market acceptance of
GM canola

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max foster and simon french

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Australian Bureau of Agricultural and Resource Economics
GPO Box 1563 Canberra 2601

Telephone +61 2 6272 2000 Facsimile +61 2 6272 2001
Internet www.abareconomics.com

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foreword

There are emerging biotechnologies throughout the world, including genetic modification techniques, that are enabling a range of crop innovations that have the potential to markedly improve the profitability and sustainability of Australia's cropping industries.

However, the development and adoption of genetically modified (GM) food crops in Australia are being slowed by perceptions of consumer resistance to GM foods in both Australia's domestic and export markets. The view that there could be market disadvantages with GM food crops has led to moratoriums being imposed on the commercial cultivation of GM canola in the states and territories, with the exceptions of Queensland and the Northern Territory. This is despite positive assessments by the Gene Technology Regulator of the safety of two varieties of GM canola, for human consumption and the environment..

This report provides an assessment of the market acceptance of GM canola in both Australia's domestic and export markets. The report complements a recently released ABARE research report – GM Grains in Australia: Identity Preservation – that addresses the costs of keeping GM and non-GM grains separate throughout the Australian grain supply chain.

This research was funded under Australia's National Biotechnology Strategy. The key objective of the strategy is to provide a framework for government and key stakeholders to work together to ensure that developments in biotechnology are captured for the benefit of the Australian community, industry and the environment, while safeguarding human health and ensuring environmental protection.

Phillip Glyde
Executive Director

March 2007

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summary

- Two varieties of genetically modified (GM) canola were approved in 2003 for environmental release in Australia by the Gene Technology Regulator. However, a number of concerns related to market acceptance have meant that virtually all the main canola producing states in Australia have put in place legislation preventing commercial plantings of GM canola.
- The concerns arise mainly from the perception that there is considerable consumer resistance to GM crops throughout the world and even to livestock products that are obtained from livestock fed on GM feedstuffs. The opponents of GM canola say that its commercialisation in Australia will lead to losses of markets for Australian canola and of price premiums for non-GM canola.
- Marketers of wheat and barley in Australia have also claimed that unintended presence of GM canola in their shipments could jeopardise some of their markets. Experience throughout the world since the introduction of GM grains in 1996 has shown that it is difficult to avoid unintended presence of GM materials through cross pollination in fields and co-mingling in the grain handling and storage system.
- The purpose in this report is to identify the domestic and international market related issues that are relevant to the decision to adopt GM canola in Australia.

canola or rapeseed?

Confusion often exists about the difference between canola and rapeseed.

Canola is a cultivar of rapeseed developed by Canadian scientists in the 1970s. It has lower levels of certain antinutrients than are typically found in rapeseed. Officially, canola is rapeseed that contains less than 2 per cent erucic acid and the solid component of the seed contains less than 30 micromoles per gram of glucosinolates.

Virtually all Canadian and Australian rapeseed meets canola standards and is usually termed canola. Rapeseed outside these countries is usually called rapeseed, though the bulk of it meets the canola standard.

genetically modified grains

- GM maize, soybeans, canola and cotton (producing both lint and cottonseed, an important oilseed) have been widely adopted throughout the world and particularly in the main grain exporting countries, including Argentina, Brazil, Canada and the United States. Australia, India and China have also commercialised GM cotton. Only Canada and the United States have commercialised GM canola.
- Apart from small areas of GM maize (mainly in Spain and France), crop production in the European Union has remained almost completely free from GM varieties. This reflects perceptions of consumer resistance to GM crops in the European Union on food and environmental safety grounds. Uncertainty about consumer acceptance throughout the world has also meant that GM wheat and rice varieties that have been developed in north America and Asia have not been commercialised.
- Policy processes have been developed in response to perceptions that the introduction of GM crops raises human and environmental safety issues. The processes include risk assessments before release into the environment; food and feed safety checks, and, in fifteeen countries, mandatory labelling of products that contain GM materials. Recognising the difficulty of keeping grain supply chains completely free of unintended presence of GM grains, most of these labelling regimes have thresholds for unintended presence of approved GM material before labelling is required.
- The European Union has the strictest regulatory regime in the world for GM grains. The regime includes a ban on imports of all but one GM canola variety; mandatory labelling of human food and animal feed where the unintended presence of GM materials exceeds 0.9 per cent of the volume of the product; and strict traceability requirements with GM products. (Traceability facilitates product recalls if unforeseen safety issues arise.) Unlike most other countries' labelling regimes, the European Union requires labelling as 'containing GM materials', even if modified DNA is not detectable in the final product. The European Union is also one of the few markets that require labelling of GM animal feed.
- Despite perceptions of consumer resistance and the range of market access conditions, GM producing countries dominate world trade in maize, soybeans, cottonseed and canola.

world canola market

- The world canola market is very concentrated. The export trade is dominated by Canada, with a market share of 71 per cent in the three years to 2005-06 (if intra-European Union trade is excluded). Over the same period, Australia accounted for 19 per cent of world canola exports. Australia has only become a major exporter of canola since the mid-1990s.
- Japan is the main importer of canola, taking 42 per cent of world canola imports in the three years to 2005-06. The other main canola importers were Mexico (19 per cent in the three years to 2005-06), China (12 per cent) and Pakistan (11 per cent). An emerging import market for canola is Bangladesh.
- The European Union is the world's largest producer of rapeseed. In the recent past, it has generally been a small net exporter of rapeseed. However, projections suggest that the European Union will be a net importer of around 370 000 tonnes of canola or rapeseed and 264 000 tonnes of rapeseed oil a year over the next decade, mainly to satisfy increased demand for biodiesel that is being encouraged through government support in the form of tax incentives and mandatory targets.
- The European Union maintained a moratorium on new approvals of GM crop varieties over the years 1998–2004 while putting in place its comprehensive labelling and traceability arrangements for GM products. It began approving GM varieties for import again in late 2004 and there is a strong possibility that GM canola imports will be approved soon.

GM grain and Australia's domestic market

- The Australian domestic market absorbed around 30 per cent of Australia's canola production in the three years to 2004-05. Because Australia does not produce or had not imported GM canola until the severe drought of 2006, the basis for assessing the acceptance of GM canola in this analysis is to use the experience with domestically produced GM cottonseed and imported GM soybeans, soybean meal and soybean flour. These GM oilseeds are used extensively for both food and feed in Australia. Soybean products can be found in many different food products in Australia, particularly as an emulsifier in products such as margarine, chocolate, ice cream and mayonnaise. There are only limited competitive substitutes for these soybean products.
- Australia is only a small producer of soybeans. Traditionally, most of the soybeans and soybean products consumed in Australia have been sourced

from the United States, which means that they are likely to be GM products. Most of these soybean products have been used in animal feedstuffs or in processed foods in quantities small enough to not trigger Australia's mandatory labelling requirements.

- Nevertheless, a number of Australian livestock producers and food manufacturers have indicated that they do not use GM materials in their production systems, or are working to remove them from these systems. Most notably, the main poultry meat producers in Australia have 'committed to using their best endeavours to source non-GM ingredients for their feed'. Consequently, there has been a marked shift in recent years to sourcing soybean meal imports from Brazil, where certified non-GM soybeans are more readily available, despite having to pay higher prices.
- Along with poultry meat producers, it is mainly some key dairy food manufacturers that are attempting to make their production processes GM free.

GM canola and Australia's export markets

- At the world level, the canola market has become differentiated into GM, conventional, certified non-GM and organic segments.
- The main implication of the introduction of GM canola is that Canada lost access to the EU market with its canola seed but generally Canada has found ready markets for its increased canola supplies elsewhere, particularly in Mexico, the United States, Pakistan and China. As discussed above, the European Union is likely to be a growing market for canola or rapeseed over the next decade. However, Australia's advantage of being able to supply non-GM canola to the EU market could largely disappear if the EU ban on GM canola imports is lifted, which seems likely to occur soon.
- While there is some very limited evidence of price premiums for organic and certified GM-free canola, markets for these canola types are still very much small niches and mainly located in developed countries with high incomes per person.
- Comparisons between Australian and Canadian domestic prices have been used to suggest that there is a growing price premium for Australian canola in world markets on the basis of its non-GM status. However, such a comparison reflects a range of domestic supply and demand conditions in the two markets, making it difficult to isolate any potential preferences for non-GM canola.

- Based on world import data, the conclusion of the analysis reported here is that the great bulk of GM canola is sold at very similar prices to conventional canola in most major canola markets throughout the world. The behaviour of key players in the world canola market is broadly consistent with price leadership by Canada, the dominant player in the world canola market. Price leadership reflects an oligopolistic market structure and has been noted over many years in world grain markets in a number of different studies – for example, McCalla (1966); Alouaze, Watson and Sturgess (1987); and Hellwinckel and Ugarte (2003).

GM canola and Australia's other agricultural export markets

- Some Australian marketers of livestock products, most notably of pig meat and dairy foods, say that there is a market advantage in countries such as Japan from not using GM feedstuffs in animal production processes.
- Again, however, the preference for products from livestock not fed on GM materials seems to be very much a niche market and is largely confined to dairy products. With meat products, for example, Canada's export trade has grown strongly since the introduction of GM grains and oilseeds in the United States and Canada in 1996, despite a dependence on the use of GM feedstuffs, particularly GM canola meal.
- Even in the European Union, a major exporter of meat and dairy products, livestock production is heavily dependent on the use of GM feedstuffs, particularly soybean meal and corn gluten feed. It is increasingly difficult for EU livestock producers to source non-GM protein meals because the main soybeans exporters – the United States, Brazil and Argentina – are producers of GM soybeans.
- It is very difficult to examine whether the possibility of unintended presence of GM canola in wheat and barley would jeopardise markets for those grains. Using Canada as a case study, no evidence was found of Canada's wheat and barley exports having been adversely affected by unintended presence of GM canola. One of the reasons for this is that Canada has very strict standards for unintended presence of small seeds (including canola or rapeseed) in its wheat and barley – 0.05 per cent with barley and 0.1 per cent with wheat.
- Saudi Arabia, the world's largest importer of feed barley and a major market for Australia's feed barley, has been sensitive to GM products in the past. Since 2003, however, Saudi Arabia seems to have become more accepting

of GM crops. Throughout the period since the introduction of GM canola, Canada has been able to sell significant quantities of its barley to Saudi Arabia though it is still a relatively minor supplier to this market.

- Another reason why concerns expressed by Australian wheat and barley exporters over the commercialisation of GM canola in Australia in 2003 have less basis in 2007 is that documentation requirements under the Cartagena Protocol on Biosafety agreed in March 2006 will not require wheat or barley exporters to document whether their cargoes contain unintended presence of GM canola, something that had been proposed at earlier negotiations with the protocol.

overall issues

- Marketers of GM canola and of products based on livestock fed on GM materials, including GM canola, are unlikely to be disadvantaged in the Australian and world markets – GM canola seems to be finding ready markets throughout the world at prices very similar to those received for conventional canola. There may be very small niche markets that pay premium prices for certified non-GM canola. The best prospect for the development of more widespread price premiums for conventional canola is through the reduction in export availabilities of conventional canola arising from the commercialisation of GM canola in Australia.
- Finally, in deciding whether to commercialise a GM crop after it has been approved for environmental release, market access issues are only part of the consideration. These should be weighed against the agronomic benefits (such as higher yields or reduced inputs) and environmental benefits (such as reduced chemical use) and the costs associated with keeping GM and non-GM separate in the handling and storage process.

1

introduction

There is concern that the introduction of GM canola in Australia will lead to loss of both market access and price premiums for Australian canola in world markets. These concerns stem from the perception that there is a significant body of consumers in world canola markets who are prepared to pay higher prices for non-GM canola and that market conditions imposed by governments – particularly mandatory labelling of products containing GM materials – adversely affect demand for GM canola.

There is also concern that Australia would risk losing its status as a non-GM producer and have reduced access to current canola markets were it to introduce large scale GM canola production. The market access concerns extend to the potential for the unintended presence of GM canola in other key grains exports, particularly wheat and barley, and hence may jeopardise these markets if the admixture rises above tolerance levels set by importers. Those with concerns point to the difficulty and costs associated with keeping GM canola separate in the handling, storage and transport system.

Market access issues are the main reasons why moratoriums on the commercial release of GM canola have been imposed in all states and territories of Australia, with the exception of Queensland and the Northern Territory which are not canola producers.

Supporters of biotechnology feel that opportunities for production benefits may be lost while GM canola production is held back and Australian growers will be left behind as biotechnology advances.

The purpose in this report is to identify the domestic and international market related issues that are relevant to the decision to adopt GM canola in Australia.

2

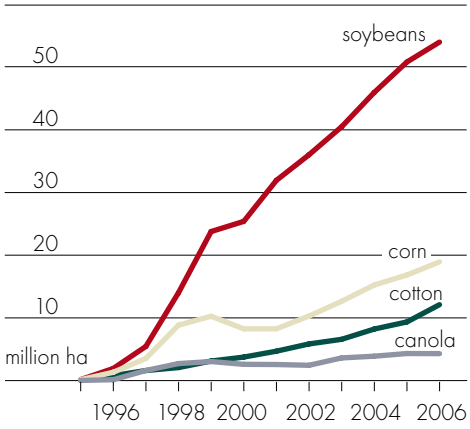
genetically modified grains

- *Over the past decade, there has been rapid global adoption of GM soybeans, corn, cotton and maize, particularly in north and south America.*
- *A range of market access conditions for GM grains have evolved throughout the world in response to perceptions that these grains raise new consumer and environmental issues. The main market access conditions are mandatory labelling of products containing GM materials.*
- *There is some limited evidence of premiums paid in niche markets for certified non-GM grains, particularly for soybeans.*
- *Nevertheless, GM producing countries dominate world trade in soybeans, corn, cotton and canola.*

adoption of GM crops

Genetically modified (GM) crops were first introduced for commercial marketing in 1996. In the ten years to 2006 the total land area dedicated to production of GM crops – mainly soybeans, maize, cotton and canola – increased rapidly to more than 100 million hectares globally (figure A). GM crops are now grown in twenty-two countries, including twelve countries that fall in the less developed category.

fig A **estimated areas harvested of GM crop**



GM varieties in 2006

United States	
Soybeans	89% of total plantings
Corn	61%
Cotton	83%
Canada	
Canola	79%
Argentina	
Soybeans	98%
Australia	
Cotton	922%
Brazil	
Soybeans	45%

In area in 2006, the United States was the largest producer of GM crops, accounting for nearly 54 million hectares (James 2006). Significant adoption has also been documented in Argentina (18 million hectares), Brazil (12 million hectares) and Canada (6 million hectares). In developing countries, the increase in the total area of GM crops has been more dramatic in recent years, growing by more than a third in the years 2004 and 2005. Apart from small quantities of GM maize in France, Germany, the Czech Republic, Portugal, Spain and Slovakia, the European Union produces virtually no GM crops.

The dominant traits of the GM varieties so far commercialised have been herbicide tolerance (68 per cent of total plantings in 2006), followed by insect resistance (19 per cent) and stacked genes (mainly herbicide tolerance and insect resistance – 13 per cent) (James 2006).

However, some of the GM grain varieties that have been developed have not been commercialised, most notably wheat and rice. A key reason for this is that at least some consumers have concerns about GM products, despite them being assessed by government authorities to be safe for human consumption and the environment. (A review of consumer attitude surveys on GM products is provided by Fernandez-Cornejo and Caswell 2006). In the case of GM wheat, the key marketers in the United States (US Wheat Associates) and Canada (Canadian Wheat Board) are opposed to its commercial release until it can be shown that release will not jeopardise their wheat markets (Canadian Wheat Board 2006; US Wheat Associates 2006).

