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Global food security and Australia

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Global food security and Australia

Executive summary

Food security relates to the physical availability and access to food, as well as to its affordability. With the escalation of global food prices through 2007 and 2008, the issue of food security, both globally and domestically, attracted considerable public and policy attention.

The most serious effects of the rise in global food prices were on the urban poor in low income countries. This resulted in civil unrest in some countries and an increase in protectionist trade policies in others. In developing countries, where populations faced declining physical availability of food as well as sharply deteriorated affordability, many people were forced to reduce nutritional intakes and defer expenditures on essential items, such as health and education, to survive.

In the long term, another food crisis will only be avoided if a concerted effort is made, by all governments, to raise the global food supply. The seriousness of the recent global food crisis showed how sensitive the world is to a sudden decline in the availability of food staples. The risk of future food shortages is increasingly likely given the increased severity of weather events over the past several years; the challenges posed by climate change; and the increased demand for food because of the increasing global population and rising incomes in key developing countries.

The initiatives required to raise the global food supply in the medium to long term are clear, and need to be implemented across the world. A key initiative is greater investment in public and privately funded research and development specific to the needs of the most vulnerable countries. Specifically, research committed to developing more drought tolerant crops for arid climates is necessary, as climate change poses a significant threat to agriculture and water supplies globally.

Regulations in some countries that restrict the use of genetically modified seeds must be reconsidered. Poorer nations should be given the opportunity to increase domestic food supplies and export surpluses to other countries that may presently limit access to genetically modified foods. Biofuels subsidies must also be reconsidered in light of the diversion of substantial quantities of cereals and oilseeds from food and feed uses to biofuels feedstocks, particularly in the United States and the European Union.

For Australia, there is no immediate threat to the domestic food supply. Australia will continue to produce in excess of what it consumes and will therefore be able to contribute to the world's food needs. However, Australia faces its own challenges, namely climate change, diminishing water supplies and soil degradation, agricultural labour shortages and declining productivity.

Australia's role in ensuring global food security extends beyond its own immediate needs. Australia has an opportunity to share its technologies, institutional knowledge, agricultural policy and rural development capability with poorer nations through extension initiatives and aid programs. Collaborative agricultural research, particularly in the areas of tropical and dryland agriculture, would benefit multiple stakeholders from a range of countries. Education opportunities, delivered through development assistance scholarship programs or formal and informal training schemes, are other capacity building initiatives Australia can take to assist developing and emerging countries.

Introduction

The escalation in global food prices since 2006 is a result of a combination of demand and supply factors. Demand for food is increasing because of population growth, changing consumer tastes as incomes rise and government support of the biofuels industry through production subsidies and consumption mandates in some countries. Supply in recent years has failed to keep pace with demand growth because of adverse weather events and rising input costs, which contributed to a rundown in stocks of staple grains in particular.

In this market environment, the issue of food security both globally and domestically, has attracted public and policy attention. Food security concerns relate to the physical availability and access to food, as well as to its affordability. Although Australia's physical availability of food is secure, rising food prices, increased living costs and the economic uncertainty arising from the global financial crisis in late 2008, generally mean more Australians could find it difficult to maintain eating and living lifestyles. The situation is considerably more serious in poorer developing countries, where populations face declining physical availability of food as well as sharply deteriorated affordability, forcing many to reduce nutritional intakes and defer expenditures on essential items, such as health and education, to survive.

Despite the challenges posed by severe drought across much of the country between 2006 and 2008, and the floods in northern New South Wales and Queensland in February and March 2009, Australia remains a net exporter of major agricultural products. Nevertheless, there are longer term challenges for Australian agriculture in maintaining productivity and cost competitiveness in an environment of climate change, and the associated potential for more frequent and severe droughts and reduced supplies of irrigation water.

Some of the broad issues of importance to ensuring food security in the long term are discussed in this paper. The paper begins with a brief overview of the global food crisis, and a discussion of the factors that brought about the escalation of prices, how higher prices have affected various regions around the world and how many countries have reacted. The falling rate of agricultural productivity growth, which can be attributed in part to a decline in research and development funding, both privately and publicly, is then addressed. A discussion follows on the effect of climate change on global food security, with particular attention to how it could affect Australian agriculture in the long term. The effects of biofuels and agricultural labour shortages are then addressed, which are two issues that have challenged policy-makers in recent years, particularly in net-agriculture exporting countries. The benefits of genetically

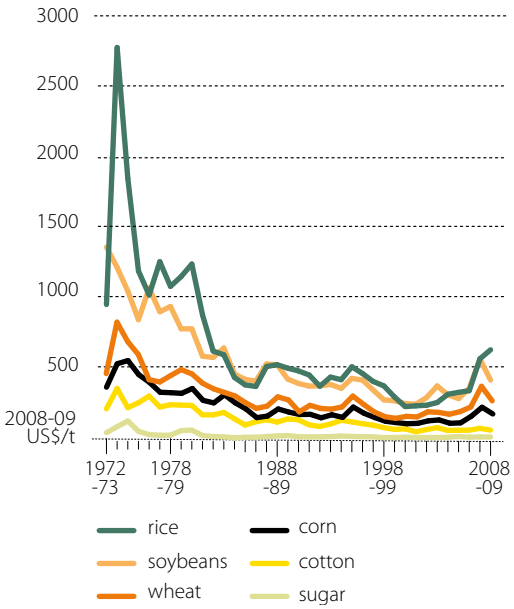
modified (GM) crops in potentially raising the world food supply are then considered. The need for greater research and development into this kind of technology is fundamental if agricultural productivity is to be lifted. Finally, the benefits of increased commercial farming are discussed in light of its inherent suitability for applying available technologies, lifting labour and land productivity and accessing markets efficiently, both domestically and internationally.

