post, 5 January 2002.

Trewin, R., M. Bosworth and P. Drysdale (2000) Moving Japanese Agriculture Forward. Chapter 1 in *Issues, Options and Strategies for Improving Japanese Agricultural Trade Policies*. RIRDC Publication # 00/176. RIRDC: Canberra.

UNCTAD/WTO. 2000. PC-TAS Trade Analysis System on Personal Computer 1996-2000 SITC3. International Trade Centre United Nations Statistics Division.

United States Department of Agriculture (2002) Dairy Livestock and Poultry Trade Update. International Agricultural Trade Report. August 14, 2002.

United States Department of Agriculture (2002b). International Agricultural Trade Report February 6, 2002.

Ushio, M (2002) Food Safety Regulatory Issues. FAO/WHO Global Forum of Food Safety Regulators, Marrakesh, Morocoo, 28-30 January 2002. Available at www.fao.org/docrep/meeting/004/y2003E.htm.

World Bank (200?). World Development Indicators World Bank: Washington, DC.

World Trade Organization (2000). Trade Policy Review. Japan: November 2000. WTO: Geneva.

Table 1: Development Indicators from Selected Asia-Pacific Countries for 1999 (World Bank 2001)

Country	GDP (millions US$)	GDP per capita (US$)	GNP per capita growth (annual %)	Illiteracy rate (% people ages 15 and over)	Infant Mortality Rate (per 1,000 live births)
Australia	466751	23554	3.22		5
China	963746	769	6.12	17	30
Cambodia	3352	285	2.2	61	100
Indonesia	199121	962	.35	14	42
Japan	5356148	42318	-0.26		4
Korea, Rep.	566337	12086	10.03	2	8
Lao PDR	2249	441	4.96	53	93
Malaysia	102784	4526	1.29	13	8
New Zealand	65582	17210	3.97		5
Philippines	84492	1138	1.58	5	31
Viet Nam	26478	342	3.43	7	37

Table 2: Food and Live Animal Exports and Imports of Selected Countries in 2000 (UNCTAD-WTO 2002)

Country	**Exports (1000 US$)**	**Percent of World Exports**	**World Rank***
USA	38,721,522	13.55	1
France	23,664,912	8.28	2
Australia	10,966,869	3.84	8
China	12,281,714	4.30	9
Thailand	9,687,066	3.39	11
New Zealand	5,590,683	1.96	19
Indonesia	3,503,016	1.23	23
Japan	1,764,170	0.62	36
Malaysia	1,702,725	0.60	35
Philippines	1,286,449	0.45	44
World Total	285,828,830		
Country	**Imports (1000 US$)**	**Percent of World Imports**	**World Rank**
Japan	41,097,098	13.55	1
USA	39,619,024	13.06	2
Korea Republic	6,496,498	2.14	13
China	4,758,318	1.57	16
Malaysia	2,995,467	0.99	24
Indonesia	2,782,240	0.92	25
Philippines	2,253,301	0.74	29
Australia	2,524,086	0.83	31
Thailand	2,073,507	0.68	33
New Zealand	851,017	0.28	49
World Total	303,286,530		

Table 3: Domestic Supply of Bovine Beef (1000 MT) (FAO, 2003, Author's calculations)

		SUPPLY				DOMESTIC ABSORPTION			SELF SUFFICIENCY INDEX
Country	Year	Production	Imports	Stock Changes	Exports	Waste	Other	Food	
Australia	1991	1760	5	0	993	0	0	771	2.28
	2000	1988	7	0	1240	0	0	755	2.63
China	1991	1579	117	1	316	0	2	1380	1.14
	2000	5352	170		72	0	2	5448	0.98
Japan	1991	575	486	33	5	23	0	1068	0.54
	2000	531	940	-148	3	31	0	1289	0.36
New Zealand	1991	540	2	-8	422	0	0	112	4.51
	2000	572	13	48	508	0	0	126	7.45

Table 4: Domestic Supply and Absorption of Maize (1000 MT) (FAO, 2003, Author's calculations)