Australia

Since 1996, Australia has commercialised a number of different forms of GM cotton and carnations. The GM traits of cotton are insect resistance and herbicide tolerance. It is estimated that in 2006-07 GM cotton varieties made up 92 per cent of total Australian cotton plantings (Monsanto Australia 2006). A number of GM canola varieties with herbicide tolerance were approved for commercial release in 2003 by the Gene Technology Regulator. However, moratoriums on unrestricted environmental release of GM canola have been imposed by most Australian state and territory governments.

policy environment for GM crops

Concerns over the safety of GMOs for humans and the environment have led to a range of regulations affecting their use. Virtually all countries require formal environ-

mental impact assessments and food safety assessments, and many countries have mandatory requirements for labelling products if they contain GM materials. The regulatory arrangements for key countries in the world grain market are provided in more detail later in this report. The aim in this chapter is to provide an overview of these arrangements. There are also international arrangements that affect trade in GM grains and oilseeds, most notably the World Trade Organisation (WTO) arrangements and the Cartagena Protocol on Biosafety.

A key consideration in regulatory arrangements is that it is difficult to prevent unintended presence of GM grains in parcels of non-GM grains. Unintended GM presence can happen through cross pollination in the field and through co-mingling in the harvesting, grain handling and storage system. Keeping large parcels of grain free from unintended GM presence is a particular problem because these parcels are usually accumulated from many different farms and pass through storage and transport systems that are repeatedly used to move different types of grains.

The European Union has the most stringent market access restrictions for GM products. Prior to 1998, the EU approved a number of GM varieties of soybeans and corn for import into member countries but then applied a virtual moratorium on further approvals until it had put in place a range of market requirements aimed at dealing with the issues of consumer choice and food and environmental safety (European Commission 2004). This meant that it was not until late 2004 that additional GM varieties were approved for import into the European Union. The European Union has a tolerance of 0.5 per cent for the unintended presence of GM materials not yet approved for import into the European Union, but which have been assessed as safe for consumption by the European Food Safety Authority.

The market requirements in the European Union include mandatory labelling of food products that contain more than 0.9 per cent by weight of GM materials, including animal feedstuffs. There are also strict traceability requirements, meaning that marketers and processors must have documentation showing the nature and source of materials that they use in the food making process. The claim is that traceability arrangements facilitate the operation of the labelling regime and ensure that products can be removed from the supply chain if unforeseen safety concerns emerge (European Commission 2004).

However, there are still many other countries that do not have mandatory labelling requirements for GM products including the United States and Canada. Moreover, the European Union is one of the few markets that require mandatory labelling of GM feed materials and, as yet, no country requires labelling of prod-

ucts obtained from animals fed on GM feedstuffs. The European Union (along with China) requires labelling of all food products containing GM materials, whereas most other countries only require labelling if modified DNA is detectable in the product. More details on the labelling requirements for key countries in the world grain trade are provided in appendix A.

The 'detectable DNA' condition has important implications. It means, for example, that oils for food consumption derived from GM oilseeds do not require labelling outside the European Union and China because there is no modified DNA in the oil. The oil meal remaining after the oil extraction process is mostly used as animal feed so it also largely escapes labelling requirements, the exception again being the European Union.

All countries have zero tolerance of unintended presence of unapproved GM products. There have been a number of recent cases where unapproved GM grains have entered the supply chains of other grains. One occurrence was in 2001 when a GM variety of corn called StarLink that was approved for feed use but not food use was found in US supplies of food corn. Another occurrence was in 2005 when another variety of corn called Bt-10 that was developed in the United States but had no regulatory approval was found in supplies of conventional corn. The most recent case was in late August 2006 when traces of unapproved GM rice were found in US long grain rice. In all cases, testing regimes were implemented to enable diversion of the grain from food markets with zero tolerance of unintended presence of the unapproved product. The StarLink episode caused disruption to the US corn export trade until testing regimes were developed and seed and product recalls were able to reassure customers and regulatory agencies throughout the world about the unintended presence of this variety (Lin, Price and Allen 2001; Carter and Smith 2004). To date, the Bt-10 incident has resulted in more than a dozen corn shipments being turned away from Japan.

Another important influence of the international pattern of grain trade is the Cartagena Protocol on Biosafety to the Convention on Biological Diversity. The protocol came into force in 2003 and has so far been ratified by 138 countries, accounting for more than three-quarters of the value of world imports of living organisms. However, Australia and a number of other major agricultural exporters, including the United States and Canada, are not signatories to the protocol. Essentially, the protocol is a set of rules aimed at making countries aware of shipments entering (or attempting to enter) their borders that contain living modified organisms (LMOs) that can replicate in the environment. This enables countries to protect the conservation and sustainable use of the biodiversity of their country.

A key aspect with implications for the pattern of world trade is the nature of the documentation regime that must accompany shipments of LMOs not intended to be released into the environment but rather to be used directly for food, feed and processing. (For more details, see Foster and Galeano 2006.) Negotiations on this aspect of the protocol have been protracted because strict documentation of all GM events in a shipment, no matter how small and accidental, is seen by GM producing countries (and others) as adding significantly to the cost of shipping grain and disadvantaging GM producers.

In 2006, the parties to the protocol agreed to detailed documentation requirements for shipments of LMOs (see decision MOP BS-III/10 at www.biodiv.org/biosafety/cop-mop/result.aspx?id=11066). Where the identity of the LMOs in the shipment is known through means such as identity preservation, the documention is required to state that the shipment 'does contain' LMOs. Where the shipment could contain LMOs but the identity is not known, the documentation has to state that the shipment 'may contain' LMOs. However, there are important concessions. Shipments between parties and nonparties to the protocol do not have to meet the documentation requirements. Furthermore, it is not necessary to include in the documentation any GM events from species different from the shipment – that is, the unintended presence of GM canola in a wheat shipment does not have to be documented.

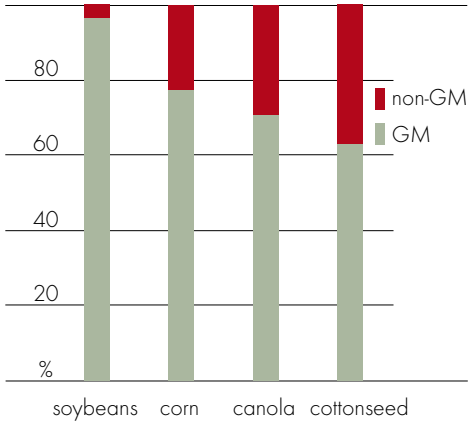
international market inroads

Despite some consumer concerns over GM products and the range of market access restrictions, GM producing countries dominate world exports of grains (figure B; US Department of Agriculture 2006a). In the case of canola, Australia accounts for the bulk of the non-GM trade. There is a component of world grain trade that is based on demand for grain that is certified to be non-GM. However, this grain represents a relatively small niche in world grain markets, apart from in the European Union and, to a lesser extent, in Japan and the Republic of Korea. The conclusion of Foster, Berry and Hogan (2003) was that the great bulk of world grain users are not prepared to pay the higher prices necessary for certified non-GM (identity preserved) grain.

The main trade flows of certified non-GM grain are soybeans to the European Union, the share of which Brookes, Craddock and Kniel (2005) estimate to be around 14–17 per cent of total soybean use of around 15 million tonnes a year in that bloc of countries. (The Brookes et al. definition of non-GM grain appears to be grain that has a GM content of less than 0.9 per cent, the threshold for mandatory labelling in the European Union.) The Brookes et al. conclusion was that prices for non-GM soybeans in the European Union averaged 2–5 per

cent higher than for noncertified soybeans over the past two years.

fig B **shares of GM and non-GM producing countries in world grain trade**
three years to 2005-06; excludes intra-EU trade



The European Union has sourced most of its non-GM soybeans from Brazil but this will be increasingly difficult now that Brazil has legalised production of GM soybeans and the rate of adoption of GM varieties grows in that country. A few ports in Brazil, mainly Paranaguá and Intacoatiara, have been able to provide non-GM soybeans (US Department of Agriculture 2006f). In the case of Paranaguá, this was facilitated by a ban on exports of GM soybeans supported by the governor of the state in which the port is located (Paraná). However, Brazil's Supreme Court ruled in April 2006 that the ban was in violation of Brazil's Biosafety Law (outlined in appendix A).

There is also demand for non-GM soybeans in Japan related mainly to whole soybean food uses (such as tofu, tempeh, miso, soynuts and soymilk), rather than for crushing for oil and meal. Imports of non-GM soybeans by Japan could be as high as 1 million tonnes a year out of total imports of around 4.5 million tonnes a year. On the Tokyo Grain Exchange over the year to November 2006, the price of the futures contract for non-GM soybeans averaged around 6 per cent higher than the price for the conventional soybean contract.

It is estimated that around 8 per cent of international trade in soybeans is certified non-GM. This is mainly where the use of soybean products as food would require labelling.

Largely reflecting the import ban on some GM corn varieties by the European Union, a national survey of grain elevators in the United States (American Corn Growers Foundation 2004) found that 24 per cent of grain elevators require segregation of GM corn from non-GM corn. Thirteen per cent of these elevators were offering price premiums for non-GM corn, in the range US$2–10 a tonne. An important factor driving the demand for segregation in 2004 was that some corn varieties grown in the United States in 2004 were not approved for import into the European Union. Many of these GM corn varieties have now been approved by the European Union.

3

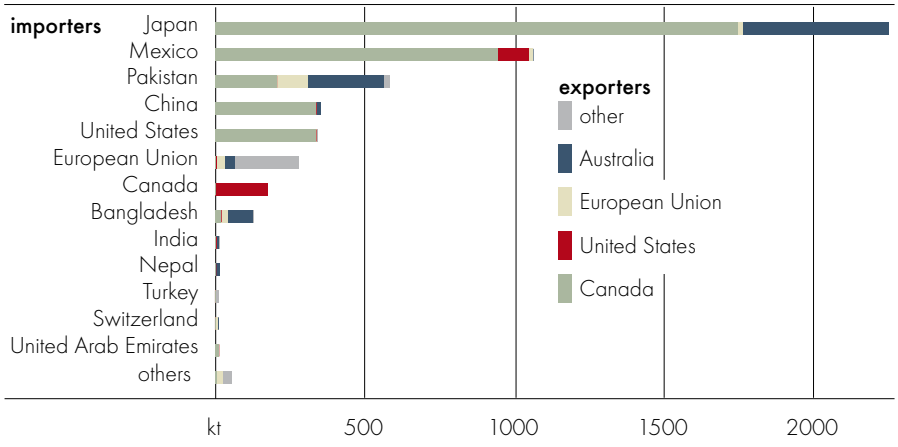
world canola market

- *World trade in canola is highly concentrated on both the export and import sides.*
- *Canada and the United States are the only producers of GM canola, with Canada typically accounting for over 70 per cent of world canola trade.*
- *Australia's non-GM canola accounts for the bulk of the remainder of world canola trade.*
- *The main importers of canola are Japan, Mexico, Pakistan, China, Bangladesh and the European Union.*
- *In the past, the European Union has been a net exporter of rapeseed but its recent mandating of biodiesel use mean that it is likely to be a large net importer of both canola and canola oil in the foreseeable future.*

world market overview

The characteristics of world canola production and trade are summarised in table 1. World production of canola seed has been increasing at about 3.3 per cent a year over the past decade, while world trade in canola in seed form has been

fig C **pattern of world trade in rapeseed**
annual average, 3 years to 2005



increasing at around 1.6 per cent a year. Trade in canola oil has been declining at an average rate of 6 per cent a year, while trade in canola meal has declined on average by 4.1 per cent a year.

World export trade in canola products (seed, oil and meal) is dominated by Canada (table 1, figures C–E; UN Statistics Division 2006). Australia, the European Union and the United States are the other main exporters of canola seed and oil, while China and India are large exporters of canola meal. Japan is the largest importer of canola seed and the United States is the largest importer of canola oil and meal.

Only Canada and the United States are producers of GM canola; together they account for around three-quarters of world canola seed exports. Around 78 per

table 1 **key characteristics of the world canola market**

	volume [a] Mt	annual growth rate [b] %	share, key countries [a]
production			
seed	44.0	3.3	European Union (32%), China (27%), Canada (18%), India (15%) and Australia (3%)
oil	15.5	4.1	European Union (34%), China (28%), India (14%), Canada (9%), Japan (6%) and Australia (1%)
meal	6.9	3.1	China (34%), European Union (32%), India (14%), Japan (6%), Canada (4%), Mexico (3%) and Australia (1%)
trade [c]			
seed	5.6	1.6	**Exporters:** Canada (71%), Australia (19%), European Union (4%) and United States (4 %) **Importers:** Japan (42%), Mexico (19%), China (12%), Pakistan (11%), United States (6%), European Union (3%) and Bangladesh (2%)
oil	1.3	-6.0	**Exporters:** Canada (71%), European Union (10%), United States (12%) and Australia (4%) **Importers:** United States (43%), China (18%), European Union (8%), Mexico (7%) and Japan (5%)
meal	3.6	-4.1	**Exporters:** Canada (45%), India (40%), China (7%) and European Union (3%) **Importers:** United States (63%), Republic of Korea (14%), Chinese Taipei (5%) and European Union (5%)

a Annual average, three years to 2005-06. **b** Based on ten years to 2005-06, with estimate significantly different from zero at the 5 per cent confidence level. **c** Excludes intra-EU (25 countries) trade.
Source: Based on data from US Department of Agriculture (2006a).

cent of Canada's canola is GM and the absence of identity preservation in the grain handling system means that virtually all Canadian canola exports can be considered to be GM.

fig D **pattern of world trade in rapeseed oil**
annual average, 3 years to 2005

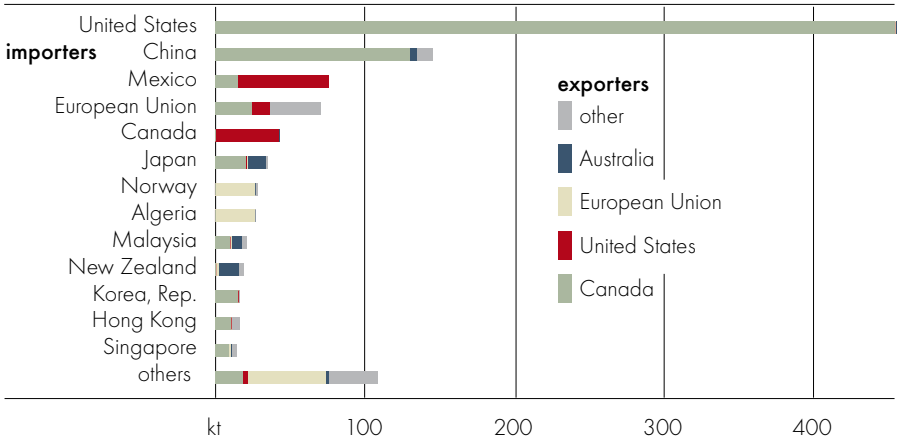
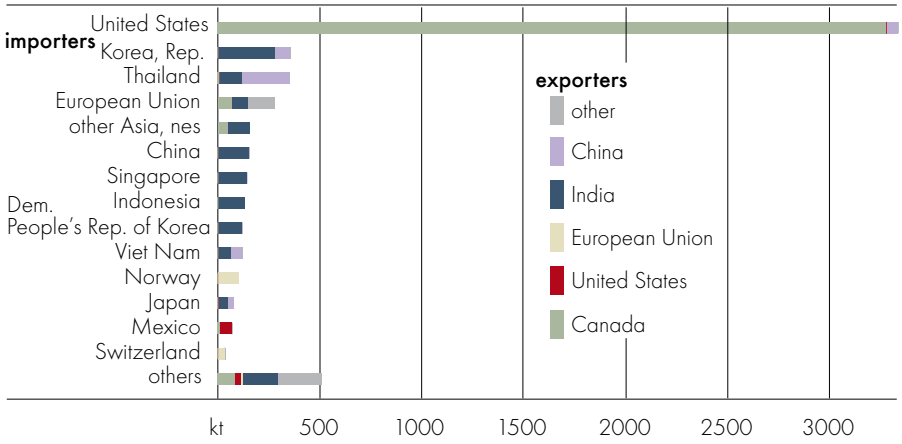


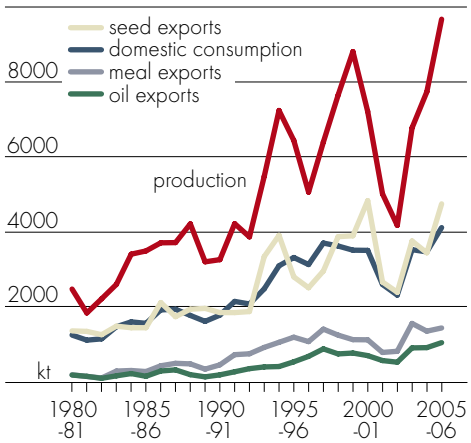
fig E **pattern of world trade in rapeseed meal**
annual average, 3 years to 2005



Canada

Canadian production of canola has doubled since the introduction of GM canola in 1996. In 2006, GM canola varieties accounted for around 79 per cent of Canada's total canola plantings. The dip in Canadian canola production in the early 2000s was largely caused by a series of adverse seasons (figure F).

fig F **supply and disposal of Canadian canola**

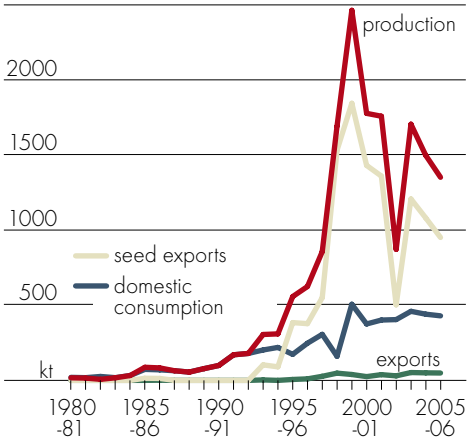


The main destinations for Canadian exports of canola in seed form are shown in table 2. While Canada has been largely locked out of the EU market because of the GM status of its crop, it has found ready markets for its canola in Japan, China, Mexico, United States and, most recently, Pakistan and the United Arab Emirates. Pakistan did not allow imports of GM canola until 2003.

