## CONTENTS

### CHAPTER 1  AGRICULTURE IN AUSTRALIA

- Australian farming and agriculture – grazing and cropping  
- Value of Australian farm production  
- Land use and farm management  
- The changing face of Australian agriculture  
- UK tops list of foreign investments in Australian farmland; China owns 0.5%  
- Farmers are in debt, and more debt won’t help  
- Drought and rural assistance  
- Help farmers with direct assistance rather than subsidies  
- Six young Australian farmers on why they stay despite ongoing drought  
- Mental health in rural and remote Australia

### CHAPTER 2  ECONOMIC AND ENVIRONMENTAL OUTLOOK

- Australia’s ‘five strong pillar economy’: agriculture  
- Australian agricultural exports  
- Australia continues to lose market share in global agricultural markets  
- Agricultural Competitiveness White Paper  
- Agriculture’s importance to the Australian economy  
- White Paper at a glance  
- Farmers welcome agriculture White Paper’s vision for the future  
- Free trade agreements fail to boost Australian agriculture and food manufacturing  
- New free trade agreement with China  
- How migrant workers are critical to the future of Australia’s agricultural industry  
- Feeding a hungry nation: climate change, food and farming in Australia  
- Australia’s land clearing rate is once again among the highest in the world  
- Farming in 2050: storing carbon could help meet Australia’s climate goals  
- Australia has a big role to play in feeding the world  
- A hungrier, wealthier, choosier, smarter, riskier world: five challenges for Australian agriculture

**Exploring issues – worksheets and activities**

- Fast facts
- Glossary
- Web links
- Index
Australian Farming and Agriculture is Volume 422 in the ‘Issues in Society’ series of educational resource books. The aim of this series is to offer current, diverse information about important issues in our world, from an Australian perspective.

KEY ISSUES IN THIS TOPIC
Agriculture makes an important contribution to all Australian consumers and to the national economy, exporting two-thirds of total production. The face of Australian agriculture has changed over the past two centuries as farmers have developed resilience and adapted to environmental and economic trends.

The challenges have been many and varied: changes to land use and farm management practices in response to climate change, water restrictions, farm debt, financial and health pressures on farmers, reliance on seasonal and migrant workers, as well as variable productivity and international competition.

This book examines the current state of the agriculture sector and the environmental and economic outlook. What is the future of farming in Australia?

SOURCES OF INFORMATION
Titles in the ‘Issues in Society’ series are individual resource books which provide an overview on a specific subject comprised of facts and opinions.

The information in this resource book is not from any single author, publication or organisation. The unique value of the ‘Issues in Society’ series lies in its diversity of content and perspectives.

The content comes from a wide variety of sources and includes:
- Newspaper reports and opinion pieces
- Website fact sheets
- Magazine and journal articles
- Statistics and surveys
- Government reports
- Literature from special interest groups

CRITICAL EVALUATION
As the information reproduced in this book is from a number of different sources, readers should always be aware of the origin of the text and whether or not the source is likely to be expressing a particular bias or agenda.

It is hoped that, as you read about the many aspects of the issues explored in this book, you will critically evaluate the information presented. In some cases, it is important that you decide whether you are being presented with facts or opinions. Does the writer give a biased or an unbiased report? If an opinion is being expressed, do you agree with the writer?

EXPLORING ISSUES
The ‘Exploring issues’ section at the back of this book features a range of ready-to-use worksheets relating to the articles and issues raised in this book. The activities and exercises in these worksheets are suitable for use by students at middle secondary school level and beyond.

FURTHER RESEARCH
This title offers a useful starting point for those who need convenient access to information about the issues involved. However, it is only a starting point. The ‘Web links’ section at the back of this book contains a list of useful websites which you can access for more reading on the topic.
CHAPTER 1
Agriculture in Australia

AUSTRALIAN FARMING AND AGRICULTURE – GRAZING AND CROPPING

An ‘Australian Stories’ overview courtesy of the Australian Government

For over 100 years, from the 1840s to the 1950s, the Australian economy was seen to be ‘riding on the sheep's back’. Agriculture, especially wool, established Australia as a thriving economy with a substantial workforce, service industries and large port cities.