Food security in a global market

The World Bank (2008) suggested the rapid rises in food prices between 2006 and 2008 led to the emergence of a global food security crisis which threatened to push up to an additional 100 million people into poverty. This was on top of the estimated 850 million people in developing countries already without adequate food. Higher food prices greatly increased the costs of maintaining food subsidies and other food price control measures, squeezing the capacity of many developing countries to fund other public goods and services. For example, food price subsidies led to budgetary problems in Indonesia, Malaysia, the Philippines, Egypt, India and Pakistan.

Much of the attention on food security has focused on world grain and oilseed prices, which started to rise in 2006 and increased sharply in the first six months of 2008. Global grain prices decreased by the end of 2008 and, with the exception of rice and soybeans, had largely returned to historical levels by the end of 2009 as a result of large harvests and a build-up of stocks. However, despite a greater supply of rice globally, the world price for rice remains significantly higher than its 2000-2006 average. Factors such as the thinness of the market, the policies of several importing countries to rebuild rice reserves and expectations of below average crops in major exporting countries have all contributed to this higher price. Similarly, soybean prices remain higher than the 2000-2006 average given the strong influence of the biofuels sector on the demand for feed stock (FAO 2009a, PECC 2009).

a World agricultural commodity prices, 1972-73 to 2008-09

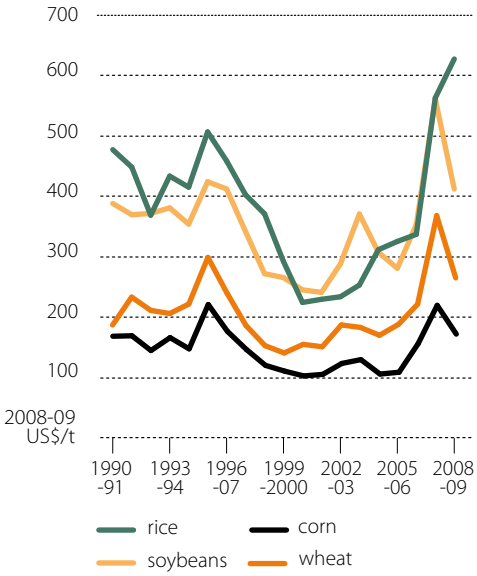


Despite the decline in the prices of the majority of staple food grains worldwide throughout 2008-09, in many developing countries domestic food prices have not fallen. The issue of food security therefore remains as relevant now as it was prior to the global financial crisis, as the vulnerability of the world's food supply to widespread production shortfalls has been clearly revealed (FAO 2009b).

The increase in food prices from 2006 to mid-2008 brought into focus similar food security concerns as those which arose in the 1970s. However, even at their 2008 peaks, agricultural commodity prices in real terms (net of inflation) were still well below those in the early to mid-1970s (figure a).

What distinguished the recent situation in the international food market from the experience of the 1970s was the severe depletions in reserves of almost all major food and feed grains commodities at the same time. Stocks of many individual food commodities were at their lowest in decades, while some dipped below all previously recorded lows. This occurred at a time when there was a new source of demand in the form of government-supported biofuels production, particularly in the United States and the European Union. At the same time, agricultural producers worldwide were facing, and continue to face, greater challenges in the form of declining land availability, water scarcity, farm-labour shortages and climate change. Although these challenges are being felt most in poorer developing nations, major developed countries are also affected.

b World grain and oilseed prices



The easing in world prices of the major food grains – wheat, corn, soybeans and rice (figure b) – is in response to larger crops being harvested (or in prospect) in significant producing regions such as North America, the European Union, the Russian Federation, the Ukraine, Latin America and Australia. Despite the price falls, projections by the Organisation for Economic Cooperation and Development (OECD), Food and Agriculture Organisation (FAO) and the World Bank suggest that agricultural commodity prices are likely to remain higher in nominal terms for the next 10 years than during the past decade. This will occur as a result of strong demand from both the agricultural and biofuels sectors, and also the persistence of recent fiscal policy responses applied by many developing countries to protect domestic food prices from further surges, including consumer and producer policies, and trade and market policies (FAO 2009b). In addition, with world stocks of many of these grains likely to stay low relative to demand, prices can be expected to be more volatile, and the risk of further price rises in the event of poor harvests or unexpected increases in demand is likely to be significant.

Dairy product prices rose substantially between 2006 and 2008 because of drought related production downturns in major exporting countries such as Australia and New Zealand, and strong growth in import demand, especially from developing countries. Stocks held by key suppliers, such as the European Union and the United States, were the lowest in many years, giving further support to prices. International dairy prices have since declined significantly because of an increase in traded supplies and stocks, combined with a fall in demand by relatively new dairy-consuming countries such as China and India. As demand by these countries recovers, prices will pick up but are not anticipated to reach the same highs as in 2008-09.