		SUPPLY				DOMESTIC ABSORPTION						SELF SUFFICIENCY INDEX
Country	Year	Production	Imports	Stock Changes	Exports	Feed	Seed	Processing	Waste	Other	Food	
Australia	1991	193	38	4600	12044	669	410	133	151	535	1253	1.13
	2000	406	11	-18	51	242	1	1	11	4	89	1.11
China	1991	97214	5587	-7312	3408	51557	1302	1264	8359	585	29013	0.98
	2000	106180	5059	16481	10593	78211	1741	1223	10103	2376	2372	1.05
Japan	1991	1	16015	86	0	12303	0	1361	5	1261	1172	0
	2000	0	16125	-430	2	11662	0	1815	3	687	1528	0
New Zealand	1991	162	42	5	1	182	0		6	9	10	.8
	2000	181	10	-8	13	145	0		6	15	4	1.02

Table 5: Domestic Supply and Absorption of Wheat (1000 MT) (FAO, 2003, Author's calculations)

		SUPPLY				DOMESTIC ABSORPTION						SELF SUFFICIENCY INDEX
Country	Year	Production	Imports	Stock Changes	Exports	Feed	Seed	Processing	Waste	Other	Food	
Australia	1991	15066	36	-300	11645	799	323	161	151	522	1201	4.77
	2000	96	1100	18106	2135	526	110	233	956	1320	4.20	4.20
China	1991	98232	13974	-2504	243	3304	4952	2000	4963	257	93984	0.90
	2000	99636	2620	4794	504	606	3928	0	2202	213	99597	0.94
Japan	1991	952	5558	184	434	613	24	146	155	0	5321	0.15
	2000	689	6054	16	424	446	19	185	164	0	5522	0.11
New Zealand	1991	188	195	-10	6	63	5	56	7	3	234	0.51
	2000	326	255	-75	23	128	11	60	11	6	268	0.67

Table 6: Domestic Supply and Absorption of Rice (1000 MT) (FAO, 2003, Author's calculations)

		SUPPLY				DOMESTIC ABSORPTION						SELF SUFFICIENCY INDEX
Country	Year	Production	Imports	Stock Changes	Exports	Feed	Seed	Processing	Waste	Other	Food	
Australia	1991	525	32	12	456		9	1	6	0	98	4.65
	2000	734	59	32	665		10	2	7	0	150	4.58
China	1991	123857	603	-55	921	2567	3013	1016	5912	10	110965	1.00
	2000	126606	630	4078	3102	2201	2647	1552	6263	9	115544	0.99
Japan	1991	8007	19	751	0	22	59	549	163	1	7983	0.91
	2000	7913	610	-57	38	255	47	408	154	14	7550	0.94
New Zealand	1991	0	17	0	0	0	0	0	0	0	16	0.00
	2000	0	32	-4	1	0	0	0	0	0	27	0.00

CIES DISCUSSION PAPER SERIES

The CIES Discussion Paper series provides a means of circulating promptly papers of interest to the research and policy communities and written by staff and visitors associated with the Centre for International Economic Studies (CIES) at the Adelaide University. Its purpose is to stimulate discussion of issues of contemporary policy relevance among non-economists as well as economists. To that end the papers are non-technical in nature and more widely accessible than papers published in specialist academic journals and books. (Prior to April 1999 this was called the CIES Policy Discussion Paper series. Since then the former CIES Seminar Paper series has been merged with this series.)

Copies of CIES Policy Discussion Papers may be downloaded from our Web site at http://www.adelaide.edu.au/cies/ or are available by contacting the Executive Assistant, CIES, School of Economics, Adelaide University, SA 5005 AUSTRALIA. Tel: (+61 8) 8303 5672, Fax: (+61 8) 8223 1460, Email: cies@adelaide.edu.au. Single copies are free on request; the cost to institutions is US$5.00 overseas or A$5.50 (incl. GST) in Australia each including postage and handling.

For a full list of CIES publications, visit our Web site at http://www.adelaide.edu.au/cies/ or write, email or fax to the above address for our *List of Publications by CIES Researchers, 1989 to 1999* plus updates.

0301 Jackson, Lee Ann, "Protectionist Harmonization of Food Safety Policies in the Asia-Pacific Region", January 2003.

0236 Damania, Richard, "Protectionist Lobbying and Strategic Investment", November 2002

0235 Damania, Richard and John Hatch, "Protecting Eden: Markets or Government?", November 2002.

0234 Anderson, Kym, "Agricultural Trade Reform and Poverty Reduction in Developing Countries", November 2002.

0233 Wood, Danielle and Kym Anderson, "What Determines the Future Value of an Icon Wine? Evidence from Australia", November 2002.

0232 Kym Anderson and Nielsen, Chantal, **"**Economic Effects of Agricultural Biotechnology Research in the Presence of Price-distorting Policies". November 2002.