Australian agriculture benefitted from many different agricultural practices, formal and informal land grants, overseas capital and access to relatively cheap labour through indigenous workers and indentured schemes. Combined with invention, ingenuity and hard work this has led to Australia becoming a leading exporter of fine food, meats and grains.

However, from 1901 to 2009 there has been a dramatic decline proportionally in the income from wool, and the people employed in agriculture, from 14 per cent to 3 per cent. At the same time, there has been an increase in the head of cattle and the variety of profitable agricultural export industries. Most of Australia’s agricultural products continue to be exported and farmers supply about 93 per cent of Australia’s food.

There have been many changes in farming methods over the last 200 years and Australian farmers have had to be adaptable as well as resilient and inventive. The challenges of access to fresh water, the legacy of high amounts of fertilisers, massive clearing, over grazing, a tyranny of distance, transport costs and feral animals, have tested Australian farmers to their limits. In response, farming has become more mechanised and reliant on technologies, as well as holistic as it seeks to become more sustainable.

Most of Australia’s land, about two-thirds, is given over to farming production. About 90 per cent of farm land is for grazing on native pastures, occurring mostly in the arid and semi-arid zones. Cattle and sheep grazing is known as pastoralism and has a long history associated with rural and outback Australia, connecting most Australians.

The opportunity to open up vast native grass resources as grasslands and establish native pasture for livestock grazing was due to the fire-stick farming carried out by Aboriginal people over thousands of years. Later, Aboriginal people became the backbone of the pastoral industry.

Grazing continues as the highest value sector in farm production. In 2012, the highest value of production, in order, was cattle, wheat, dairy, vegetables, fruit and nuts, before lamb meat and wool. At the same time, most of Australia’s agricultural businesses are involved in a ‘two-legged’ economy – combining wheat and sheep.

Cropping is across a wide variety of grains and other crops. In 2012, smaller agricultural practices, such as fruit and nut trees, grape growing, sugar cane, and other crop businesses represented about half the number of the total grain, beef, cattle and sheep businesses. New companies are developing niche industries in organic farming and native bush foods.

THE DEVELOPMENT OF AGRICULTURAL FARMING IN AUSTRALIA

European farms developed soon after British colonisation and European settlement in Australia. Three months
after the arrival of the First Fleet in January 1788, the livestock in the colony consisted of seven horses, seven cattle, 29 sheep, 74 pigs, five rabbits, 18 turkeys, 29 geese, 35 ducks, and 209 fowls.

However there were great difficulties in establishing agriculture. European food was in short supply until the more regular arrival of ships and the beginnings of trade. Europeans relied heavily upon eating native game and fruits to feed themselves.

Fish, oysters and a trade with Aborigines in kangaroos was the main diet of those around Sydney. In Tasmania, Governor Arthur Phillip sent exploratory missions in search of better soils and fixed on the Parramatta region. The Cumberland Plain was an open eucalypt woodland in which the trees were widely spaced and the ground between grass covered.

About two years after the arrival of the First Fleet from England, Governor Phillip assigned land to the ex-convict James Ruse at Rose Hill (now Parramatta). This was the location of Australia’s first wheat farm.

Merino sheep, mutton and market gardens

In 1793, John and Elizabeth Macarthur received a grant of 100 acres of land near Parramatta and, using convict labour, established Elizabeth Farm. In 1796, John Macarthur bought his first merino sheep, recognised worldwide for its ability to produce wool which is soft and fine but strong. In 1807, the Macarthurs sent their first bale of wool to England. Merino wool became the basis of Australia’s wool industry.

In 1813, after a period of drought and in search of grasslands for pasture, three men – Gregory Blaxland, William Lawson and William Charles Wentworth with an Aboriginal guide, three convicts, as well as horses, managed to survey a route over the Blue Mountains in the Great Dividing Range.

Arriving at Blaxland, they saw a vast expanse of bush and grasslands. Governor Macquarie instructed George Evans to follow Lawson’s clearly-marked route. Soon after, William Cox and a team of convicts built a road in less than six months. Settlers began populating the area, bringing their livestock to graze on the open plains.

In 1824, the Australian Agricultural Company was established through an Act of the British Parliament, with the right to select 1,000,000 acres (4,047 km²) in New South Wales for agricultural development. The area selected ran from Port Stephens to the Manning River. It began operations to improve the stock of merino sheep for export to Britain. Cheap labour was sourced through convicts, Aboriginal workers and indentured labourers on seven-year contracts.