The increase in meat prices was considerably less than for grains, oilseeds and dairy products. However, prices of poultry, pigs and grain-fed beef in 2007 and 2008 were affected by higher feed costs and rising demand for meat in the fast growing developing countries, particularly in Asia. The relatively more subdued response of meat prices to rising costs of production could partially be attributed to high slaughterings of grazing livestock in regions affected by drought, as well as recurring episodes of animal diseases such as avian influenza in poultry which dampened demand (FAO 2008). Since late 2008, the improved production of major feed grains globally has led to lower feed grain prices. While meat prices, particularly for grain-fed animals (poultry, pigs and fattened cattle), remain sensitive to changes in feed grain costs, the price pressures faced by producers in 2007 and mid-2008 have been reduced.

Escalating grain prices and difficulties in accessing affordable food contributed to civil unrest in some countries in 2008, resulting in the introduction of temporary policy responses to ensure domestic supply and curb domestic food price rises. Countries affected by food-related unrest in 2008 included Indonesia, Egypt, Mauritania, Mozambique and Senegal. The most popular measures to control the increase in food prices were the reduction or suspension of import tariffs and taxes, and support to domestic production with agricultural inputs and credit (FAO 2009b). Countries that employed these policies included Cambodia, China, Indonesia, Pakistan, the Philippines, Ghana, Senegal, Brazil, Ecuador and Mexico. In addition, export restrictions, such as bans, quotas and taxes, were imposed by some key grain and oilseed producers such as Argentina, Cambodia, India, the Russian Federation, Thailand, the Ukraine and Viet Nam. Restrictions on exports tend to be counterproductive and only exacerbate the food security problem for other countries. They increase supply uncertainty and price volatility in global markets, and reduce prices received by the imposing country's own farmers, thus reducing incentives to increase domestic output.

Consumers in developed and developing countries have different levels of exposure to high food prices. In developed countries, the price of a basic food commodity, such as wheat, is typically only a small fraction of the final price consumers pay for that food in, say, bread or noodles. Food in developed countries also accounts for a much smaller proportion of overall consumer income than in developing countries. Nevertheless, higher prices for agricultural commodities have underpinned increased food prices in developed countries and contributed to growing inflation.

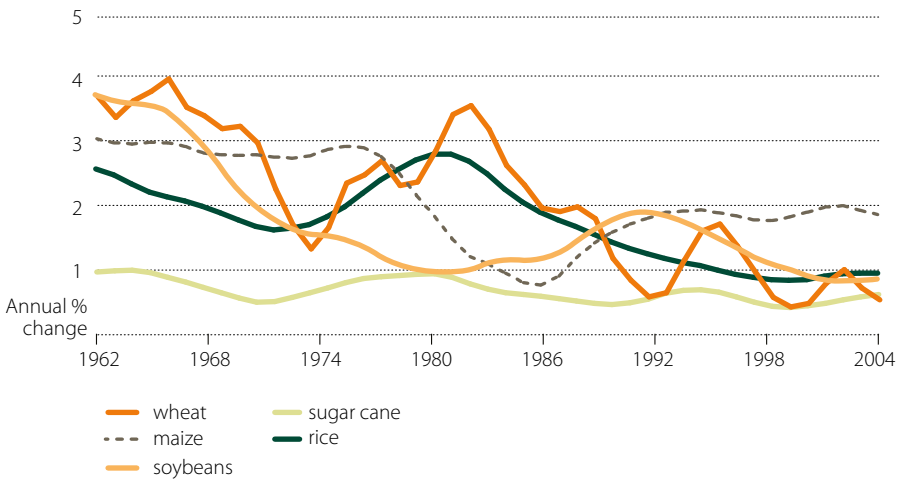
In seeking to address ongoing food security issues, policy-makers globally face the challenge of determining what can be done in a coordinated way to alleviate the problem. In the short term, the principal efforts will need to be directed toward easing the effects of reduced food security on the poor and the vulnerable in developing countries, where higher food prices persist. Longer term, strategies will need to be implemented to encourage the increased food production necessary to meet growing demand. Increasing global food production and affordability will require agricultural productivity to be lifted substantially, and the openness and efficiency of markets for agricultural and food products to be improved.

Australian producers have the potential to benefit from increasing world demand for food and food commodities, particularly for grains, beef and semi-prepared foods where there is a comparative advantage. Australia's relatively low-cost agricultural producers are well placed to take advantage of expanding high-value markets, particularly in Asia.

Productivity, R&D and improved food security

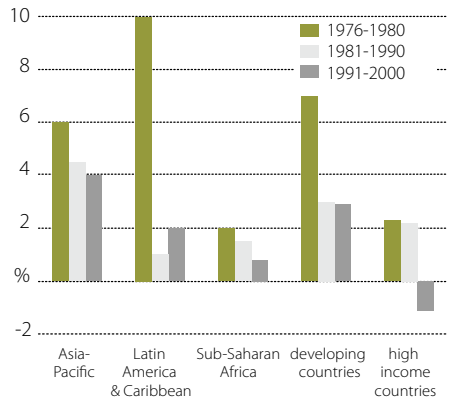
Over the past 20 years, a perceived decline in publicly and privately funded research and development is likely to have been a significant factor in declining global productivity growth. Specifically, there have been lower rates of growth in the areas sown and harvested of the major crops, and also lower rates of yield growth (figure c).

c Trends in global yield for the major food crops



Source: RIRDC 2008.

d Average annual change in public R&D spending



Source: Pardey, Beintema, Dehmer and Wood 2006.