Australia

Australia only emerged as a major canola producer and exporter in the mid to late 1990s (figure G) but canola is now an important crop in Australian crop–livestock rotations. Apart from its direct financial return, the use of canola (a plant from the Brassica family) helps to break crop disease cycles. A key reason is because the decay of brassica roots in the soil produces residues (isothiocyanates) that harm many soil borne fungal diseases of plants such as 'take-all', a process called 'biofumigation' (CSIRO 2003). As a result, wheat yields are significantly higher after a canola crop.

fig G **supply and disposal of Australian canola**



Australia mostly exports canola in seed form, with only small quantities of oil exports and virtually no canola meal exports (figure G). The main export destination for Australian canola is Japan, with Pakistan and Bangladesh emerging as important markets in recent years (table 2).

table 2 **destinations for Canadian and Australian canola exports**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
Canada											
Bangladesh	0	0	0	0	0	0	0	13	22	23	87
China	20	0	1 218	1285	1 131	1254	66	319	324	367	543
European Union **a**	227	37	14	1	1	3	8	2	2	2	2
Japan	1 431	2 019	1 812	1 811	1 785	1 705	1 557	1 682	1 642	1 915	1 982
Mexico	470	490	678	465	862	757	489	693	1 066	1 049	1 109
Pakistan	0	0	0	–	0	0	0	398	49	167	664
United Arab Emirates	0	0	0	0	0	0	0	0	0	34	330
United States	267	320	355	223	249	243	157	113	453	443	668
other	1	37	38	1	23	1	1	23	29	2	196
total	2 416	2 903	4 115	3 786	4 051	3 963	2 278	3 244	3 587	4 001	5 579
Australia											
Bangladesh	108	75	120	89	112	158	115	81	103	66	30
China	0	74	210	588	915	248	386	0	2	40	3
European Union **a**	2	0	90	315	0	362	63	1	94	0	287
Japan	242	245	237	302	426	393	446	379	681	396	312
Mexico	0	0	21	155	66	0	0	0	0	0	0
Malaysia	–	–	–	8	26	18	11	1	3	0	–
Pakistan	–	–	28	68	68	182	307	142	289	326	50
United Arab Emirates	0	0	0	0	0	0	0	0	0	0	72
other	1	0	15	47	1	56	25	21	25	14	9
total	353	394	721	1 572	1 614	1 418	1 352	625	1 198	842	764

a Eleven months to November. **b** Twenty five countries.
Sources: ABS (2006); ISTA Mielke GmbH (2006); United Nations Statistics Division (2006).

Despite the moratoriums in Australia, low level presence (around 0.01 per cent) of a GM canola variety – Topas 19/2 – was detected in conventional canola in some parts of Australia in 2005. The event was approved by the Australian regulators – the Gene Technology Regulator and Food Standards Australia New Zealand – and is also approved for import in Australia's major export markets, including the European Union. Recognising the difficulty of ensuring freedom from GM grains, the Australian, state and territory governments agreed in October 2005 to allow threshold levels of 0.9 per cent of GM canola in conventional canola (Primary Industries Ministerial Council 2005). It was also agreed that the threshold for commercial seed for sale will be set at 0.5 per cent for 2006 and 2007 but with the intention of setting a limit of 0.1 per cent thereafter. These thresholds mean that farmers are not in breech of the state moratoriums if they plant canola seed with trace presences of GM canola.

4

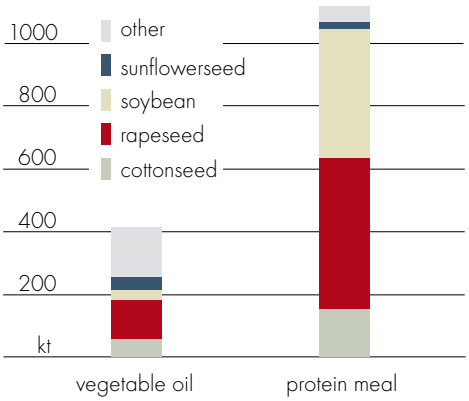
GM grain and Australia's domestic market

- *Australia is already a large consumer of GM products, mainly domestically produced GM cottonseed (as oil for human consumption and protein meal for livestock rations) and imported GM soybean meal.*
- *Products derived from imported GM soybeans and corn are widely present in Australian foods but mostly at levels that do not require labelling under Australia's mandatory labelling rules.*
- *Some Australian food manufacturers have stated policies of not using GM inputs, mainly manufacturers of poultry meat and dairy products, even where the use of GM inputs would not trigger labelling requirements.*
- *Nevertheless, the great bulk of Australian food manufacturers do not have publicly stated policies of avoiding GM inputs.*

Australian market overview

There is extensive experience of using products from GM cottonseed and soybeans in the Australian domestic market. There were also imports of GM corn at the height of the severe drought affecting the eastern states of Australia in 2003. During the most recent drought, there was a shipment of 57 000 tonnes of GM canola from Canada in early December 2006.

fig H **vegetable oils and protein meal consumption in Australia, by type**
annual average, 3 years to 2004-05



Plantings of GM cotton varieties have grown from around 30 per cent of total Australian cotton plantings in the late 1990s and early 2000s, to around 92 per cent in 2005. Generally, GM and conventional cottonseed have not been

kept separate in the ginning process so most Australian cottonseed is considered to contain GM cottonseed. It is estimated that in 2005 only around 20 000 tonnes of Australian cotton was certified as non-GM cottonseed and virtually all of this was exported.

Australia produces only around 70 000 tonnes of soybeans a year and no GM soybean varieties have been approved for unrestricted release in Australia. Australia has traditionally sourced much of its soybean products from the United States (table 3), a country from which certified non-GM soybeans are available but at a considerable premium. In recent years, however, Brazil has emerged as the major source of Australia's soybean meal imports.

table 3 **Australian imports of soybean products**

	2001	2002	2003	2004	2005
	kt	kt	kt	kt	kt
whole beans					
Brazil	0.0	0.0	0.0	0.0	0.0
United States	0.0	0.2	73.9	8.2	0.0
other	0.1	0.2	0.4	1.2	0.6
total	0.1	0.4	74.3	9.4	0.6
oilcake (protein meal)					
Brazil	0.1	0.1	0.0	109.9	206.3
United States	165.6	319.0	349.9	116.4	34.4
other	0.4	1.0	0.6	0.7	0.6
total	166.1	320.1	350.5	227.0	241.3
oil					
Brazil	0.0	0.5	0.0	1.5	2.4
United States	0.0	0.0	0.0	0.0	0.1
other	9.0	11.7	12.8	12.1	8.0
total	9.0	12.2	12.8	13.6	10.5
flours and meals					
Brazil	0.0	0.1	0.1	0.1	0.0
United States	44.2	0.4	0.2	81.3	113.6
others	2.8	2.9	10.2	3.4	27.1
total	47.1	3.4	10.5	84.7	140.7

Source: ABS (2006).

Soybeans and cottonseed are important components of the Australian vegetable oil and protein meal markets (figure H). There is also widespread consumption in Australia of soy milk and other soybean products that are used in a range of manufactured food products.

The regulatory arrangements in Australia for GMOs and GM materials are summarised in table 4. There is mandatory labelling of food for humans if accidental GM presence is 1 per cent or more. However, no labelling is required with human food if modified DNA is not detectable in the final product. This means that oil from GM oilseeds is not subject to the mandatory labelling requirement. GM labelling is not required with animal feedstuffs.

A ruling in late 2004 by the Australian Competition and Consumer Commission (ACCC) – the government body responsible under the *Trade Practices Act 1999*

(Commonwealth) for vetting product claims – is that poultry that is not genetically modified but is fed on GM feedstuffs cannot be labelled as 'GM-free' as some key poultry producers were doing (ACCC 2004).

table 4 **regulatory arrangements for GMOs and GM materials in Australia**

experimental and commercial release	All field trials and commercial releases of GMOs must be approved by the Gene Technology Regulator whose powers are prescribed by the *Gene Technology Act 2000 (Commonwealth)*. The object of this Act is to protect the health and safety of people and to protect the environment, by identifying the risks posed by, or as a result of, gene technology, and by managing those risks through regulating certain dealings with GMOs.
marketing approval	All genetically modified foods must undergo a rigorous science based pre-market safety assessment by Food Standards Australia New Zealand (FSANZ). This safety assessment is aimed at ensuring that GM foods sold in Australia are at least as safe as non-GM varieties of the same crop.
imports	Import of live and viable GMOs must be approved by the Gene Technology Regulator. Australia has not ratified the Cartagena Protocol on Biosafety.
labelling	Under standard 1.5.2 of the Australia New Zealand Food Standards Code, labelling is mandatory for a food that is, or contains as an ingredient including a processing aid, a food produced using gene technology that: • contains novel DNA and/or novel protein or • has altered characteristics but does not include: • highly refined food, other than with altered characteristics, where the effect of the refining process is to remove novel DNA and/or novel protein • a processing aid or food additive, except where novel DNA and/or novel protein from the processing aid or food additive remain present in the food to which it has been added • flavours present in the food in a concentration not more than 1 gram per kilogram or • a food, ingredient or processing aid in which genetically modified food is unintentionally present in a quantity of no more than 10 grams per kilogram per ingredient.

GM food use

Many different GM grains and processed foods are approved for food use in Australia by Food Standards Australia New Zealand (FSANZ).

The most obvious uses of soybeans are for oil, soy milk and a range of foods, such as tofu and miso. Soybean products are also used in a wide range of other foods, usually in small quantities. In particular, soybean lecithin is widely used as an emulsifier in margarine, ice cream and chocolate. Soybean flour is used in many baked products, including donuts (because soybean flour absorbs less fat) and in wheaten bread as a dough improver (Dines 2003).

Cottonseed oil has a relatively high burning point compared with other vegetable and animal oils so it is often the preferred oil for deep frying.

In the United States, the Grocery Manufacturers of America is quoted as saying that roughly 75 per cent of all processed foods contain some GM ingredients (Associated Press 2005).

Despite extensive use of domestically grown cottonseed and significant imports of corn and soybeans from GM producing countries, particularly the United States, there are very few cases of products on Australian supermarket shelves that are labelled as containing GM materials. A 'pilot' survey in Australia in 2003 of 51 products, claiming to be representative of the range of soybean and corn derived food products in Australia, found novel DNA in ten products (five soymilk, three tacos and two corn chip products) but all GM material levels were below the threshold level for labelling (TAG Working Group 2003).

All soy milk products on supermarket shelves in Australia appear to be derived from non-GM soybeans, with most brands explicitly labelled as not containing GM soybeans as a marketing strategy. The total value of grocery sales of soy milk in Australia in 2005 was $108 million (Retail World 2006).

Some Australian food manufacturers have stated policies of avoiding the use of GM materials, even if use would not require labelling. These are mainly producers of dairy products and poultry meat that avoid, as much as possible, products based on livestock fed GM feedstuffs (discussed further in the next section of this chapter).

Takeaway and restaurant foods made from GM materials do not require labelling in Australia.

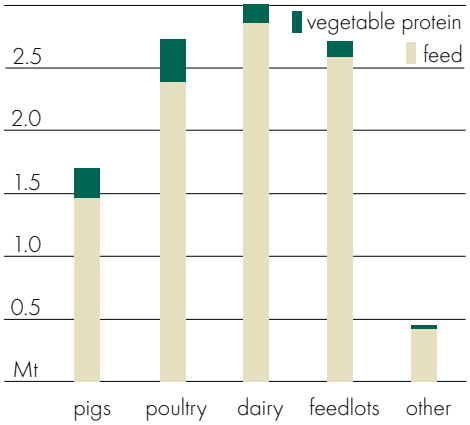
GM feed use

The main livestock sectors in which feedstuffs are consumed in Australia are shown in figure 1 (Spragg 2005). The poultry industry accounts for around 38 per cent of total vegetable protein use in Australia. Australia is not self sufficient in protein meals, with large quantities of imports of soybean meal and fishmeal necessary to meet the gap. This gap is growing, with intensive livestock production (lotfed beef, pig meat, poultry meat and eggs) in Australia growing at 5.5 per cent a year over the past ten years, while Australian production of oilseeds has been growing at only 1.6 per cent a year over the same period.

DNA from GM crops is broken down in the process of digestion by animals and there appears to be no credible scientific evidence of modified DNA being detected in the meat or milk – see MacKenzie and McLean 2002 for a review of the scientific literature. Nevertheless, even after safety checks by authorities, some consumers may be concerned about the use of GM feedstuffs. This is either because they still have doubts over direct human health effects or because they do not want to support the use of GM crops on environmental grounds. These concerns have led to a limited market for livestock products from animals that have not been fed on GM feedstuffs.

The Australian Stockfeed Manufacturers Association does not have a publicly stated position on GM feedstuffs. Rather, feed manufacturing firms are simply responding to end user requirements on the use of GM feedstuff inputs. ABARE discussions with the main feed manufacturing firms in Australia suggest that less than 10 per cent of customers, by volume of sales, require that only non-GM inputs are used in feed compounds.

fig 1 **feed and vegetable protein meal use in Australia, by livestock sector, 2004**



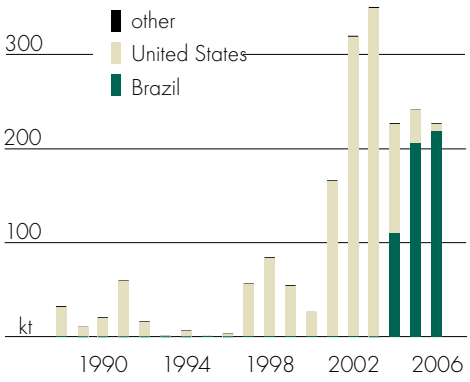
The position of the Australian Chicken Meat Federation, representing 85 per cent of Australian poultry meat production, is that the industry is 'committed to using their best endeavours to source non-GM ingredients for their feed' (Australian Chicken Meat Federation 2006).