With wool reaching record prices in Europe, especially during the Napoleonic Wars from 1803 to 1815, there was a large influx of merinos into Australia. By the end of the 1850s, sheep numbers across Australia had reached 16 million, or around 39 sheep per head of population, compared to around 6 sheep per head of population today.

The merinos did not improve the sheep for slaughter as meat sheep. In Adelaide in 1845, high demand for kangaroo from the new settlers pushed the price to an ‘extraordinary’ nine pence per pound. (Edward Abbott, The English and Australian Cookery Book, 1864 in Barbara Santich, Bold Palates)

From the 1850s, market gardens were developed by Chinese people to service the diggings in the gold rush period and from the 1860s until the 1890s, the diggings across Australia saw a fresh supply of vegetables and sometimes delivery of fruit from Chinese market gardeners.

Between 1900 and 1920 the majority of vegetables grown in Western Australia were grown by Chinese market gardeners. Over a third of the Chinese population of Western Australia was involved in the market garden industry, which was labour intensive and relied on farming techniques practised in China.

The 1800s – natural grasslands for grazing pasture and clearing for cropping

Throughout the 1800s, colonial government sponsored surveys and exploration opened up new tracts of land. In NSW, after George Evans discovered the Lachlan River in 1815 (under instructions from Governor Macquarie), the Surveyor-General Oxley successfully surveyed and described the country by following the Lachlan River and across to and down the Macquarie River. In 1816 Allan Cunningham found a way through in Queensland. Hamilton Hume, an experienced explorer, and William Hovell reached the Murray River in 1824 and then headed southwest...
...and discovered and crossed the Ovens and Goulburn Rivers in Victoria.

Major Mitchell was appointed as the Surveyor-General of NSW in 1828 and by 1834 Mitchell had drawn a map of the colony divided into 19 counties with a description of their boundaries. Mitchell’s surveys started a land rush of people keen to settle these areas and benefit from their rich soil and open plains.

Farmers and pastoralists, known as ‘squatters’, who squatted on the land without formal land grants, gradually moved inland and occupied huge areas of pasture for cropping and grazing cattle and sheep.

The extensive grasslands, open woodlands and abundant wildlife exclaimed upon by Europeans for their pastoral opportunities has been described as The Biggest Estate on Earth. The fire-stick farming which had created this landscape was a complex, country-wide system of land management used by Aboriginal people in pre-settlement Australia.

Further, huge areas of forest and scrub (land covered with low trees or shrubs) were cleared for pasture and crop farming along Australia’s coast and inland. By 1860, after 70 years of European farming settlement, there were 1.2 million acres (or 480,000 hectares) under crop and livestock numbers had increased to 25 million head.

THE WHEAT BELT

Distribution of farm types — the rainfall lines

The development of crops was limited by rainfall distribution, in this case, 12 inches (30 centimetres) of rainfall a year. The temperate buffer between the 20 and 12 inch rainfall lines, separates the coastal areas from the semi-arid zones. This buffer zone, suitable for cropping, became known as the wheat belt.

The 12 inch rain fall line was marked as the Goyder Line in South Australia. This was drawn by South Australia’s surveyor-general, George W. Goyder in 1865 after two drought years to delineate cropping country from extensive grazing land.

In the 1870s, however, after a series of wet years, optimistic farmers ignored Goyder’s warnings and moved beyond the 12 inch rainfall line. When a series of dry seasons occurred in the 1880s, many of the farmers were ruined. When the farmers retreated the land was worse off due to the over-stocking.

The struggle to maintain the viability of this farming on the edge of suitable rainfall distribution is still discussed by CSIRO as a benchmark.

Nevertheless, South Australia’s main wheat areas in the temperate buffer zone were reasonably close to the coastal port towns and it was the major wheat producer of the Australian colonies until the 1890s. Tasmania was initially part of ‘the granaries of the east’ but lost out to South Australia as transport costs were higher.

The modern wheat belt in the eastern states was established in pastures west of the Great Dividing Range and railways established rail heads in these areas in the 1870s. Victoria surpassed South Australia’s wheat production in the 1890s. Western Australia became a major grain producer by 1905 and then New South Wales became the premier producer in 1910.