To achieve the largest payoff to investment in agricultural R&D, considerable research is required to understand the role of the factors contributing to agricultural productivity growth. Since the 1970s, growth of publicly funded spending on research and development has fallen across all regions (figure d). Publicly funded spending in Latin America and the Caribbean has been among the lowest globally since the 1980s, while in developed countries it declined through the 1990s.

The ability to achieve significant gains in productivity will be affected by climate change, by policies relating to genetic modification of plants and by the rates of adoption of new varieties and technologies, both in developed and developing countries. Rates of adoption may be hastened if agricultural research, technological innovation and market implementation are more heavily supported

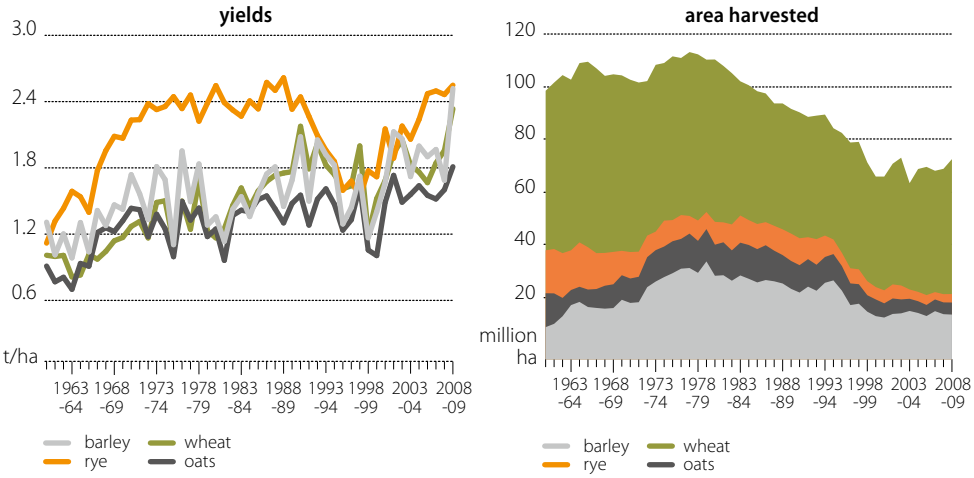
by the public and private sectors in partnership (Ferroni 2009). Given the constraints on arable land availability in many countries, increased productivity through yield growth and the development of drought resistant varieties will be particularly important to food supply security.

In developing countries, yield growth for most major crops remains low compared with the advanced economies. Low yields can be attributed to poor crop management skills of farmers, use of cheaper seeds, lack of agriculture infrastructure and post-harvest technologies, limited research and the gap between available research and practical applications, as well as inadequate funding for research and development. The World Bank estimates that developing countries invest only one-ninth of what industrial countries put into agriculture R&D, as a share of agricultural GDP (World Bank 2008). For these countries, sharply increased investment and regional cooperation in R&D has the potential to lead to better yields, less variability in crop production and, by extension, increased food availability. In so doing, the gap in agricultural productivity that currently exists between developed and developing countries would be narrowed. Indeed, it has been suggested that if the yields in the major producing countries that are below the world average could be increased at least to the world average, global production of wheat, for example, would rise by around 17 per cent and rice by 23 per cent (ADB 2008).

For some Eastern European countries and the Commonwealth of Independent States (CIS), which includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, the Ukraine and Uzbekistan, the full potential of the agricultural land is not being fully realised. Once characterised by a system of large, collective farms, the USSR (Union of Soviet Socialist Republics) was one of the world's leading producers of cereals. However, the bureaucratic and centralised nature of the sector, combined with low labour productivity (equivalent to one-tenth of its United States counterpart), a lack of transport infrastructure, and little to no investment in research and development, eventually resulted in a reduction of area cultivated starting in the mid-1970s. The period of adjustment following the break-up of the USSR in 1991 led to the privatisation of many farms. However, the amount of cultivated land fell by nearly 25 per cent. While yields also declined over this period, they have since recovered, although the amount of cultivated land remains at a historically low level (figure e).