0231 Jackson, Lee Ann, "Who Benefits from Quality Labelling? Segregation Costs, International Trade and Producer Outcomes". November 2002.

0230 Rajan, Ramkishen, "Trade Liberalization and Poverty: Where Do We Stand?", November 2002.

0229 Rajaguru, Gulasekaran and Reza Siregar, "Sources of Variations Between the Inflation Rates of Korea, Thailand and Indonesia During the Post-1997 Crisis", November 2002.

0228 Barbier, Edward B, "Water and Economic Growth", October 2002.

0227 Barbier, Edward B, "The Role of Natural Resources in Economic Development", October 2002. (The 49th Joseph Fisher Lecture.)

0226 Rajan, Ramkishen and Rahul Sen, "Liberalisation of Financial Services in Southeast Asia under the ASEAN Framework Agreement on Services (AFAS)", October 2002. (Forthcoming in *Journal of International Banking Law*).

0225 Anderson, Kym "Building an Internationally Competitive Australian Olive Industry: Lessons from the Wine Industry," October 2002.

0224 Bentzen, Jan, Søren Leth-Sørensen and Valdemar Smith, “Prices of French Icon Wines and the Business Cycle: Empirical Evidence from Danish Wine Auctions,” September 2002.

0223 Bentzen, Jan and Valdemar Smith, “Wine Prices in the Nordic Countries: Are They Lower Than in the Region of Origin?” September 2002.

0222 Rajan, Ramkishen and Graham Bird, ““Will Asian Economies Gain from Liberalizing Trade in Services?” September 2002. (Forthcoming in *Journal of World Trade*).

0221 Siregar, Reza Y. and Gulasekaran Rajaguru, “Base Money and Exchange Rate: Sources of Inflation in Indonesia during the Post-1997 Financial Crisis” August 2002.

0220 Rajan, Ramkishen, “International Financial Liberalisation in Developing Countries: Lessons from Recent Experiences” July 2002. (Published in *Economic and Political Weekly*, 37 (29): 3017-21, July 20-26, 2002).

0219 Rajan, Ramkishen, Reza Siregar and Graham Bird, “Capital Flows and Regional Financial Interdependencies in the Context of Crises: Evidence From East Asia” August 2002.

0218 Bird, Graham and Ramkishen Rajan, “The Political Economy of A Trade-First Approach to Regionalism”, July 2002.

0217 Ramkishen, Rajan and Rahul Sen, “Liberalisation of International Trade in Financial Services in Southeast Asia: Indonesia, Malaysia, Philippines and Thailand”, July 2002. (Since published in *Journal of International Financial Markets* 4(5): 170-80, 2002).

0216 Anderson, Kym, “International Trade and Industry Policies”, July 2002. (Forthcoming in *The Cambridge Handbook of Social Sciences in Australia*, edited by I. McAllister, S. Dowrick and R. Hassan, Cambridge: Cambridge University Press, 2003).

0215 Anderson, Kym, “The New Global Economy: Opportunities and Challenges for Small Open Economies”, July, 2002. (Forthcoming as Ch. 3 in *Sustaining Singapore’s Competitiveness in the New Global Economy*, edited by R. Rajan, London: Edward Elgar, 2003).

0214 Pincus, Jonathan, “Environmental Economics and the Murray-Darling”, July 2002.

0213 Brennan, Geoffrey and Jonathan Pincus, "From the Australian Settlement to Microeconomic Reform: the Change in Twentieth Century Policy Regimes", July 2002.

0212 Teuku Rahmatsyah, Gulasekaran Rajaguru and Reza Y. Siregar, “Exchange Rate Volatility, Trade and ‘Fixing for Life’ in Thailand”, June 2002.

0211 Anderson, Kym, Jikun Huang and Elena Ianchovichina, “Impact of China’s WTO Accession on Farm-Nonfarm Income Inequality and Rural Poverty”, November 2002.

0210 Bird, Graham and Ramkishen Rajan, “Too Much of a Good Thing? The Adequacy of International Reserves in the Aftermath of Crises”, April 2002. (Forthcoming in *The World Economy*.) (Forthcoming in *Trading Arrangements in the Pacific Rim*, edited by P. Davidson, New York: Oceana Publications.)

0209 Anderson, Kym, “Measuring Effects of Trade Policy Distortions: How Far Have We Come?” April 2002. (Forthcoming in *The World Economy* Vol. 25, 2002).