Overcoming low soil fertility for cropping – super phosphate and nitrogen

In the 1890s the introduction of super phosphate and nitrogen to improve soil fertility preached salvation although there was a tendency to crop and overgraze in low rainfall areas. One hundred years later this has led to challenges with soil erosion and salinity. Contemporary management recognises that pastures grazed at lower stocking rates such as with beef, have a much lower need for fertilisers.

Science, inventions and seed breeding for cropping

Science, inventions in machinery and experimentation in seed have added millions of hectares to wheat farming in the low rainfall areas. For most of the 1800s, most farming tasks used manual labour along with horses and bullocks. Australian inventions, like the 1840s Ridley Stripper, drastically reduced labour harvesting costs.

The invention of the stump-jump plough in the 1870s by Richard Bowyer Smith (1837-1919) made it possible to crop large areas of the mallee scrub country. The invention was adopted almost universally across the mallee lands, further extending the reach of cropping into previously unfarmed country.

Experimentation with pedigree wheat seeds by William Farrer in Cuppacumbalong in the Australian Capital Territory led to the production of wheat that was resistant to rust and flourished in the hot dry lands of the north. Merino sheep and drought-resistant strains of crops led to two of the most common forms of agriculture in Australia — wheat and sheep farming.

SMALLER AGRICULTURAL PRACTICES

Dairy, fruit and nuts

An average rainfall of more than 20 inches and associated rich alluvial soils allowed coastal areas to develop smaller agricultural practices, such as timber, dairy, sugar, fruits and vegetables. Tasmania changed its production from wheat to potatoes, oats and fruit, which it exported to the mainland.

These agricultural areas with rich soils have a long history of settlement farmer occupation and, have contributed greatly to a variety of food regions and a wine industry. After the White Australia Policy came into law with the Immigration Restriction Act 1901, Chinese immigration was restricted and the Italian and Slavic peoples who arrived in the 1900s worked as market gardeners in suburbs surrounding Perth.

By 1900, greater diversity in agriculture had developed with beef and dairy cattle, and a wide range of grain, fruit and vegetable crops. Dairying and horticulture became the main industries of the coastal agricultural areas. Today, yoghurts, cheese, butter, dried fruits, canned
fruits, macadamia nuts and sugar are all exported but vulnerable to markets.

**Sugar cane industry**
The sugar cane industry in Queensland was established in the 1860s using Pacific Island labourers, known as Kanakas. Tens of thousands of Kanakas, some of whom were kidnapped from their island homes, worked under indentured labour schemes on the sugar plantations. By 1906, most of the 10,000 Pacific Islanders living in Queensland were repatriated under the *Pacific Island Labourers Act 1901*. The plantations then became family farms. Government protection and subsidies were then provided to cover the costs of white labour.

Following the deportation of the Pacific Island families, newly arrived Italian and other European workers took up the opportunities to work on the sugar farms cutting cane, and worked hard to buy their own small farms. Today, many sugar cane growers in Queensland are descendants of the early cane cutters. While machinery for cutting cane was introduced in the 1940s, it was not until the 1960s that the process became almost completely mechanised.

**WATER, DROUGHTS AND EMPIRES**
Fresh water availability and drought management are key challenges for farmers throughout most of Australia. The location of wells, the building of dams and the sinking of bores all became part of the necessary requirements for farming in the low rainfall areas to establish access to water in dry times and for droving stock to markets. In 1910 in Western Australia, the Canning Stock Route was opened up by Alfred Canning.

The prolonged drought of 1895-1904, seriously affected wool production. Sheep numbers fell from 106 million in 1892 to 54 million in 1903 – a 49 per cent fall. It took about two decades for sheep numbers to be restored to the levels of 1892, when in 1926 sheep numbers rose above 100 million once again.

Sir Sidney Kidman (1857-1935) used his experience and understanding of the Australian environment and business to build an empire of cattle stations that were ‘drought-proof’. He ended up with over 100 properties, from the top of the Northern Territory and Western Australia to South Australia. They were in two ‘chains’ and used river systems to move cattle in good condition from the north to markets in the south.