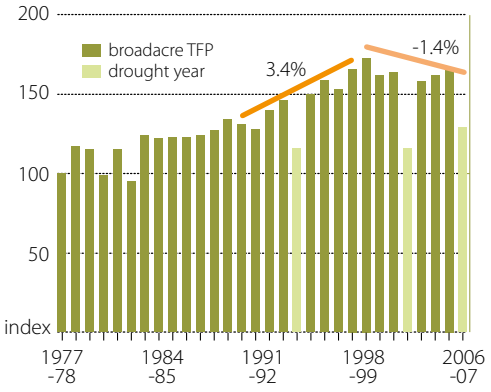
The potential contribution the CIS could make to the world's food supply is considerable. However, further reform to the institutional framework surrounding the agricultural sector is required, as is greater capital investment to modernise less-efficient operations. The Brazilian model of highly productive, large farms has the potential to be successful in this region where significant tracts of land have sat idle, been underused or been converted to non-agricultural uses. It is estimated that if land were brought back into cultivation to the same level harvested in the USSR from 1960 to 1975, and assuming recent average crop yields (2001-2009) for wheat, barley, oats and rye, that approximately 64 million additional tonnes of grain could be produced each year. This is almost 50 per cent more than the average production of these four grains since 2001, of which almost 30 million tonnes would be wheat (author's estimate using USDA PS&D data 2009).

e Yields and area harvested of major cereal grains in the Commonwealth of Independent States



Note: Prior to 1987 data from the USSR (Union of Soviet Socialist Republics) is used.
Source: USDA, PS&D online.

f Australian productivity growth, 1977-2007



Source: ABARE estimate.

Productivity in the Australian farm sector has been increasing strongly at 2 per cent a year over the past 30 years. Productivity growth in the cropping sector has been particularly strong, outperforming that of the livestock sector. During the 1990s the rate of productivity growth in the broadacre sector, which includes dryland farms, sheep, beef and grains, averaged around 3.4 per cent a year but has since slowed (figure f). There are a variety of reasons for the apparent slowing in productivity growth. These may include an increased number of dry periods over the past 10 to 15 years, the lack of major technological advances in cropping systems beyond minimum tillage and associated technologies, a change in data collection methods and climate change.

The fall in productivity growth in the cropping sector poses a challenge for Australian agriculture. It is important that initiatives be taken to maintain productivity performance in the face of possibly more difficult climatic conditions. If Australia is to meet the productivity challenges caused by climate change, the government will need to remove any policy impediments slowing or preventing successful farmers from innovating and growing their businesses.

Investment in targeted rural research and development has the potential to improve agricultural productivity in Australia. Research findings in Australia are likely to benefit developing countries with similar climatic challenges. Policies aimed at allocating investment capital to its most productive and economically efficient end uses, and at removing impediments to industry responsiveness to changing economic demands, are also likely to assist in addressing the food security issue in Australia and elsewhere.

The effect of climate change on food security

While weather has always been a critical factor for food prices and agricultural production, supply responses to increased prices over the medium to long term may be constrained by climate change. Potential changes in climate over the next several decades may reduce productivity and output growth in agricultural industries in major producing countries, including Australia. An effective response to climate change will require significant advances in technology and a combination of adaptation and mitigation measures in both advanced and emerging economies.

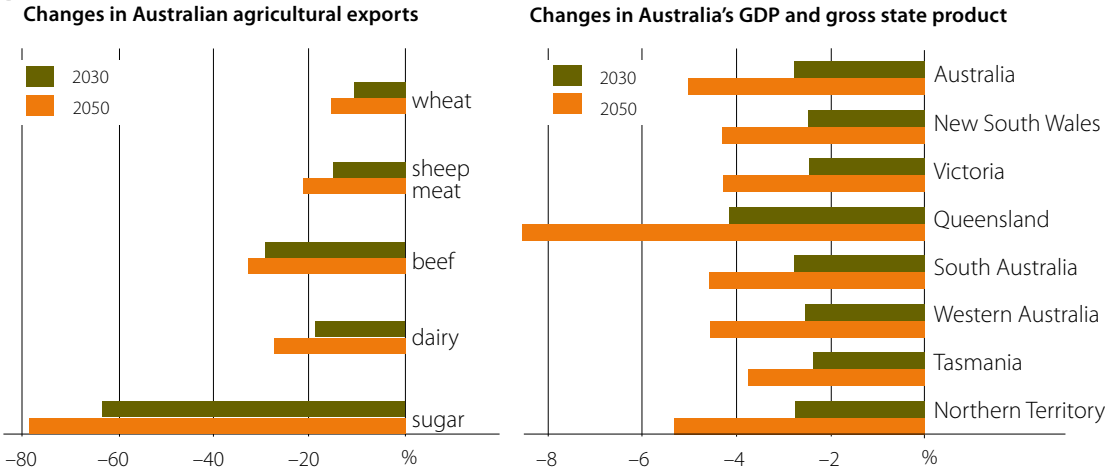
Future climate changes and associated declines in agricultural productivity and global economic activity may affect global production of key commodities such as wheat, beef, dairy products and sugar (Gunasekera et al. 2007). The Intergovernmental Panel on Climate Change (IPCC) reports that an increase in global mean annual temperatures of 3 to 5 degrees Celsius could result in a 10 to 40 per cent increase in cereal imports by developing countries. With global demand for food increasing steadily, particularly in Asian markets, any permanent reductions in output of key agricultural commodities resulting from climate change is likely to drive average food prices higher as consumers compete for limited supplies. However, it can be assumed such an outcome would only occur if there is no technological change and no adjustment of agricultural production systems or water management strategies in response to climate change.

In global terms, Australia is projected to be one of the most adversely affected regions from climate change. While agricultural production and exports will continue to grow, climate change will slow the rate of growth which would otherwise be expected (figure g). To the extent this occurs, these changes to the agricultural sector would have significant implications for Australia's gross domestic product and state level economic performance. However, while the economic ramifications of climate change have the potential to be serious, they are unlikely to pose a threat to Australia's physical food security.