Some pig meat exporters in Australia also consider not using GM feedstuffs to be a marketing advantage, particularly in their key growth market Japan, where

commercial vendor declarations are required stating that GM feed materials have not been fed to pigs (Australian Pork Limited 2004).

There has been a marked trend in the Australian dairy industry over the past twenty years to use more grain and other feedstuffs to supplement pasture in the diets of cows (ABARE 2005). These feedstuffs include relatively small quantities of soybean and cottonseed meal. A number of important manufacturers of dairy products in Australia require that milk producers do not feed GM feedstuffs to their cows. There is evidence that a few buyers of Australian dairy exports, most notably in Japan and the Republic of Korea, require vendor declarations that GM feedstuffs have not been used (ACIL Tasman and Farm Horizons 2004). However, a search of the websites of the main dairy manufacturers in Australia found that only Parmalat Australia has a publicly stated policy of avoiding GM feedstuffs. This was stated as 'in the case of milk, our preference is that our farmers avoid GE/GM feed for their cows and seek warranties from their suppliers of compounded feeds when in doubt' (Parmalat Australia 2006).

fig J **Australian imports of soybean meal, by source country**



Only minor Australian egg producers, mainly organic ones, have policies of not using GM feedstuffs. Organic egg production makes up only around 2 per cent of total Australian grocery sales of eggs (Retail World 2006).

Perceptions of consumer resistance to products from livestock that are fed on GM materials appears to have led to a marked shift in recent years away from GM soybean meal imported from the United States, to (presumably) certified non-GM soybean meal from Brazil (Figure J). This shift has occurred despite the unit cost of purchasing the Brazilian meal being 10 per cent higher than that for the US meal in 2005, compared with 7 per cent lower in 2004 (based on data in ABS 2006).

5

GM canola and Australia's export markets

- *Import data for the main canola importing countries are examined with the aim of identifying market access advantages and willingness to pay extra for non-GM canola.*
- *It is clear in the cases of Japan, Mexico, China and Pakistan that non-GM canola does not have widespread market advantages compared with GM canola.*
- *The contentious canola import market is the European Union where Canadian canola (but not canola oil) is effectively denied access because of its GM status.*
- *The European Union has traditionally only been an occasional importer of Australian canola but its recently set targets for biodiesel use are expected to make it a larger importer of both canola and canola oil in the future.*
- *There is anecdotal evidence of price premiums for canola in the European Union market in 2006 but large EU imports of Canadian canola oil are limiting the extent to which EU canola prices can rise.*
- *Any price premium in the European Union market is largely an artefact of bans on GM canola imports. These bans are expected to be lifted in the near future.*

approach

Australia exports around 70 per cent of its canola production, usually to markets where there is strong competition from Canada's GM canola.

The aim in this chapter is to assess the extent to which non-GM canola may have a market advantage over GM canola in the key world canola import markets. In particular, the analysis seeks to identify the extent (if any) to which non-GM canola commands price premiums over GM canola. Where possible, the import data reported by each importing country is used as the basis for comparison. In the cases of Bangladesh and Pakistan, however, this would mean having only three years of data so the patterns of these countries' trade in rapeseed are established through reported exports to them.

The nature of mandatory labelling regimes for GM products is reported for each country because these can heighten incentives for importers to buy non-GM canola. This is where the use of GM canola would trigger labelling requirements and food manufacturers perceive that consumers of their products would react adversely to the labelling. Buying from a country like Australia where GM canola is not produced means that costly identity preservation and traceability processes can be avoided. These cost savings may be reflected in the prices that importers are willing to pay for Australian canola.

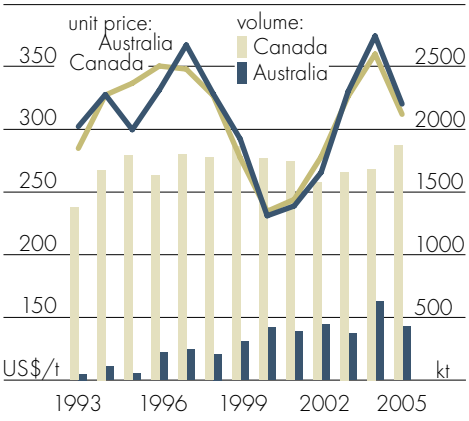
The main markets for Australian canola are Japan, China, Pakistan, Bangladesh and the European Union, while Mexico was also an import market in the late 1990s. (More information on the supply and disposal of rapeseed and rapeseed products in these countries is provided in appendix B.)

Japan

Japan has emerged as an important export market for Australian non-GM canola where exports have steadily increased since 1996 (table 5). Japan typically accounts for around 42 per cent of world rapeseed imports (table 1).

The Government of Japan allows for the presence of up to 5 per cent for an individual approved GM ingredient in a product before labelling is required. A tolerance of 1 per cent adventitious presence of GM material is allowable where the GM variety has not been approved by Japanese authorities but has received safety approval from authorities in the exporting nation.

fig K **Japanese imports and import prices of GM (Canadian) and non-GM (Australian) canola**



Japanese trade figures indicate more than three-quarters of Japan's imports of canola in the three years to 2005 were sourced from Canada (table 5), where canola production is dominated by GM crops. There is apparently little difference in the prices paid for GM canola from Canada and non-GM canola from Australia (figure K; UN Statistics Division 2006).

Together, Canada and Australia supply around 90 per cent of Japan's canola oil imports, which have grown substantially in recent years (figure L). Australian canola oil has usually been traded at a discount to Canadian canola oil in the Japanese import market but this discount appears to have been declining in recent years (figure L; UN Statistics Division 2006).

fig L **Japanese imports and unit import prices of canola oil from Australia and Canada**

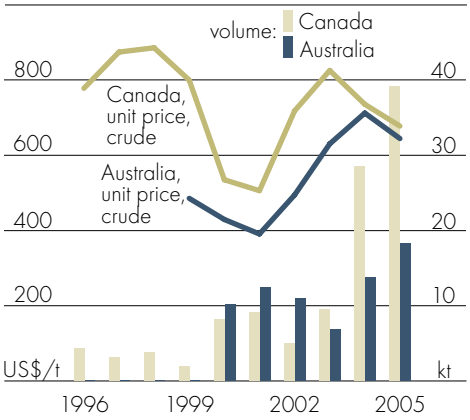


table 5 **Japanese rapeseed imports, by source country**

	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2001 kt	2002 kt	2003 kt	2004 kt	2005 kt
rapeseed										
Australia	218.1	244.3	208.8	305.4	418.6	385.2	445.8	369.1	628.8	426.7
Canada	1 632.3	1 802.3	1 777.0	1 862.4	1 767.3	1 743.5	1577.6	1660.0	1683.6	1869.6
China	3.2	0.9	0.0	0.7	1.0	0.0	0.1	0.1	0.0	0.2
European Union **a**	46.3	1.7	73.3	24.1	0.2	21.1	59.1	52.7	0.1	0.4
United States	22.4	12.6	19.0	9.0	5.8	0.2	1.1	2.0	0.1	5.5
other	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
total	1 922.4	2 062.1	2 078.2	2 201.6	2 192.8	2 150.0	2 083.6	2 083.9	2 312.6	2 304.2
rapeseed oil										
Canada	4.4	3.1	3.8	1.9	8.1	9.1	4.9	9.5	28.5	39.2
Australia	0.0	0.0	–	–	10.2	12.5	11.0	6.9	13.8	18.3
Malaysia	–	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	4.1
United States	0.2	0.3	–	0.6	–	0.6	0.2	0.7	0.8	0.5
European Union **a**	0.0	–	0.2	0.0	0.3	0.0	0.8	0.0	0.0	–
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	1.0
other	0.0	–	–	0.0	0.1	0.0	–	0.0	0.0	0.0
total	4.7	3.6	4.3	2.6	18.8	22.2	17.0	17.1	48.5	63.2

a Twenty five countries. – negligible quantities.
Source: UN Statistics Division (2006).

box 1 GM-free canola exports to Japan – a recent specific case

A cooperative of canola growers on Kangaroo Island in South Australia has won a contract to export 2000 tonnes of canola to Japan in a twelve month period that commenced in 2006. It appears that canola growers on the island have been able to negotiate a premium price for their canola, reportedly based on the island's GM-free status and environmental record. While the price premium has not been revealed, it is said to be more than sufficient to cover the additional transport costs associated with shipping grain from the island. The cooperative anticipates that further contracts will be forthcoming, with a view to doubling the initial volume (Black 2006; McEwen 2006). The 2000 tonne contract accounts for approximately half of the canola currently being produced on the island but is less than 0.2 per cent of Australia's total canola exports.

Given that Australia does not produce GM canola, it is not clear why the importer should single out Kangaroo Island canola to pay a price premium on the basis of non-GM status. It could be that the importer is anticipating the future release of GM canola in Australia and is acting now to shore up future supplies of non-GM canola from an island where avoiding cross-pollination from GM canola in other producing regions may be relatively easy.

China

Over the past decade, China has emerged as the world's largest importer of oilseeds, mainly soybeans. In 2005, Chinese imports of soybeans totalled 26.5 million tonnes, mainly from the United States (42 per cent), Brazil (30 per cent) and Argentina (28 per cent). China has required labelling of all products containing GM materials since January 2002 (see appendix A). However, Lin et al. (2006) say that the requirement was not strictly enforced until August 2003.

Lin et al. employed econometric techniques to determine the impact of mandatory GM labelling on consumer purchasing of vegetable oil in China. They used supermarket data for the Chinese city of Nanjing for the period January 2002 to April 2004. Their conclusion was that mandatory labelling reduced the expenditure share of soybean oil by nearly 2 percentage points, and increased the expenditure share of sunflower oil (non-GM and the most direct substitute for soybean oil) by 2.3 percentage points. That is, mandatory labelling caused only a small decline in soybean oil consumption. Lin et al. also concluded that the labelling impact would be even smaller if the analysis was extended to include consumers in smaller sized cities and rural areas.

China is a major producer of rapeseed but still imports substantial quantities of rapeseed (see table B4). However, imports of rapeseed have declined sharply in recent years, probably reflecting a shift to importing soybeans, particularly from GM soybean producing countries the United States and Brazil.

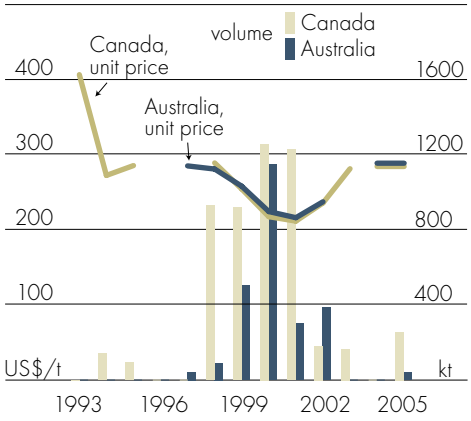
Since 1996, China's rapeseed imports have been sourced largely from Canada, Australia and the European Union (table 6). In recent years, however, the market has been increasingly dominated by Canada. A contributory factor to the increased dependence on Canadian canola may be reduced export availabilities in the European Union and Australia.

table 6 **China's rapeseed and rapeseed oil imports, by source country**

	1996	1997	1998	1999	2000	2001	2002	2003	2004 a	2005
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
rapeseed										
Australia	0.0	42.7	90.5	502.5	1148.0	301.8	385.8	0.0	na	39.6
Canada	0.0	0.0	929.0	916.7	1 255.9	1 225.7	181.2	165.6	na	255.3
European Union **b**	0.0	12.0	365.9	1175.9	563.1	195.9	50.0	0.0	na	0.0
Mongolia	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	na	1.1
Russian Federation	0.4	0.5	0.9	0.1	1.7	0.6	0.9	0.7	na	0.2
total	0.4	55.1	1 386.4	2 595.3	2 968.9	1 724.3	618.2	166.7	na	296.2
rapeseed oil										
Australia	0.1	1.0	–	–	0.0	–	10.0	5.2	na	0.4
Canada	55.1	23.9	42.8	12.7	70.5	46.1	16.6	142.6	na	176.9
European Union **b**	182.5	275.9	186.1	32.8	1.9	0.1	48.3	2.2	na	–
Hong Kong	10.4	5.1	17.8	0.4	0.2	1.5	1.6	0.2	na	0.1
Malaysia	53.1	18.0	16.8	3.5	1.3	0.3	0.5	1.4	na	0.2
United States	0.0	15.9	13.0	11.9	0.7	1.2	0.6	0.0	na	0.0
other	14.9	10.9	8.2	7.9	0.0	0.1	0.2	0.1	na	0.0
total	316.0	350.6	284.7	69.2	74.7	49.4	77.8	151.6	na	177.6

a No quantity data are available for 2004 but the total value of imports of rapeseed reported by China was US$134.4 million, of which Canada supplied US$134.3 million and Australia US$0.9 million. **b** Twenty five countries. – indicates negligible. **na** Not available
Source: UN Statistics Division (2006).

fig M **China's imports and unit import prices of canola oil from Australia and Canada**



Canada has also almost completely replaced other countries as supplier of China's import requirements of rapeseed oil (table 6). The intermittent trade makes import price comparisons between GM and non-GM canola difficult. It can be seen from figure M that in years where comparison is possible that the average import prices are very similar for Australian and Canadian canola (UN Statistics Division 2006).

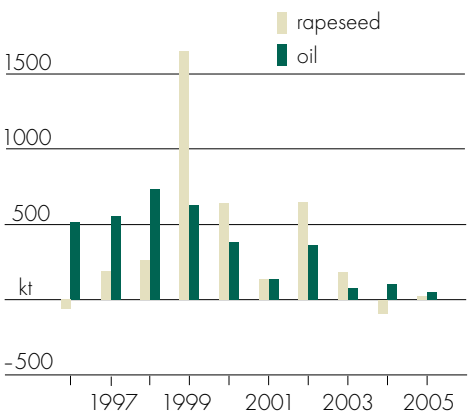
European Union

The European Union (25 countries) is a major producer of rapeseed. While both an importer and exporter of rapeseed and rapeseed oil from non-EU countries (table B5), in the past the European Union has generally been a net exporter of both of these products (figure N; UN Statistics Division 2006). However, as discussed in an earlier chapter, EU net exports have declined in recent years and the European Union is expected to become a net importer of both rapeseed and rapeseed oil over the next decade.

The projected import growth reflects growing demand for oilseeds for biodiesel production in the European Union. Around 40 per cent of EU rapeseed is currently crushed for biodiesel purposes. There are targets for biodiesel use in the European Union of 2 per cent of road fuel transport use in 2005; 5.75 per cent by 2010; and 10 per cent by 2020. The targets are to be achieved through government support in the form of tax incentives and mandatory use requirements. While the higher demand is expected to bring forth greater domestic rapeseed production, projections reported in FAPRI (2006) are for net rapeseed and rapeseed oil imports by the European Union of around 370 000 tonnes and 264 000 tonnes a year, respectively, over the next decade.

The European Union has established very strict laws governing the import and labelling of GM products (see appendix A). This reflects that consumers in Europe are generally less accepting than consumers elsewhere of GMOs in food and feed (European Commission 2006; McCluskey et al. 2003).

fig N **EU net exports of rapeseed and rapeseed oil to non-EU countries**



The EU regulatory arrangements for GM grains are an important determinant of its grain imports. These regulatory arrangements are described in more detail in appendix A.

Prior to 1998, the European Union had approved for import one variety of GM soybeans; one variety of GM canola (Topas 19/2); and a number of varieties (but not all commercialised varieties) of GM corn. From 1998 to 2004, the European Union maintained a virtual moratorium on further approvals of GM varieties until it put in place its comprehensive labelling and traceability arrangements for GM products. In late 2004, some further GM corn varieties were approved but imports of the most important varieties of GM canola are still not allowed. (Topas 19/2 is virtually no longer commercially grown.)