Half a century later, another large property owner, the Englishman Lord Vestey, the owner of Wave Hill Station in the Northern Territory, was at the centre of a dispute over equal wages for Aboriginal pastoral workers. In August 1966, Aboriginal pastoral workers at Wave Hill station in the Northern Territory walked off the job, unhappy with their poor working conditions and disrespectful treatment. This was part of a civil rights campaign which achieved equal wages. However, as a result, whole communities of Aboriginal pastoral workers, mostly in their traditional countries, were turned off properties.

**Irrigation**
Irrigation has been a very important factor in making farming viable in inland Australia. Vast irrigation systems, such as the Snowy Mountains Scheme were established to divert water into the Murray and Murrumbidgee Rivers, and to important inland areas for farming. On the east coast and in the Murray-Darling Basin many Australian rivers have had their flows changed or regulated by human engineering.

Since the 1960s, new industries of rice and cotton have rapidly expanded on large properties with mechanised production. Today these industries, followed by grapes, vegetables, and nurseries/cut flowers/cultivated turf, are the most intensively irrigated crops.

Most irrigated land is located within the confines of the Murray-Darling Basin, which covers parts of New South Wales, Victoria, Queensland and South Australia, and all of the Australian Capital Territory. However, the total area of land irrigated, about 1.8 million hectares in 2009-10, represents less than one per cent of the total land used for agriculture.

**TRANSPORT – BULLOCKS, CAMELS, CLIPPER SHIPS AND PADDLE-STEAMERS**
The development of Australian agriculture relied upon overcoming the tyranny of distance that separated farms from their markets. From the 1830s, the droving of herds of cattle from distant stations along Travelling Stock Routes was how cattle and sheep reached metropolitan markets. The feats by ‘drovers’ and ‘overlanders’ with teams of bullocks and horses became part of Australia’s folklore.

The first paddle steamer arrived in Australia in 1831 and paddle-steamers plied the Murray and Darling Rivers with agribusiness supplies and return cargoes of wool for another 70 years.

Camels and cameleers first arrived in Australia in 1840. Services to outback communities and properties all depended on them. The Afghans, as they came to be called, helped turn around Australia’s rural transport and communication. From the 1850s until the early 1900s, agribusiness and thereby, agriculture, relied upon the Afghan cameleers for the transport of supplies.

The creation of railways from the 1850s onwards began to connect the more remote farmers with quicker and easier transport of their produce to cities and ports.

In the 1850s, revolutions in shipping greatly expanded Australia’s opportunities for agricultural exports. The development of clipper ships almost halved the time that it took to complete the voyage from Australia to England, taking only 90 days instead of 140 days. By this time, steam was also a part of transporting Australian wool and other produce.

**EXPORT VIABILITY – REFRIGERATION, INFRASTRUCTURE, BOUNTIES AND TARIFFS**
In 1881, the clipper sailing ship *Dunedin*, owned by the New Zealand and Australian Land Company (NZALC), was refitted with a Bell-Coleman compression...
refrigeration machine and successfully landed a cargo of frozen meats in the United Kingdom. Consequently, an extensive frozen meat trade from New Zealand and Australia to the UK developed. Over 16 different refrigerated and passenger refrigerated or Reefer ships were built or refitted by 1900. By 1910, UK refrigerated meat imports rose to 760,000 tons per year.

Queensland beef, Victoria cheeses, Tasmanian apples and mutton from everywhere was sent off to grace the tables in Europe. By the early 1900s, Australia was one of the world’s major food exporters. Between 1901 and 1906, exports of frozen mutton and lamb rose by 50 per cent.

Throughout the early 1900s, the export trade was assisted by the Australian government who provided assistance to farmers and primary producers in the form of bounties. The government also placed tariffs on some goods to discourage imports. This was part of an all-round policy called protection.

Australian agriculture continued to grow throughout the first half of the 1900s despite huge impacts from the Great Depression, and the First and Second World Wars. Following the First World War (1914-1918), there were numerous government marketing schemes for agricultural products which maintained high prices.

These protection programs continued until the 1980s when the National Farmer’s Federation challenged the protective tariff policy. This eventuated in prices for agricultural products being directly related to the cycles of the international markets. In 2012, Australia exported 60 per cent of its agricultural products.