While the long-term effects of climate change may be profound for Australia, the most immediate effect farmers will experience will be the introduction of an emissions trading scheme (ETS), should that occur. An emissions trading scheme is the most efficient way for the economy to move toward lower carbon emissions. The amended version of an ETS that was put before the Australian Parliament in late 2009 excludes agriculture from the government's proposed Carbon Pollution Reduction Scheme (CPRS) and would allow farmers to generate carbon credits. Although the legislation is yet to be agreed in the Parliament, the introduction of the currently proposed scheme (with agriculture excluded) will affect the agricultural sector by changing prices in the economy. Prices for emissions intensive products will increase

under an ETS, with farmers facing higher costs for inputs such as electricity, freight, chemicals, fertilisers and fuels over the longer term.

g Changes to Australian agricultural exports, GDP and Gross State Product in 2030 and 2050
(relative to the 2005 reference case)



Source: Gunasekera et al. 2007.

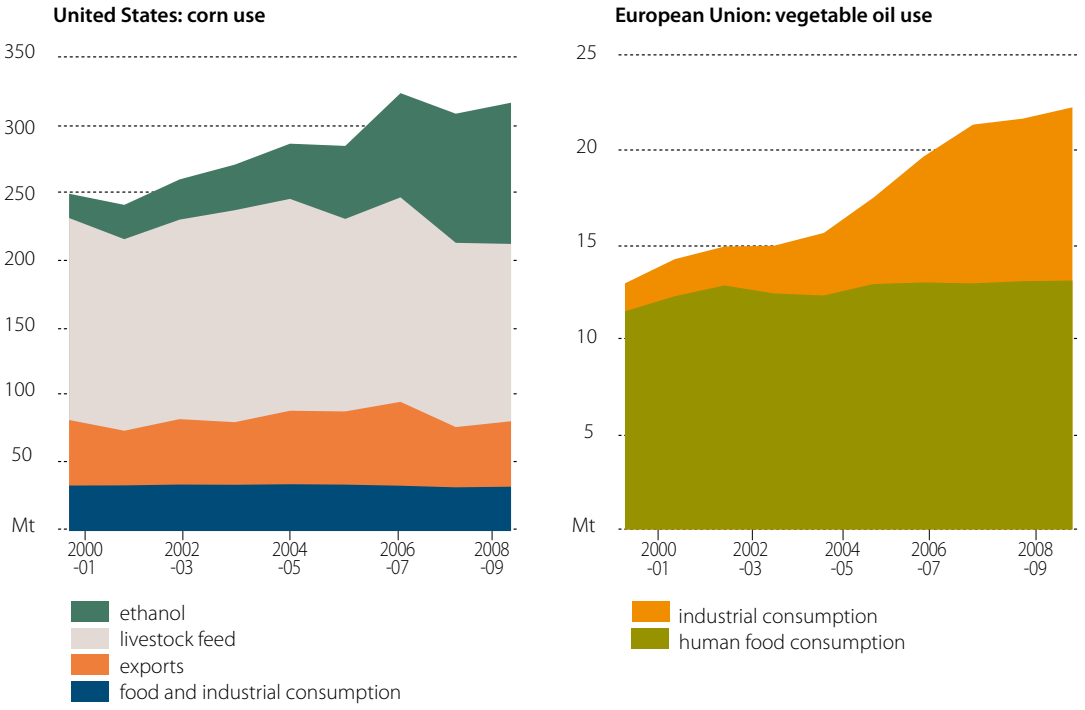
The effect of biofuels on food security

Many governments have encouraged a rapid increase in production of biofuels over the past few years through a combination of direct subsidies, tax exemptions, consumption mandates, and import tariffs. Expanding demand for cereals and oilseeds as feedstocks for biofuels production has had significant effects on global food security and land use. The diversion of substantial quantities of cereals and oilseeds from food and feed uses to biofuels feedstocks, particularly in the United States and the European Union, contributed at least in part to the increase in food prices.

In the United States, it is estimated that about 25 per cent of the corn crop is now used to produce biofuels. While US corn production increased markedly in the past couple of years, in 2007-08 more than 100 million tonnes of corn were converted to ethanol, resulting in a decline in corn available for export and livestock feed (figure h). In the European Union, nearly 40 per cent of total canola production is now used for biodiesel, compared with 20 per cent in 2003-04, which is equal to approximately 8 million tonnes a year (figure h).

Although estimates of biofuels' contribution to food price increases vary, results of various analyses indicate that the effect is significant. The International Food Policy Research Institute (IFPRI 2008) estimated that increases in biofuels production between 2000 and 2007 contributed to 30 per cent of the increase in cereal prices over that period. In contrast, the International Sugar Organisation has determined that the direct association between

h Use of corn and vegetable oil in the United States and European Union



Source: USDA PS&D Feed Grains Database: Yearbook Tables.

Source: USDA PS&D (Oilseeds Reports).

sugarcane production for ethanol and food prices has been negligible, although the expanding areas of land for sugarcane production in Brazil could have an indirect effect on the price of coarse grains in the future (ISO 2009).