The mandatory labelling arrangements for GM products in the European Union include a tolerance level for accidental GM presence in non-GM products of 0.9 per cent for approved varieties of GMOs. Labelling is required with stockfeed and with foods, even where modified DNA is not detectable in the final product (as is the case with vegetable oils like canola oil). This requires elaborate arrangements for tracing GM inputs throughout food supply chains.

Another key aspect of the arrangements for GMOs in the European Union is that there is a 0.5 per cent tolerance for the unintended presence of 'unapproved' GM events in imports, provided the GM event has been approved as safe by the European Food Safety Agency.

The inability to import key GM canola varieties has virtually eliminated Canada as a supplier of EU rapeseed imports (table 7). Over the past decade, Australia has been the main supplier of EU rapeseed imports. However, this trade has been highly variable, with large imports generally only occurring when seasonal conditions have adversely affected the EU rapeseed harvest. Canada has still been able to export rapeseed oil and meal to the European Union (figure D, E).

There are already signs that the incentives for biodiesel use are leading to larger rapeseed and rapeseed oil imports by the European Union. In the first nine months of 2006, Australian canola exports to the European Union totalled 286 000 tonnes (ABS 2006). Over the same period, Canadian canola seed exports to the European Union were negligible but Canadian canola oil exports to this market were 260 000 tonnes (ISTA Mielke GmbH 2006), a very large increase from the annual average 5300 tonnes over the five years to 2005. The European Union

table 7 **EU rapeseed and rapeseed oil imports, from non-EU sources** a

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
rapeseed										
Argentina	5.0	–	–	3.5	0.1	6.7	–	–	0.1	0.0
Australia	1.3	–	100.1	303.9	0.3	221.2	62.8	1.0	134.4	0.1
Belarus	4.5	6.9	10.1	0.0	6.0	33.2	9.1	0.0	2.2	2.8
Brazil	0.0	0.0	51.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	–	1.3	–	–	0.2	0.2	–	2.8	8.1	–
Canada	245.9	71.0	12.0	10.5	1.7	2.5	2.4	4.0	3.0	14.3
Croatia	3.4	5.1	8.1	10.5	18.2	7.7	3.0	13.8	3.2	11.8
Romania	0.5	2.8	6.7	23.1	18.0	36.4	8.6	2.5	29.9	69.5
Russian Federation	45.0	37.9	101.1	31.1	73.6	31.7	31.0	14.9	64.2	55.0
Turkey	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	0.0
Ukraine	12.7	28.8	14.7	17.7	24.6	46.0	11.5	9.8	29.0	0.1
United States	0.2	–	155.5	3.4	–	–	0.6	–	–	–
other	9.6	1.3	0.8	10.1	5.7	9.7	1.7	2.1	2.3	0.3
total	328.1	155.2	460.3	413.9	148.5	395.2	130.9	50.9	290.1	154.0
rapeseed oil										
Belarus	0.0	0.2	0.4	0.3	0.0	0.0	0.0	0.2	9.3	2.5
Canada	1.9	5.2	0.0	0.0	0.0	0.0	0.0	22.2	2.6	1.9
China	4.7	4.1	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russian Federation	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	7.8	4.7
Ukraine	0.0	0.5	1.6	0.1	0.0	2.1	2.0	0.0	3.4	11.2
United States	0.7	0.2	0.2	0.3	2.2	0.4	2.0	0.2	10.4	1.1
other	8.1	6.7	6.6	1.7	4.5	3.8	6.7	6.0	8.9	14.0
total	15.4	17.1	12.5	2.4	6.7	6.3	10.7	28.6	42.5	35.3

a The data have been adjusted throughout to reflect imports by the current 25 countries in the European Union, ignoring the fact that there were only 15 countries in the European Union from 1996 to 2004. – indicates negligible.
Source: UN Statistics Division (2006).

also sourced 32 800 tonnes of canola oil in the first three quarters of 2006 (ISTA Mielke GmbH) from the United Arab Emirates, a country whose recently emerged canola crushing industry is based on canola imports from Canada and, to a lesser extent, Australia.

It is difficult to confirm the anecdotal evidence that the canola exported to the European Union is earning price premiums. A comparison of Australian export returns for the Japanese and EU markets over the four months in 2006 when large shipments to the European Union were made does not show unequivocal evidence of price premiums. The ability to import Canadian canola oil is a factor limiting the extent of import price premiums for canola in the European Union.

Any price premium with the EU rapeseed market is mainly an artefact of the restrictions on imports of Canadian canola and would probably largely disappear when the restrictions are lifted.

In 2003, Canada, the United States and Argentina appealed to the World Trade Organisation (WTO) to intervene in trade matters between the three countries and the European Union by asserting that the moratoriums applied by EU member states are inconsistent with the European Union's obligations under World Trade Organisation (WTO) arrangements.

The report of a panel convened by the World Trade Organisation (2006) under its dispute settlement arrangements was released in September 2006. The panel found that the European Union applied a general de facto moratorium on approvals of GM products between June 1999 and 29 August 2003 (the date of establishment of the panel). This resulted in a failure to complete approval procedures for individual GM products without undue delay in a way that was inconsistent with various aspects of the Sanitary and Phytosanitary Agreement of the WTO arrangements. Given this ruling, it will be difficult for the European Union to maintain its import ban on GM canola for much longer in the face of pressure from major GM grain exporting countries.

Pakistan

Pakistan is a producer of rapeseed but has become increasingly dependent on the supply of canola and rapeseed from external sources (table B8). Pakistan is only a small importer of rapeseed oil.

The Pakistani Government regards the development of agricultural biotechnology, including GM crops, as playing an important role in meeting its future food supply needs (USDA 2005i). Pakistan allows the importation of GM crops for food and feed purposes. Pakistani research institutes are progressing in developing their own GM varieties but there are no GM varieties currently being commercially cultivated (see appendix A for more details about the biotechnology regulatory arrangements for Pakistan).

A ban on imports of GM canola was lifted by Pakistan in early 2003 and no labelling of GM products is required. Since 2003, there have been large imports of GM canola from Canada, particularly in 2003 (table 8). However, Australia has become established as the largest supplier of canola to the Pakistani market. The other large suppliers are the European Union and non-EU countries in Eastern Europe.

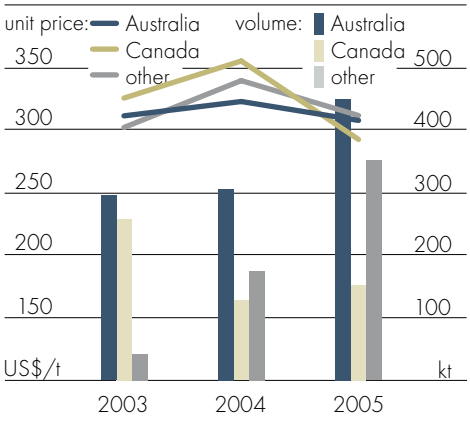
Three years of import data reported by Pakistan are available but these are the only years in which GM canola from Canada has been allowed to be imported

table 8 **exports of rapeseed to Pakistan, by source country**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
Australia	0.2	–	28.4	67.8	68.3	182.0	306.6	142.0	289.3	326.2
Bulgaria	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.4	4.5	0.0
Canada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	398.3	48.7	167.1
European Union **a**	0.0	26.2	1.0	189.9	329.9	120.0	206.1	93.6	121.4	98.4
India	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Romania	0.0	0.0	0.0	0.0	0.0	56.3	0.0	0.0	0.0	48.0
Ukraine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	10.5
total	0.2	26.3	29.4	257.7	398.2	358.3	513.6	637.3	464.4	650.4

a Twenty five countries. – indicates negligible.
Source: UN Statistics Division (2006).

fig O **Chinese imports and unit import prices from Australia and Canada**



into Pakistan. In figure O (UN Statistics Division 2006), Canadian canola has moved from selling at a price premium to non-GM canola in 2003 and 2004, to a slight discount in 2005.

Bangladesh

Bangladesh is a densely populated, food deficient country where approximately 50 per cent of the population fall below the poverty line. While Bangladesh is a producer of rapeseed, it supplements its domestic production substantially with imports in order to meet domestic consumption requirements (see table B2). There is no mandatory labelling of GM products.

Australia has been the main supplier of Bangladeshi imports of rapeseed, with the European Union as an important supplier until 2004 (table 9). More recently, Canada has also exported rapeseed to the Bangladeshi market. This is despite there being no official approval in Bangladesh for imports of GM canola.

table 9 **rapeseed exports to Bangladesh, by source country**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
Australia	108.4	74.6	120.3	88.6	111.7	158.4	115.0	80.6	103.3	65.6
Canada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	21.8	22.5
European Union **a**	29.1	53.7	92.0	148.8	108.2	63.7	33.7	68.0	0.0	0.0
Russian Federation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	5.9
Ukraine	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.9	1.0
total	137.5	128.3	212.2	237.3	219.9	225.5	148.7	161.8	126.6	95.2

a Twenty five countries. – indicates negligible.
Source: UN Statistics Division (2006).

Mexico

Mexico does not produce rapeseed but is a major importer of rapeseed and rapeseed oil (table B7). Mexico imports mainly Canadian canola, largely because of a freight advantage and both countries' participation in the North American Free Trade Agreement (NAFTA). In the ten years to 2005, Canada supplied nearly 80 per cent of Mexico's canola/rapeseed imports (table 10). The other suppliers of canola/rapeseed have been the European Union and the United

fig P **Mexican imports and import prices for GM (Canadian) and non-GM canola**

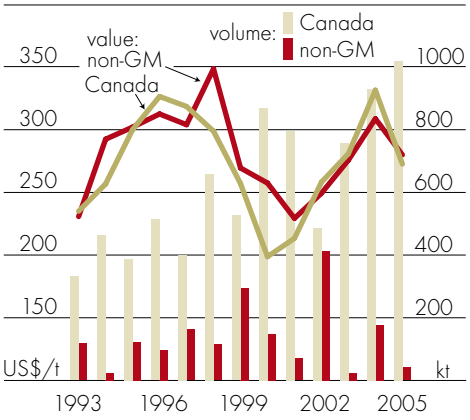


table 10 **Mexican rapeseed and rapeseed oil imports, by source country**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
rapeseed										
Argentina	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0
Australia	0.0	0.0	21.0	97.7	97.2	0.0	0.0	0.0	0.0	0.0
Canada	513.6	399.6	657.4	526.0	869.0	795.2	485.9	757.6	928.8	1018.1
European Union **a**	89.4	162.6	89.0	197.5	–	47.3	371.2	0.0	93.2	0.0
United States	8.8	–	4.6	0.0	39.3	22.6	41.4	23.6	83.6	41.3
other	0.0	0.0	0.0	–	0.0	0.0	0.0	0.0	0.0	0.0
total	611.8	562.3	772.0	821.2	1018.0	865.1	898.4	781.2	1105.6	1059.3
rapeseed oil										
Canada	13.1	10.2	34.7	28.9	31.0	16.0	40.0	22.9	37.4	20.4
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0
European Union	–	–	–	–	–	–	–	0.0	–	–
United States	22.5	44.9	83.9	46.5	38.4	56.7	62.5	73.8	89.6	57.1
other	0.0	0.0	–	0.0	0.0	–	–	–	–	–
total	35.6	55.2	118.7	75.4	69.4	72.7	102.6	96.9	127.2	77.6

a Twenty five countries. – indicates negligible.
Source: UN Statistics Division (2006).

States. Mexico was a significant market for Australian canola in the late 1990s, when Australian canola production was at its peak, but has virtually not been supplied with Australian canola since then.

In the period since the introduction of GM canola, the prices paid for non-GM canola/rapeseed in the Mexican market have substantially reflected prices received by Canadian exporters (figure P). With 40 per cent of its population falling below the poverty line, consumers in Mexico are inclined to place more emphasis on price rather than on the manner with which agricultural products are produced (USDA 2005f).

Reflecting Mexico's reliance on the economic benefits available under the NAFTA, biotechnology policies are largely designed to complement those of Canada and the United States. Consequently, there are few technical trade barriers that would hinder trade in GM grains between Mexico and the United States or Canada. This, however, excludes corn which is widely held to originate from Mexico and thus the preservation of its genetic diversity is of high importance (USDA 2005f).

price premiums

The analysis of canola import prices reported above indicates that prices received for non-GM canola generally move in line with those for GM canola – that is; there is no evidence of widespread price premiums for non-GM canola. The evidence is broadly consistent with price leadership by Canada, the dominant canola exporter.

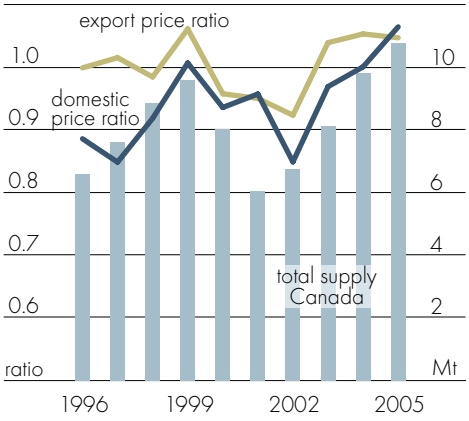
Price leadership is a characteristic of oligopolistic markets where there are relatively few market participants that are intimately aware of each others' strategic responses to price cuts. The price leader is usually the dominant market player and the other smaller suppliers can sell as much grain as they like, provided they follow the price set by the price leader. Such price leadership has been noted in world grain markets for many years – see, for example, McCalla (1966); Alouaze, Watson and Sturgess (1987); Bredahl and Green (1983); Mitchell and Duncan (1987); Hellwinckel and Ugarte (2003). The paper by Hellwinckel and Ugarte (2003) found strong evidence of price leadership by the United States in the corn and rice markets, and weaker evidence in the cotton market. In the case of canola, however, there is insufficient data available to formally test this hypothesis.

Chance (2006), in a comparison between Australian (Fremantle) and Canadian (Vancouver) domestic prices for canola at export positions (port), shows that the Australian price for canola has shifted from $70 below the Canadian price in

1998 to $50 above in May 2006. The same broad trend relationship is evident in figure Q, in which the ratio of the Melbourne canola price to the Canadian (Vancouver) canola price is shown. In the late 1990s, the Melbourne price was around 85 per cent of the Canadian domestic price, but increased fairly steadily to average 6 per cent higher than the Canadian price by 2006.

A comparison of domestic prices reflects a range of domestic supply and demand factors in the two countries, making it more difficult to isolate any preferences for non-GM canola. In Australia, domestic canola price trends over the past decade mainly reflect a growing protein meal deficit owing to intensive livestock production growing at 5.5 per cent a year, while domestic production of the oilseeds that produce the protein meal has been growing at only 1.6 per cent a year (due importantly in recent years to drought). At the same time, in Canada, there have been large increases in canola production that have put downward pressure on domestic Canadian canola prices.

fig Q **canola: domestic and export price relationships between Australia and Canada**



A more appropriate comparison is between canola export returns of the two countries because it is international markets where importers can choose between non-GM canola from Australia and GM canola from Canada. Looking at the ratio of average export returns (expressed in common currency terms) for Australian and Canadian canola, the same trend in favour of Australian canola is not evident (figure Q). Rather, the average export return for Australian canola has cycled around parity with Canadian canola. Furthermore, the price ratio has dipped below parity when Canadian export supplies have been relatively restricted (2000–02), and moved above parity when Canadian canola supplies have been relatively abundant (2003–05). This confirms the country by country assessments reported above that do not reveal any strong evidence of price premiums on a wide scale for non-GM canola.

There is at least one explanation for why price premiums have emerged in world markets for non-GM soybeans but not for canola. The premium paying component

of the soybean market is largely related to human food uses that would require GM labelling, such as soy milk, miso and tofu. Canola products are virtually only canola oil (for human food and biodiesel) and protein meal. Canola oil does not have to be labelled as GM in most countries, with the notable exceptions of the European Union and China. Canola meal is virtually all used as animal feed; there is very little human food use and, hence, demand is largely unaffected by labelling requirements.