Biofuels production needs government support globally to be economically viable, so current policies distort grains markets and impose costs on livestock producers and consumers through increased grain prices. For example, the cost per head turned off from Australian beef feedlots in 2008 rose by an estimated $40 as a result of the estimated $26 a tonne (30 per cent of the total) added to world grain prices by biofuels demand since 2000 (ABARE estimate).

As global biofuels production increases, and in the absence of commercially viable second generation feedstocks for perhaps another decade, the industry's demand for agricultural feedstocks will increase. This will lead to the diversion of more cereals, soybeans, sugar and vegetable oils away from food and feed for humans and animals. Assuming second generation feedstocks become economically viable, there is still a risk they will continue competing for the same land and resources which are required to produce food and feed crops.

In Australia, only relatively small amounts of grains (wheat) are currently used in biofuels production. However, this is expected to change with the recently opened ethanol-producing plant at Dalby (using grain sorghum feedstock), and as the Queensland Government proceeds

with announced plans to mandate the use of 5 per cent ethanol in petrol by 2010. Biodiesel is principally produced in Australia from used cooking oil and tallow.

Removal of government production subsidies and consumption mandates in major regions such as the United States and European Union would have the potential to immediately free-up substantial amounts of grains and oilseeds for human and livestock consumption, thus taking pressure off prices and reducing global food security concerns.

The effect of labour shortages on food security

In 2007 and the first half of 2008, unemployment in Australia was low and all sectors of the economy were concerned about their ability to attract and retain labour. Strong economic growth, a boom in the resources sector and an ageing population (particularly affecting the agricultural sector) all made it difficult for agricultural industries to find skilled and unskilled labour. Labour shortages existed for core jobs in the agricultural sector, such as farm managers and fruit pickers, as well as for support services such as traditional trades. The onset of the global recession in late 2008 led to higher unemployment, with many workers in the mining and services industries losing their jobs. While this has loosened some of the constraints on agricultural employers, many people still resist seeking employment in the agricultural sector because of the nature of the work.

Coupled with the regional location of most jobs, attracting and retaining workers in a competitive employment market is challenging. For agriculture, attracting labour is made more difficult by a general perception (and reality) of the industry having comparatively low wages, poor working conditions (long hours outside and involving heavy work) and occupational health and safety performance, and lack of professional development opportunities. In 2009, ongoing drought in some regions, combined with floods in Queensland and fires in Victoria, may have added to negative perceptions about the future viability of agriculture.

Wages paid to workers in the agricultural sector have generally been below those paid to workers in other industries, with mean weekly full-time earnings in the agriculture, fishing and forestry industries almost 30 per cent lower than median weekly earnings for all industries (ABS 2008a). Agriculture, forestry and fishing has the highest average full-time weekly hours worked (52.8 hours), compared with all other industries (average of 43.7 hours) (ABS 2008b).

Although the supply of labour has been difficult for the sector in recent years, the current difficulties experienced by Australian agriculture in attracting and retaining labour are unlikely to affect Australia's food security in any meaningful way. To a large extent, technological developments in the cropping sector have allowed the substitution of machinery for labour, reducing labour requirements and allowing for expansion in the size of operations. For those industries where labour needs remain high, such as horticulture, employers and industry organisations are aware that to compete with other, higher-paying industries, they have to improve the wages offered and the perception of agriculture as a career and lifestyle choice.

The government has a strong focus on addressing skills and labour shortages in the economy and is implementing a number of new initiatives. For example, there is a commitment to fund

an additional 450 000 skilled training places between 2008-09 and 2011-12. Of these, 90 per cent will be at the Certificate III level or above.

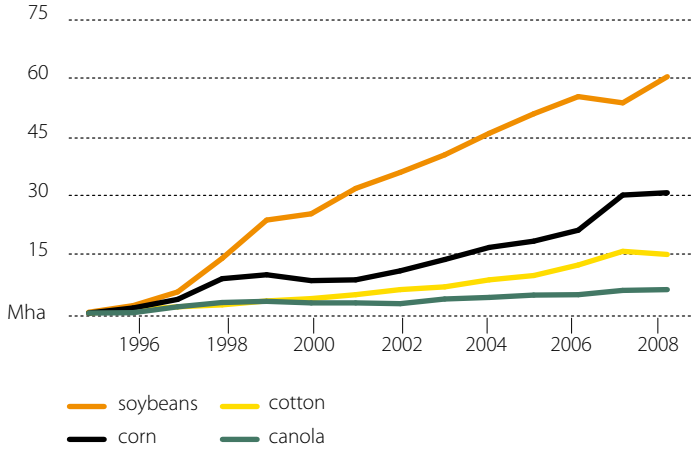
In the 2008-09 federal budget, the government committed to providing $51 million between 2008-09 and 2011-12 to further strengthen Industry Skills Councils (ISCs), which includes the Agri-Food Industry Skills Council. Training places will be allocated directly to the ISCs, who will work with employers to identify the skills they need and match those needs with tailored training. There are likely to be benefits for the agricultural sector from this initiative.

In November 2008, the government implemented a three year pilot Pacific Seasonal Worker Pilot Scheme. The goal of the scheme is to assist the Australian horticulture sector to source labour for harvesting. In addition, the scheme will contribute to the economic development of the Pacific workers' home countries through remittances, employment experience and training. The pilot program is currently entering its second phase.