Even if a mixed production system of GM and non-GM were to operate in Australia, the thresholds throughout the world for unintended presence of GM canola before labelling is required are not particularly onerous. In the three years to 2005, less than 6 per cent of Australia's canola exports went to countries with labelling thresholds less than 5 per cent – that is, the great bulk of Australian canola goes to countries with a threshold of 5 per cent or greater, or no labelling requirements. However, unintended presence in Australia shipments could become more of an issue if the European Union becomes a larger and more regular importer of Australian canola for food uses, because of the EU labelling threshold of 0.9 per cent.

6

GM canola and other agricultural export markets

- *The aim in this chapter is to review the evidence in world markets of:*
  - *unintended presence of GM canola in exports of other grains (particularly wheat and barley), causing market acceptance problems, and*
  - *market disadvantages with products produced from livestock fed on GM materials.*
- *In the case of Canada, no evidence was found of unintended presence of GM canola causing market acceptance problems with Canadian wheat and barley exports.*
- *Moreover, Canada has markedly increased its share of world trade in beef, pig meat and poultry meat since the mid-1990s, suggesting that the introduction of GM canola has not been a hindrance in market acceptance of Canadian livestock products.*
- *World export trade in intensive livestock products (meat and milk products) is dominated by countries that make extensive use of GM feedstuffs in their livestock production processes.*

issues and approach

In 2003, both AWB Limited and the Australian Barley Board (now ABB Grains), key grain marketers in Australia, expressed concerns over the commercialisation of GM canola in Australia because of the possibility that unintended presence of GM canola seed in wheat and barley shipments would jeopardise some of their markets (AWB Limited 2003; Australian Barley Board 2002). Similarly, as discussed in the previous chapter, some marketers of Australian livestock products have claimed that there is a market advantage to not feeding GM material to livestock (see, for example, Australian Pork Limited 2004).

The aim in this chapter is to examine the extent to which being free from unintended presence of GM material or not using GM inputs, even if GM material is not detectable in the final product, delivers a market advantage. First, world trade in livestock products is examined for evidence of a market disadvantage through

feeding GM materials, drawing particularly on the experiences of Canada, the main producer of GM canola (and also a major exporter of wheat and barley). Second, the experiences of the Canadian grains industry with unintended presence of GM canola are examined.

The regulatory arrangements for GMO and GM materials in each of Australia's main export markets for grains are summarised in appendix A to this report.

livestock product trade

Canada

The Canadian meat industry has markedly increased production since 1996 and has also substantially increased its share of world trade in meat (figure R; USDA 2006a). The industry seems to have gained an advantage from increased availability of domestic protein meals that have resulted from the introduction of GM canola. The sharp dip in Canadian beef and veal exports from 2003 reflects the detection of the first case of BSE (bovine spongiform encephalopathy or 'mad cow' disease) in the cattle herd in Canada in May 2003.

However, the impact of the introduction of GM crops on the Canadian dairy industry is not so clear. Milk production increased in the late 1990s but has since eased (figure S; USDA 2006a). Canada is only a minor exporter of dairy products. Its share of the world export market for butter has increased since 1996 but it has lost market share in world export markets for cheese and skim milk powder.

fig R **Canadian meat production and shares of world meat trade**

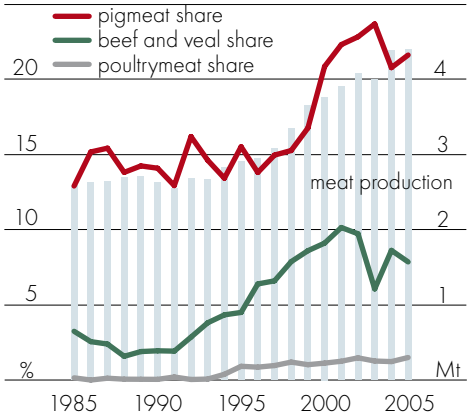
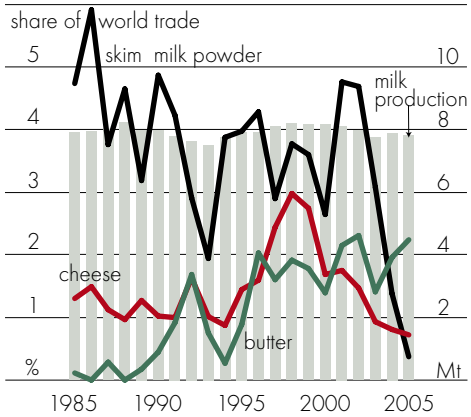


fig S **Canadian milk production and share of world dairy products trade**



European Union

The European Union, a major world exporter of dairy products and meat (figures T, U; USDA 2006a), makes extensive use of GM feedstuffs, particularly imports of soybeans from the United States. This is despite a number of large supermarket chains in Europe requiring that their livestock products are derived from animals fed only on non-GM feedstuffs.

Annual imports by the European Union from the United States include around 6 million tonnes of soybeans (the meal of which is fed to animals) and around 6 million tonnes of corn gluten (a high protein byproduct of the starch making process). Brookes, Craddock and Kniel (2005) estimated that in the European Union in 2003-04 only 12–15 per cent of soybean meal and 10–15 per cent of corn feedstuffs (including corn gluten) were non-GM.

fig T **major exporting countries of dairy products** annual average, 5 years to 2005-06

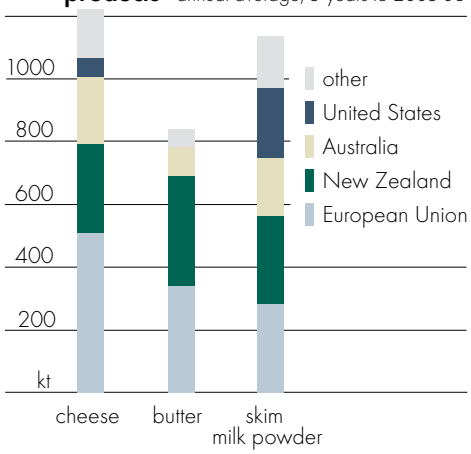
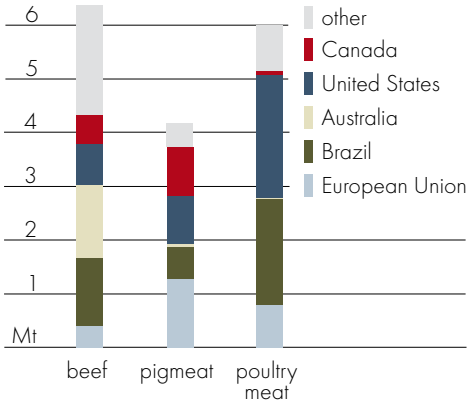


fig U **major exporting countries of meat** annual average, 5 years to 2005-06



trade in wheat and barley

Canada's share of world trade in wheat and barley has declined since the introduction of GM canola in Canada in 1996 but the downward trend was evident before then (figure V; UN Statistics Division 2006). The main reasons behind the declines are the strong growth in Canada's intensive livestock industry and increased canola plantings at the expense of wheat and barley.

No evidence was found of accidental canola presence causing market access problems with Canadian wheat and barley exports. One of the reasons for this is that there are very low tolerances for the presence of small seeds in Canadian wheat and barley exports. Grain shipments in Canada must meet standards for commercial cleanliness administered by a government inspection agency, the Canadian Grain Commission. Shipments that do not meet the standards for commercial cleanliness are permitted only with the permission of the commission. For all grades of Canadian wheat, the commercial cleanliness standard allows a maximum presence of small seeds of 0.05 per cent, by volume (Canadian Grain Commission 2005). For barley, the small seed allowance is 0.1 per cent.

The Australian standards for small seeds in wheat and barley are much more liberal than the Canadian standards. The tolerances for small seeds in Australian wheat exports are set by AWB Limited. For milling wheat, the tolerance is 0.6 per cent; for soft and durum wheat, 1.2 per cent; and for feed wheat from 1.2 per cent to 2.85 per cent, depending on the grade. For barley, the tolerance in Australia ranges from 0.6 per cent in malting barley to 2.5 per cent in feed barley (Ezigrain 2006).

However, ABARE discussions with wheat and barley marketers suggest that actual occurrences of canola in Australian wheat exports is low, varying from region to region according to the extent to which canola is part of the crop rotation. With wheat, for example, the average presence of foreign materials in 2004-05 ranged from 0.15 per cent in Australian prime hard wheat in Queensland, to 0.49 per cent in Australian standard white wheat in Victoria (AWB Limited 2005). (The AWB defines 'foreign material' as all matter other than wheat grain and does not identify individual components.) The worst case is that virtually all the foreign material would have to be GM canola for the 0.5 per cent tolerance level for GM canola required by the European Union to be triggered. A key reason for the low presence is that canola is such a small seed compared with wheat and barley that it is easily removed through the screening processes that occur in harvesters or at ship loading facilities.

fig V **Canada's shares of the world wheat and barley trade**

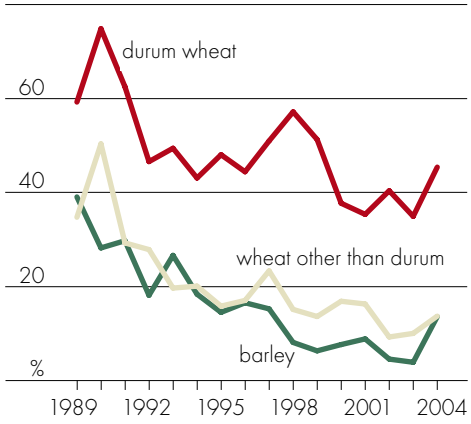
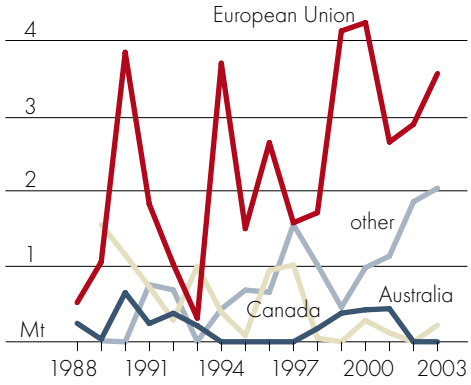


fig W **exports of barley to Saudi Arabia, by country**



Some of the concerns of Australian grain marketers on the commercialisation of GM canola expressed in 2003 may have been related to the documentation requirements proposed at the time under the Cartagena Protocol on Biosafety (see the discussion in chapter 2). This would have required documentation accompanying wheat shipments to indicate whether GM grains of any type were present, no matter how small the quantity. However, the documentation requirements agreed by Parties to the Protocol in March 2006 now do not require notification of the presence of GM canola in wheat or barley cargoes.

A market that has been sensitive to GM grains in the past is Saudi Arabia but there has been a recent easing in its regulatory arrangements. Saudi Arabia is the largest importer of feed barley, taking considerable quantities from Australia (figure W; UN Statistics Division 2006). Canada is only a relatively small supplier of the Saudi Arabian market for barley but it is clear from Figure W that the possible presence of GM canola has not meant that it has been denied access to this market.

7

conclusions and implications

There is already extensive use in the domestic Australian food and feed markets of imported GM soybeans and domestically produced GM cottonseed for both food and feed consumption. A number of Australian food manufacturers have indicated that they do not use GM materials in their production systems, or are working to remove them from these systems. This is mainly some key dairy food manufacturers and most of the poultry meat producers in Australia.

At the world level, the canola market has become differentiated into GM, conventional, certified GM-free and organic segments. While there is some limited evidence of price premiums for organic and certified GM-free canola, markets for these canola types are still very much small niches and mainly located in developed countries with high incomes per person. A conclusion of this analysis is that, in the main traditional import markets for canola – Bangladesh, China, Japan, Mexico and Pakistan – GM canola is generally accepted as readily as conventional canola and is priced at very similar levels.

The exception with market acceptance of GM canola is the European Union that currently does not allow imports of the main GM canola varieties. The European Union is a major producer of rapeseed and in the recent past has only been an occasional importer of canola from non-EU countries. However, there are projections that the European Union will be a net importer of around 370 000 tonnes of rapeseed and 264 000 tonnes of rapeseed oil a year over the next decade (FAPRI 2006), mainly driven by the mandated use of rapeseed for biodiesel production. The European Union resumed the process of approving GM varieties for import in late 2004 after a moratorium on new approvals that started in 1998. It will be difficult for the European Union to maintain the import ban on GM canola much longer in the face of pressure from major GM trading countries.

Some Australian exporters of some livestock products, most notably of pig meat and dairy food, say that there is a marketing advantage available in markets such as Japan associated with not using GM feedstuffs in animal production processes. Again, however, outside the European Union, the preference for products from livestock not fed on GM materials seems to be very much a niche market and is largely confined to dairy products. With meat products, for example, Canada's export trade has grown strongly since the introduction of GM grains and oilseeds in the United States and Canada in 1996, despite a heavy dependence on the

use of GM feedstuffs. Even in the European Union, much livestock production is dependent on the use of GM feedstuffs, particularly soybean meal and corn gluten feed derived from US soybeans and corn. It is increasingly difficult for EU livestock producers to source non-GM protein meals because the main soybean exporters – the United States, Brazil and Argentina – are producers of GM soybeans.

Another factor in the decision to commercialise GM canola is that some key Australian marketers of wheat and barley have expressed concerns that the possibility of unintended presence of GM canola in their shipments could jeopardise markets for their grain. There is no convincing evidence to suggest that wheat and barley exports have been adversely affected by the unintended presence of GM canola in other countries such as Canada.

Some of the reasons for Australian wheat and barley marketers concerns expressed in 2003 have now disappeared. Saudi Arabia, a major market for Australian feed barley, is now more accepting of GM grains. Furthermore, the documentation requirements agreed under the Cartagena Protocol on Biosafety in March 2006 do not require notification of unintended presence of GM canola in wheat and barley shipments.

In summary, the marketers of GM canola and of products based on livestock fed on GM materials, including GM canola, do not appear to be disadvantaged in the Australian and world markets – GM canola seems to be finding ready markets throughout the world at prices very similar to those received for conventional canola.

Finally, in deciding whether to commercialise a GM crop after it has been approved for environmental release, market access issues are only part of the consideration. These should be weighed against the agronomic and environmental benefits and the costs associated with keeping GM and non-GM separate in the handling and storage process. A framework for estimating grain separation costs is outlined in Foster (2006).

A appendix

regulatory arrangements for GMOs and GM materials –country details

The purpose in this appendix is to outline the regulatory arrangements for GM products in key countries in the world grain trade (both importers and exporters), with a particular emphasis on the countries that are important export markets for Australian grain (tables A2–A19). The nature of Australian trade in grain is summarised in table A1, indicating the main markets for each grain type.

table A1 **composition of Australian exports of unprocessed grain**

	total exports [a]		
	volume	**value**	**major customers** (share of total exports in the three years to 2004)
cereals	kt	$m	
barley			
– malting	1 677	412	China (64%), Japan (14%), Saudi Arabia (7%), Colombia (4%), Korea, Rep. (3%), Chinese Taipei (3%), Peru (1%), South Africa (1%), Ecuador (1%)
– feed	2 755	528	Saudi Arabia (53%), Japan (24%), Iran (7%), United Arab Emirates (5%), Kuwait (4%), Chinese Taipei (2%), Oman (1%), China (1%), Qatar (1%)
– other barley	15	4	Japan (93%), China (3%), Kuwait (1%), Chinese Taipei (1%), New Zealand (1%)
maize	48	9	Chinese Taipei (29%), New Zealand (29%), Korea, Repub. (23%), South Africa (6%), Japan (6%), Papua New Guinea (2%), Malaysia (2%), Sri Lanka (1%), United Arab Emirates (1%)
oats	175	41	Confidential (81%), Japan (5%), Philippines (3%), Hong Kong (3%), China (2%), United Arab Emirates (1%), Korea, Rep. (1%), India (1%)
rice (paddy)	45	10	Turkey (100%)
sorghum	370	73	Japan (79%), Papua New Guinea (9%), New Zealand (8%), Chinese Taipei (2%), Philippines (1%)
wheat	14 218	3 582	Indonesia (15%), Egypt (11%), Iraq (10%), Japan (8%), Korea, Republic of (8%), Iran (6%), China (5%), Malaysia (4%), Sudan (4%)
other cereals	25	5	New Zealand (33%), Japan (31%), Philippines (10%), China (7%), Italy (3%), French Polynesia (3%), Belgium-Luxembourg (2%), Belgium (2%), Portugal (1%)

continued...

table A1 **composition of Australian exports of unprocessed grain** *continued*

	total exports a		
	volume kt	**value** $m	**major customers** (share of total exports in the three years to 2004)
oilseeds			
canola	1 059	467	Japan (47%), Pakistan (23%), China (12%), Bangladesh (9%), United Kingdom (2%), Germany (1%), Belgium (1%), India (1%), Nepal (1%)
cottonseed	266	80	Japan (53%), United States (34%), Korea, Rep. (12%)
safflower	4	2	Chinese Taipei (19%), France (17%), United States (12%), Belgium (10%), Portugal (8%), Netherlands (7%), Philippines (6%), United Kingdom (4%), Belgium-Luxembourg (3%)
soybean	6	4	Japan (37%), Chinese Taipei (24%), Papua New Guinea (11%), New Zealand (9%), New Caledonia (7%), Malaysia (6%), Philippines (3%), Sri Lanka (1%), Korea, Repub. (1%)
sunflower	2	5	Philippines (26%), Pakistan (19%), Thailand (13%), Korea, Rep. (10%), New Zealand (6%), Sudan (5%), South Africa (4%), Japan (4%), China (4%)
other oilseeds	17	24	Netherlands (35%), United States (21%), United Kingdom (8%), New Zealand (8%), Germany (8%), Japan (8%), Canada (5%), Fiji (1%), Austria (1%)
pulses			
chickpea	127	62	Bangladesh (50%), India (26%), Pakistan (11%), United Kingdom (4%), United Arab Emirates (2%), Sri Lanka (1%), Saudi Arabia (1%), Nepal (1%)
faba bean	189	69	
field pea	199	66	India (56%), Bangladesh (17%), Sri Lanka (8%), Malaysia (5%), Pakistan (4%), Mauritius (2%), Fiji (2%), Belgium (1%), Philippines (1%), Chinese Taipei (1%)
lentils	159	86	Confidential
lupins	428	101	Korea, Repub. (47%), Netherlands (16%), Spain (13%), Japan (11%), Chinese Taipei (6%), Egypt (2%), Thailand (2%), Philippines (1%), Malaysia (1%)
other Legume			Egypt (53%), Saudi Arabia (13%), Belgium (6%), United Arab Emirates (5%), Indonesia (3%), Philippines (3%), Sri Lanka (2%), India (2%), Italy (2%), Chinese Taipei (2%)

a Average, three years to 2004.
Source: Based on data from ABS (2006).

Argentina

table A2 **Argentina – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Secretariat of Agriculture, Livestock, Fisheries, and Food (SAGPyA) issues licences for experimentation on and/or release into the environment of GM plant organisms, relying on assessments carried out by an agency within SAGPyA called the National Advisory Committee on Agricultural Biosafety (CONABIA).
marketing approval	Biosafety of food products evaluated by the National Service of Agricultural And Food Health and Quality (SENASA). To avoid negative impacts on Argentine exports, a market assessment impact is also carried out by an organisation called the National Direction of Agricultural Food Markets (DNMA). Argentina has commercialised GM soybeans, maize and cotton.
imports	Biosafety assessments are the joint responsibility of CONABIA and SENASA. Argentina has not ratified the Cartagena Protocol on Biosafety.
labelling	No labelling requirements.

Sources: US Department of Agriculture (2005a).

Bangladesh

table A3 **Bangladesh – regulatory arrangements for GMOs and GM products**

overview	The Ministries of Agriculture (MOA), Science and Information Technology (MOSICT) and Environment and Forest (MOEF) are jointly responsible for the development of biotechnology policy and regulations. In June 2006, the National Task Force on Biotechnology Development approved a national policy framework for biotechnology. However, a formal regulatory framework is still being developed.
experimental and commercial release into the environment	The Technical Committee on Crop Biotechnology in the MOA has approved the import of some GM plants for contained trials. However, in the absence of a formal regulatory framework, there have been no field trials or commercial releases of GMOs.
marketing approval	No formal process for approving the marketing of GMOs is evident.
imports	Bangladesh has no mechanism in place to detect the presence of biologically engineered organisms in imported commodities, nor have authorities been advised of the importation of any products containing bioengineered organisms. Consequently Bangladesh authorities have not prohibited the importation of any commodities due to its status as a bioengineered product. Bangladesh ratified the Cartagena Protocol on Biosafety in May 2004.
labelling	With no regulatory system in place, there are no specific requirements governing the labelling of biotechnology products beyond those pertaining to food and feed products currently in effect.

Sources: FAO (2006); US Department of Agriculture (2006b).

Brazil

table A4 **Brazil – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Regulations for the introduction and production GM crops are established in Law 11,105 of March 2005. Field testing of GM crops requires approval from the National Technical Commission on Biosafety (CTNBio). Brazil has commercialised GM soybeans and GM cotton.
marketing approval	Application for approval to sell GM products must be filed with CTNBio. Each GM event must be a separate application.
imports	Imports of GM products are received from the United States and Argentina. Approval from CTNBio is required for each shipment. Brazil is a signatory to the Cartagena Protocol on Biosafety.
labelling	Labelling is required for GM products or products containing GM ingredients or being produced from GM ingredients for both human and animal consumption, where the GM content exceeds one per cent.

Sources: US Department of Agriculture (2005b).

Canada

table A5 **Canada – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Canada maintains a science based regulatory framework based on three government agencies: the Canadian Food Inspection Agency (CFIA), Health Canada and Environment Canada. CFIA, in collabouration with Environment Canada, is responsible for approving the environmental release of GMOs. Canada has commercialised GM canola, soybeans and maize.
marketing approval	Health Canada is responsible for assessing human health safety of products derived through biotechnology including foods. CFIA is responsible for assessing the safety of animal feeds and animal feed ingredients.
imports	CFIA authorises and oversees import permits.
labelling	Canada has not ratified the Cartagena Protocol on Biosafety. Health Canada and CFIA have joint responsibility for food labelling policies in Canada under the Food and Drugs Act. Canada has a voluntary standard for labelling of GM foods (see Government of Canada 2004). Products can be labelled as non-GM if accidental presence of GM material is less than 5 per cent. Labelling is mandatory in Canada where Health Canada decides that a novel protein or other chemical has been introduced through the genetic modification.

Sources: US Department of Agriculture (2005a).

China

table A6 **China – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	All organisations involved in research, testing, production, processing, marketing and import/export of agricultural GMOs require approval from the Agricultural Administrative Department of the State Council (AADSC).
marketing approval	A marketing licence must be obtained from the AADSC and must: • employ special managerial personnel and marketing records; • undertake appropriate safety measures; and • comply with any other conditions as required by the AADSC.
imports	Importation of agricultural GMOs requires application to the AADSC having met the requirements that the export country: • allows the use of, and sells the product in their own domestic market; • has verified the safety of the product for humans, animals and the environment; and • has instituted appropriate safety measures.
labelling	All GM foods that are sold within the People's Republic of China must be clearly labelled. A prescribed list of agricultural GMOs is maintained.

Sources: US Department of Agriculture (2001).

Chinese Taipei

table A7 **Chinese Taipei – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	The Council of Agriculture regulates research approval for GM crops and oversees the use of GM grains as feed inputs. Several GM crops are undergoing field-testing but no GM crops have been commercially released.
marketing approval	Chinese Taipei does not have a regulatory program specifically for GM products. Responsibility for GM products intended for human consumption falls to the Department of Health under the Food Sanitation Law. GM products must receive approval from the Genetically Modified Food Safety Advisory Committee before approval is given by the Department of Health.
imports	Chinese Taipei imports a significant amount of GM crops from the United States. Current biotechnology regulations do not present barriers to imports from GM producing nations. Chinese Taipei is unable to sign the Cartagena Protocol on Biosafety as it is not internationally recognised as a sovereign state.
labelling	Mandatory labelling of GM products was progressively introduced from 2001 for products with at least 5 per cent GM content. Labelling was introduced in recognition of consumer rights rather than as a food safety issue. Refined products where the GM protein is not present in the final product are not subject to the mandatory labelling requirements.

Sources: US Department of Agriculture (2005k).

Egypt

table A8 **Egypt – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	The National Biosafety Committee, made up of representatives from key government ministries, scientific and other organisations, is responsible for permits for field-testing GM crops, maintaining awareness of biotech issues and providing advice to government ministries on matters concerning biosafety. Egypt is yet to produce any GM crops for commercial release although 4 crops (potatoes, squash, maize and cotton) are nearing completion of field-tests.
marketing approval	Food safety policy is administered by several government departments including the Ministries of Health, Agriculture, Higher Education and Scientific Research. Additionally, the Ministries of Foreign Trade and Industry, Supply and Home Trade, and Finance have authority in import matters.
imports	Approval for imports is required from the Ministry of Health and Population. Egypt ratified the Cartagena Protocol on Biosafety in March 2004.
labelling	There are no labelling requirements for GM crops or products.

Sources: US Department of Agriculture (2005c).

European Union

table A9 **European Union – regulatory arrangements for GMOs and GM materials**

experimental and commercial release into the environment	GMO research and release is governed by two EC directives: • Directive 90/219/EC, that regulates the contained use of GMOs for labouratory research; and • Directive 2001/18/EC, that regulates field testing and other experimental release. Prior to 1998, the European Union approved a number of GM crops for commercial release, including some (but not all) varieties of soybeans and maize but did not approve any further releases until late 2004. The reason given for this extended delay was that labelling, traceability and co-existence arrangements had to be put into place. GM corn is grown commercially in Spain and also in Portugal, France, Germany and the Czech Republic in relatively small quantities.
marketing approval	Regulation (EC) 1829/2003 establishes procedures for parties seeking to market products containing GM ingredients within the European Union although application may also be made under Directive 2001/18/EC. Applications are made to a member state that forwards the product to the European Food Safety Authority for scientific assessment before being considered by the Standing Committee on the Food Chain and Animal Health.
imports	The European Union currently does not allow the import of all but one GM canola variety. Some varieties of GM soybeans and most varieties of GM corn are approved for import. In late November 2006, there were 30 GM crop varieties that were awaiting approval. The European Union allows accidental presence of up to 0.5 per cent of GMOs that have not been approved for importation, provided the GMOs have been assessed as safe by the European Food Safety Authority. The European Union and all its member states are parties to the Cartagena Protocol on Biosafety.
labelling	Details on labelling and traceability requirements can be found in Regulation (EC) 1829/2003 and Regulation (EC) 1830/2003.EU regulations require that all foods or feeds that contain GM ingredients at a threshold of 0.9 per cent or greater must be labelled as containing genetically modified organisms. This includes highly refined foodstuffs where the GM protein or DNA may not be present in the final product. Animal feedstuffs must also be labelled where the GM content is greater than 0.9 per cent. Meat or milk obtained from animals fed with GM feed do not require labelling.

Sources: European Commission (2006); US Department of Agriculture (2005d).

India

table A10 **India – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Release is governed under the Environmental Protection Act by various committees depending on the purpose of the GM event. The key committee is the Genetic Engineering Approval Committee (GEAC). Only insect resistant GM cotton is produced and marketed for domestic consumption and export but several private and public institutions are developing GM crops for food and non-feed purposes. The GM crops under development include mustardseed.
marketing approval	GEAC is responsible for approval to market GM products.
imports	Importers of GM crops and foods must apply to the GEAC for approval. India ratified the Cartagena Protocol on Biosafety in January 2003.
labelling	Compulsory labelling arrangements with GM foods were introduced in August 2006 and are administered by the Ministry of Health and Family Welfare (MHFW). With imported products, the label must also specify that the product has been cleared for marketing and use in its country of origin.

Sources: US Department of Agriculture (2006d).

Indonesia

table A11 **Indonesia – regulatory arrangements for GMOs and GM materials**

experimental and commercial release into the environment	Responsibility for the development of a biotechnology policy and compliance with the Cartagena Protocol is borne jointly by the Ministries of Environment, Health and Agriculture. No formal biotechnology policies have yet been approved by the Indonesian government but this has not prevented some small scale research activities being undertaken. No GM crops have been approved for commercial planting in Indonesia.
marketing approval	USDA reports indicate that the Indonesian government has yet to make any significant progress toward policies for the purpose of approval, use or regulation of GM products.
imports	According to the USDA, the USA exports a significant amount of grains to Indonesia including GM soybeans and GM corn and products containing GM ingredients. Indonesia has also received imports of GM products from other sources. Indonesia became a party to the Cartagena Protocol in March 2005.
labelling	Food labelling regulations are expected to be included in biotechnology policies under development.

Sources: US Department of Agriculture (2005e).

Japan

table A12 **Japan – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Japan Agricultural Standards (JAS) administered by the Ministry of Agriculture, Forestry and Fisheries (MAFF).
marketing approval	Under the Food Sanitation Law (FSL), administered by the Ministry of Health, Labour and Welfare (MHLW), all genetically modified foods must undergo a safety assessment prior to being awarded certification for distribution on the domestic market.
imports	Foods cannot be imported that contain unapproved GM varieties. There is a tolerance for 1 per cent for adventitious presence of GM varieties in feed that are approved in other countries but are not yet approved in Japan. Regular testing is carried out by MAFF and MHLW with food and feed imports to check compliance. The Cartagena Biosafety Protocol came into force in Japan in January 2004.
labelling	Labelling of GM foods is legislated under two laws – the Food Sanitation Law (administered by MHLW) and the Japan Agricultural Standards Law (administered by MAFF). There are 31 foods listed as subject to labelling requirements, because they are made from ingredients that could include GM materials and because GM DNA or proteins can be identified in the foods. The list is available in US Department of Agriculture (2006c) and includes products such as tofu, natto and miso. No canola or rapeseed products are listed. Where the content of GM materials is greater than 5 per cent, the product must be labelled as 'Biotech ingredients used' or as 'Biotech ingredient not segregated', if there is not documentation showing that identity preservation arrangements have been undertaken to ensure that non-GM materials have been used. Products do generally not require labelling where the recombinant DNA or proteins produced by such DNA are eliminated from or broken down in the final product. The exception is products containing high oleic acid soybeans. Because soybeans of this type are judged to be substantially different in nature to conventional soybeans, products from them must be labelled, irrespective of whether modified DNA is detectable or not. Labelling as 'non-biotech' is optional where the product contains non-GM ingredients that have been handled in accordance with identity preserved protocols.

Sources: US Department of Agriculture (2006c).

Republic of Korea

table A13 **Republic of Korea – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	The Ministry of Agriculture and Forestry is responsible for conducting Environmental Risk Assessments on GM crops which are currently voluntary but will become mandatory upon ratification of the Cartagen Biosafety Protocol. Several GM crops have been developed but none are yet commercialised.
marketing approval	GM products for human consumption require safety assessments conducted by the Korea Food and Drug Administration on behalf of the Ministry of Health and Welfare. Safety assessments for GM products for human consumption are mandatory.
imports	Imports of GM grains and products containing GM ingredients are subject to the successful completion of an appropriate safety assessment and labelling requirements. The Republic of Korea has indicated its intention to ratify the Cartagena Protocol on Biosafety.
labelling	All products containing GM ingredients and unprocessed GM grains must carry 'GM Food' labels. Non-GM grains may have up to 3 per cent adventitious presence of GM material before mandatory labelling is enforced. Labelling is not required where the GM protein or DNA is not present in the final product, as is the case with highly refined oils.