The potential benefits of GM crops

Since the first commercial plantings in 1996, genetically modified (GM) crops have expanded rapidly and now constitute a significant proportion of the world's broadacre crop output. By 2008, the area of GM crops harvested globally exceeded 112 million hectares, with soybeans accounting for more than half.

World area of GM crops harvested



GM varieties in 2008	
United States	
Soybeans	92%
Corn	80%
Cotton	86%
Canada	
Canola	87%
Argentina	
Soybeans	99%
India	
Cotton	85%
Brazil	
Soybeans	55%

Source: ABARE estimate.

GM technology is expected to play an increasing role in improving global food supplies. Future supply response will depend primarily on the ability to increase yields of agricultural commodities, with the wider adoption of genetically modified crops likely to be one of the best options for dramatic improvements in productivity. For example, GM crops that are better adapted to saline soils or offer better pest and disease resistance will contribute to higher yields. At the same time, some of these attributes can help lower farm input costs, including expenditure on pesticides and herbicides. Adoption of GM crops could also accelerate

adaptation to climate change, that is, to a hotter and drier environment, and may be important to the development of cropping in new locations such as northern Australia.

In Australia, GM canola has been approved for commercial release by the Office of the Gene Technology Regulator (OGTR) and for commercial production by the New South Wales and Victorian Governments, commencing from the 2008 season. In 2009, the Western Australian Government allowed commercial evaluation trials of GM canola. However, moratoria on GM canola planting remain in South Australia and Tasmania. Over the longer term, other broadacre GM crops may also be available for adoption by Australian farmers. The rate of adoption of GM crops in Australia and elsewhere will depend on the development of new varieties and the benefits farmers gain by switching to these crops. For example, apart from increasing yields over time, some GM crops, canola in particular, have the potential to reduce growing costs by increasing flexibility in weed and pest management.

GM crops can facilitate acceleration of crop breeding programs designed to incorporate the above and other traits. These selective breeding programs also have the potential to lead to the production of grains for use in new markets, such as the neutroceuticals or functional foods industry. Indeed, the development of GM crops is a 21st century response to an old idea of using biotechnology to decrease world famine. Large scale development and adoption of GM crops could herald the next great leap forward in agricultural productivity, following on from the 'green revolution' of the 1960s to 1980s.

However, despite the potential of GM grains to lift the world food supply, one constraint limiting the general and widespread use of GM seeds is the reluctance of consumers to accept them. Many governments have responded to strong consumer lobbying by blocking the planting of GM seeds or the import of food and animal feed made from GM grain. Prominent among these is the GM crop ban in the European Union, which has had three adverse effects:

- lowered productivity growth in European agriculture
- slowed the pace of publicly and privately funded research in the European Union given the low return to investment attributable to the impossibility of sales of GM technology
- caused many African governments to also ban the use of GM crops (Collier 2008).

For most African countries, the European Union is the principal export market. The European Union's ban on GM crops is effectively a non-tariff barrier that has precluded Africa, the world's poorest continent, from developing and applying available technologies to increase its domestic food supply. To do otherwise would sever access to one of Africa's largest sources of export earnings, a consequence it cannot afford. It has also discouraged privately funded R&D into foods important to the African diet, such as cassava and yams. For a continent where most farmers are unable to afford the high cost of chemical fertilisers and pesticides, greater agricultural production currently depends on expanding the area cultivated. GM seeds offer Africa a biological alternative which could assist with the challenges of weather and pests. The ban on GM crops effectively causes low productivity to persist, thereby increasing Africa's food vulnerability.

For developed countries, consumers' resistance to GM foods has limited the adoption rates of GM technology. Yield improvements for major cereal crops have resulted from the application of alternative technologies. However, the potential of GM seeds to reduce the risks of crop failure resulting from increasingly arid weather, salinity, pests or disease is considerable and often at a lower cost than other viable alternatives.

Commercialised agriculture

In developing countries, the agricultural sector is largely characterised by small, subsistence farms employing traditional technologies. In Africa, the additional burden of the complexity of soil types precludes the application of a single technology to achieve a desired result. Without farmers' ability to utilise modern technologies suited to their environment, and to access markets where they can sell their product, the traditional peasant farming system will persist and the full potential of agricultural land will remain unfulfilled. However, initiatives taken by some developing countries, Brazil in particular, to commercialise their agricultural sectors, has been effective at improving agricultural production, the supply of food and the livelihoods of those who work the land.

The commercialisation of agriculture is viewed with scepticism by those who seek more protectionist policies and, in Africa, by governments reluctant to allow land rights to be marketable. However, as demonstrated in Brazil, the commercialisation of agriculture facilitates innovation, cooperation between firms and, ultimately, productivity gains (Collier 2008). Unlike small farmers, large agricultural firms are able to withstand changes to input costs and commodity prices, ensuring continuity of production in the short term. These goals cannot be achieved within the traditional farming framework. Large farms managed by companies which can invest in and utilise the latest technologies, and are part of an existing marketing chain which provides access to distant markets, improves the food security of a region and forms part of a rural development strategy.

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