Sources: US Department of Agriculture (2005h).

Mexico

table A14 **Mexico – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	The Ministry of Agriculture (SAGARPA) monitors and authorises imports, transportation, field trials and animal consumption of GM crops. Mexico has commercial plantings of GM cotton and soybeans. SAGARPA has not approved experimental planting of GM corn due to the status of Mexico's native corn. The Ministry of Environment and Natural Resources (SEMARNAT) monitors GMO releases into the environment but does not approve their use.
marketing approval	Mexico approves GM crops for human consumption in general and makes no distinction between food and animal feeds. Mexico allows the planting of GM crops as field trials only. No GM crops are being grown for commercial release.
imports	Mexico is a significant recipient of agricultural exports from the United States. Biotechnology has not yet presented a barrier to trade considering the US is the largest producer of GM crops. Mexico became a party to the Cartagena Protocol on Biosafety in September 2003
labelling	Labelling is required for GM seeds used for planting only. Legislation has been proposed a number of times for labelling of GM foods and feeds but has never been passed into law.

Sources: FAO (2006); US Department of Agriculture (2005f).

Pakistan

table A15 **Pakistan – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Responsibility for biotechnology research is shared between the Ministry of Food, Agriculture and Livestock and the Ministry of Science and Technological Research. The Ministry of Environment, Local Government and Rural Development is responsible for environmental aspects of biotechnology and biosafety. No GM crops have yet been approved for commercial release in Pakistan which is surprising considering Pakistan is a major producer of cotton and would probably benefit from GM cotton.
marketing approval	Biosafety guidelines and rules were approved and enacted in 2005 and the National Commission on Biotechnology (NCB) has submitted a draft national policy for biotechnology to the Ministry of Science and Technology for approval. Pakistan is not currently producing biotechnology crops. Several strains of locally produced GM crops are being cultivated for field-testing under the recently established guidelines.
imports	Pakistan banned the import of GM products until early 2003 and is now importing GM crops from various countries. Pakistan has not ratified the Cartagena Protocol on Biosafety.
labelling	No labelling requirement.

Source: FAO (2006); US Department of Agriculture (2005g).

Russian Federation

table A16 **Russian Federation – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Several GM crops have been developed and are undergoing field trials in isolated research facilities. Two GM crops (potato) have received registration but have not been approved for commercial planting. No GM crops are currently produced for commercial purposes.
marketing approval	Varieties of GM food products must undergo a risk assessment by the Institute of Nutrition and gain registration through the Chief Sanitary Physician of the Russian Federation. Registration for feed use has been discontinued but may be re-instated.
imports	Imports of GM food and feed products are allowed where the GM ingredient has received registration. Registration for imports of GM grains may be difficult where the GM grain remains reproductive. The Russian Federation has not ratified the Cartagena Protocol on Biosafety.
labelling	Labelling is mandatory for all products containing GM ingredients. Drafted guidelines maintain an adventitious presence of 0.9 per cent before mandatory labelling is required. Labelling is not required where the recombinant protein or DNA is not present in the final product.

Sources: US Department of Agriculture (2005i).

Saudi Arabia

table A17 **Saudi Arabia – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	From 2004, the Ministry of Agriculture (MoA) banned the import of GM seeds for planting, so Saudi Arabia does not grow any GM crops.
marketing approval	Trade and production of GM grains is governed by the Ministry of Agriculture. Trade in products containing GM ingredients is governed by the Ministry of Commerce and Industry (MoCI). The MoA and the MoCI are advised on biotechnology issues by the Saudi Arabian Biosafety Committee.
imports	The MOA and the MOCI allow imports of GM grains and products provided that the product has been certified safe for human or animal consumption by the exporting nation. Health certificates may only be issued by an authorised government agency. Saudi Arabia is not a party to the Cartagena Protocol on Biosafety.
labelling	All products that contain one or more GM ingredient must bear a label 'contains genetically modified product/s', if the GM content is one per cent or greater. Labels must be written in both Arabic and English.

Sources: US Department of Agriculture (2005j).

Thailand

table A18 **Thailand – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Thailand has not yet developed a law to regulate biotechnology management. This responsibility currently falls to the Ministry of Natural Resources and Environment. Several research organisations are conducting trials in GM crops but these are restricted to laboratories or greenhouses. There are no commercially grown GM crops in Thailand.
marketing approval	Approval may be granted for processed foods and grains but GM plants for commercial/environmental release are banned.
imports	Allows imports of processed foods containing GM ingredients and selected grains for human and animal consumption. Thailand ratified the Cartagena Protocol on Biosafety in November 2005.
labelling	Labelling is required for products that contain GM ingredients if an individual GM ingredient constitutes more than 5 per cent of the product weight. Labelling is largely voluntary. The Ministry of Public Health conducts post-market tests and can apply fines where an unlabelled product is found to contain more than the allowable level of GM ingredient.

Sources: US Department of Agriculture (2006e).

United States

table A19 **United States – regulatory arrangements for GMOs and GM products**

experimental and commercial release into the environment	Under the Coordinated Framework for Regulation of Biotechnology introduced in 1986, biotechnology policy is regulated by three Federal government agencies under legislation that was already in place. The agencies are: • Animal and Plant Health Inspection Service (APHIS) of the US Department of Agriculture; • Environmental Protection Agency (EPA); and • Food and Drug Administration (FDA) of the US Department of Health and Human Services. APHIS is the lead agency for ensuring the safety of GMOs for the environment but has a joint responsibility with EPA for the release of crops that have been modified to contain anti-pest proteins, such as insect resistant cotton. The United States has approved a number of different GM crops for commercial growing, including soybeans, maize, cotton, canola, potato, tomato, papaya, alfalfa and squash.
marketing approval	Food safety is assessed by FDA.
imports	The importation of GM products is allowed with the joint approval of the three agencies. The United States has not ratified the Cartagena Protocol on Biosafety.
labelling	Labelling is not required if the FDA rules that the GMO is 'substantially equivalent' to its conventional counterpart but is required if it is considered that consumers must be alerted to a safety issue. Currently, there are no GMOs that require labelling.

Sources: Federal Government of the United Staes of America (2006).

B appendix

supply and disposal of rapeseed (or canola)– selected countries

table B1 **Australia – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	80	45	83	204	366
production	871	1 703	1 496	1 441	500
imports	0	0	0	0	50
total supply	951	1 748	1 579	1 645	916
domestic consumption	404	459	475	479	476
exports	502	1 206	900	800	350
closing stocks	45	83	204	366	90
oil					
opening stocks	7	15	12	13	14
production	161	175	184	184	184
imports	0	0	0	0	0
total supply	168	190	196	197	198
domestic consumption	123	126	143	138	147
exports	30	52	40	45	45
closing stocks	15	12	13	14	6
meal					
opening stocks	0	0	0	0	0
production	230	250	264	264	265
imports	0	11	0	0	0
total supply	230	261	264	264	265
domestic consumption	230	261	264	264	263
exports	0	0	0	0	2
closing stocks	0	0	0	0	0

f forecast.
Source: US Department of Agriculture (2006a).

table B2 **Bangladesh – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	3	3	3	0	0
production	233	218	230	248	255
imports	185	125	72	123	150
total supply	421	346	305	371	405
domestic consumption	418	343	305	371	405
exports	0	0	0	0	0
closing stocks	3	3	0	0	0
oil					
opening stocks	33	25	13	14	14
production	145	119	104	128	140
imports	10	2	3	3	5
total supply	188	146	120	145	159
domestic consumption	163	133	106	131	137
exports	0	0	0	0	0
closing stocks	25	13	14	14	22
meal					
opening stocks	38	31	28	27	5
production	245	201	177	216	235
imports	0	0	4	5	0
total supply	283	232	209	248	240
domestic consumption	252	204	182	243	232
exports	0	0	0	0	0
closing stocks	31	28	27	5	8

f forecast.
Source: US Department of Agriculture (2006a).

table B3 **Canada – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	1 200	852	570	1 555	2 054
production	4 178	6 771	7 728	9 660	9 100
imports	240	243	108	140	100
total supply	5 618	7 866	8 406	11 355	11 254
domestic consumption	2 345	3 533	3 358	3 875	3 875
exports	2 421	3 763	3 493	5 426	5 650
closing stocks	852	570	1 555	2 054	1 729
oil					
opening stocks	29	25	102	105	60
production	910	1 395	1 247	1 423	1 449
imports	27	38	42	61	45
total supply	966	1 458	1 391	1 589	1 554
domestic consumption	401	535	472	435	444
exports	540	821	814	1 094	1 050
closing stocks	25	102	105	60	60
meal					
opening stocks	21	21	14	10	37
production	1 250	1 935	1 730	1 935	1 965
imports	30	2	2	0	0
total supply	1 301	1 958	1 746	1 945	2 002
domestic consumption	457	372	322	420	473
exports	823	1 572	1 414	1 488	1 500
closing stocks	21	14	10	37	29

f forecast.
Source: US Department of Agriculture (2006a).

table B4 **China – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	0	0	0	0	0
production	10 552	11 420	13 182	13 050	12 500
imports	51	419	316	676	800
total supply	10 603	11 839	13 498	13 726	13 300
domestic consumption	10 599	11 838	13 498	13 726	13 300
exports	4	1	0	0	0
closing stocks	0	0	0	0	0
oil					
opening stocks	0	0	0	0	0
production	3 538	4 000	4 556	4 635	4 558
imports	127	368	209	45	10
total supply	3 665	4 368	4 765	4 680	4 568
domestic consumption	3 658	4 363	4 756	4 546	4 318
exports	7	5	9	134	250
closing stocks	0	0	0	0	0
meal					
opening stocks	0	0	0	0	0
production	6 325	7 150	8 079	8 208	7 986
imports	14	75	90	182	200
total supply	6 339	7 225	8 169	8 390	8 186
domestic consumption	6 123	7 068	8 093	8 320	8 106
exports	216	157	76	70	80
closing stocks	0	0	0	0	0

f forecast.
Source: US Department of Agriculture (2006a).

table B5 **European Union – supply and disposal of rapeseed seed, oil and meal** a

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	630	265	227	1 606	1 952
production	11 652	11 174	15 336	15 396	15 591
imports	59	174	107	450	370
total supply	12 341	11 613	15 670	17 452	17 913
domestic consumption	11 215	11 267	13 864	15 288	16 935
exports	861	119	200	212	100
closing stocks	265	227	1 606	1 952	878
oil					
opening stocks	320	315	152	200	190
production	4 353	4 339	5 365	5 945	6 690
imports	7	33	38	335	500
total supply	4 680	4 687	5 555	6 480	7 380
domestic consumption	4 115	4 392	5 230	6 215	7 140
exports	250	143	125	75	75
closing stocks	315	152	200	190	165
meal					
opening stocks	163	127	86	86	85
production	6 050	6 000	7 425	8 230	9 250
imports	69	110	105	97	75
total supply	6 282	6 237	7 616	8 413	9 410
domestic consumption	6 106	6 100	7 482	8 290	9 272
exports	49	51	48	38	50
closing stocks	127	86	86	85	88

a Twenty five countries. Does not include intra EU trade. **f** forecast.
Source: US Department of Agriculture (2006a).

table B6 **Japan – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	254	168	178	165	181
production	1	1	1	1	1
imports	2111	2283	2231	2281	2300
total supply	2366	2452	2410	2447	2482
domestic consumption	2198	2274	2245	2266	2300
exports	0	0	0	0	0
closing stocks	168	178	165	181	182
oil					
opening stocks	51	50	40	40	35
production	883	905	890	911	924
imports	18	37	65	28	30
total supply	952	992	995	979	989
domestic consumption	902	952	955	944	951
exports	0	0	0	0	0
closing stocks	50	40	40	35	38
meal					
opening stocks	40	45	44	41	40
production	1 240	1 270	1 267	1 277	1 297
imports	24	19	35	31	30
total supply	1 304	1 334	1 346	1 349	1 367
domestic consumption	1 259	1 290	1 305	1 309	1 327
exports	0	0	0	0	0
closing stocks	45	44	41	40	40

f forecast.
Source: US Department of Agriculture (2006a).

table B7 **Mexico – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	121	0	76	38	28
production	0	0	0	0	0
imports	657	1 126	1 026	1 375	1 320
total supply	778	1 126	1 102	1 413	1 348
domestic consumption	778	1 050	1 064	1 385	1 320
exports	0	0	0	0	0
closing stocks	0	76	38	28	28
oil					
opening stocks	0	0	0	0	0
production	302	409	414	540	526
imports	50	109	87	90	89
total supply	352	518	501	630	615
domestic consumption	352	518	501	630	615
exports	0	0	0	0	0
closing stocks	0	0	0	0	0
meal					
opening stocks	0	0	0	0	0
production	425	575	580	755	720
imports	16	10	43	30	10
total supply	441	585	623	785	730
domestic consumption	441	585	623	785	730
exports	0	0	0	0	0
closing stocks	0	0	0	0	0

f forecast.
Source: US Department of Agriculture (2006a).

table B8 **Pakistan – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	0	0	0	0	0
production	221	235	241	260	260
imports	512	600	669	850	825
total supply	733	835	910	1110	1085
domestic consumption	733	835	910	1110	1085
exports	0	0	0	0	0
closing stocks	0	0	0	0	0
oil					
opening stocks	16	16	18	17	37
production	215	248	274	340	332
imports	16	1	6	0	0
total supply	247	265	298	357	369
domestic consumption	231	247	281	320	346
exports	0	0	0	0	0
closing stocks	16	18	17	37	23
meal					
opening stocks	0	0	0	0	0
production	369	425	471	584	567
imports	0	0	0	0	0
total supply	369	425	471	584	567
domestic consumption	369	423	468	581	564
exports	0	2	3	3	3
closing stocks	0	0	0	0	0

f forecast.
Source: US Department of Agriculture (2006a).

table B9 **United States – supply and disposal of rapeseed seed, oil and meal**

	2002-03	2003-04	2004-05	2005-06	2006-07 f
	kt	kt	kt	kt	kt
rapeseed					
opening stocks	68	72	40	60	86
production	697	686	613	718	555
imports	197	244	467	518	650
total supply	962	1 002	1 120	1 296	1 291
domestic consumption	603	657	921	1 055	1 051
exports	287	305	139	155	145
closing stocks	72	40	60	86	95
oil					
opening stocks	24	35	41	58	119
production	226	274	363	389	404
imports	445	555	514	728	682
total supply	695	864	918	1 175	1 205
domestic consumption	587	697	738	842	975
exports	73	126	122	214	175
closing stocks	35	41	58	119	55
meal					
opening stocks	5	5	5	5	5
production	356	433	566	619	639
imports	919	1 486	1 334	1 461	1 475
total supply	1 280	1 924	1 905	2 085	2 119
domestic consumption	1 244	1 883	1 869	2 031	2 064
exports	31	36	31	49	50
closing stocks	5	5	5	5	5

f forecast.
Source: US Department of Agriculture (2006a).

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Australian Government Department of Transport and Regional Services
Australian Wool Innovation Limited
CRC – Plant Biosecurity
CSIRO (Commonwealth Scientific and Industrial Research Organisation)
Dairy Australia
Department of Business, Economic and Regional Development, Northern Territory
Department of Premier and Cabinet, Western Australia
Department of Primary Industries, New South Wales
Department of Primary Industries, Victoria
East Gippsland Horticultural Group
Fisheries Research and Development Corporation
Fisheries Resources Research Fund
Forest and Wood Products Research and Development Corporation
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Grape and Wine Research and Development Corporation
GHD Services
Independent Pricing and Regulatory Tribunal
International Food Policy Research Institute
Land and Water Australia
Meat and Livestock Australia
Minerals Council of Australia
Ministry for the Environment, New Zealand
National Australia Bank
Newcastle Port Corporation
NSW Sugar
Rio Tinto
Rural Industries Research and Development Corporation
Snowy Mountains Engineering Corporation
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