WOOL PRODUCTION – THE ‘GOLDEN FLEECE’

By 1914, the United Kingdom was purchasing about 30 per cent of Australia’s total wool exports and by the mid-1920s, it was an astonishing 50 per cent. Wool exports accounted for three-quarters of all pastoral export income, which included live cattle and sheep, meat, wool and hides.

Wool production was helped by a mechanical sheep shearing machine, invented by Frederick Wolseley (1837-99) when it was demonstrated around the country – to the delight of woolgrowers and the horror of blade shearers in the mid-1880s. In 1888, at Louth in New South Wales, Dunlop station become the first large machine shed, with 40 Wolseley shearing stands operating.

Throughout the 1930s, wool remained the cornerstone of Australian agriculture. Wool represented about 30 per cent of the total value of Australia’s exports in the 1930s and this prosperity continued into the 1950s.

Prosperity in the wool industry peaked in 1950-51 when the average greasy wool price reached 144.2 pence per pound (equivalent to around $37 per kilogram in today’s prices), compared to the around $3.20 per kilogram achieved in mid-2002.

However, by 1970-71, wool production contributed only 15 per cent to total gross value of agricultural production. In the decade to 1999-2000, Australian greasy wool production fell by 35 per cent, partly due to a lack of demand influenced by new developments in synthetic fibres.

While there has been growth in wool exports to China and other South East Asian countries over the last decade, the contribution of wool exports to Australia’s total merchandise exports fell significantly, from 5.8 per cent in 1991 to 3.0 per cent in 2001. Nevertheless, Australia produces more than a quarter of the world’s wool.

Lamb – an Australian favourite from the 1920s and 30s

With the expansion of sheep and wool industries in Australia, mutton was cheap and abundant. In 1903, it was estimated that the average Australian ate 61 kilograms of beef and 41 kilograms of mutton. In the 1920s, new improved pastures enabled lamb to become readily available and by the 1930s, lamb was well and truly ensconced as an Australian favourite.

CHALLENGES – DEFORESTATION, EROSION, RABBITS, SALINITY AND ALGAE

By definition, successful and sustainable farms necessarily depend upon healthy soil and fresh water for their arable land and this has an in-built resilience if biodiversity is maintained. A balance needs to be struck between removal of vegetation and water which may cause erosion and salinity and the cropping or grazing needs which require open pastures. A lack of biodiversity can lead to invasions of weeds and pests.

Early laws forbade the clearing of river banks but this was soon ignored and then forgotten. Great swathes of timber were cleared. By the 1840s, there was hardly a single stand of Australian cedar left on the east coast. As a result of the loss of timber in the Hunter Valley combined with overgrazing, the erosion was considered the worst land and riverbank erosion in Australia. In 1948 it was estimated that the total soil loss from erosion in the Hunter Valley was in excess of 765,000 cubic metres annually.
Rabbits
Rabbits are a feral pest that have seriously reduced the productivity of farming in Australia to the point where they have created new deserts by eating out the vegetation. Rabbits originally spread north from Geelong in Victoria across the eastern states. By 1896 rabbits were found as far west as Eucla and then Esperance.

By the beginning of the First World War (1914-18), rabbits were a major pest to farmers. In the 1930s the Australian Encyclopedia estimated that the removal of rabbits would increase the arable capacity of lands by 25 per cent. Rabbit control is still a major issue for farmers and governments today.

NATURAL RESOURCE MANAGEMENT: CONSERVATION MEASURES
Farmers are looking to support outcomes like the Murray-Darling Basin ‘Living Murray’ Initiative, balancing the needs of sustaining the environment and communities’ needs for water allocation. The Australian Government Biodiversity Fund assists farmers and land managers to enhance biodiversity and build greater environmental resilience across the Australian landscape. It provides support for revegetation of native plants or better management of existing native vegetation.

Since 2003, Australia’s largest environmental organisation, begun in the 1980s, Greening Australia has run a national vegetation knowledge service – in partnership with government agencies across rural services, land and water, and agriculture.

Farmers have also implemented holistic systems such as integrated pest management and rotational grazing. New technologies such as the use of satellite positioning systems assist in land management to minimise soil compaction, help map salinity and other soil properties.

Holistic management was one method which saw Martin Royds nominated as a finalist and award winner in the 2010 Australian Diversification Farmer of the Year awards for his property Jillamatong, near Braidwood. Enterprises included beef cattle grazing property, native grass seed harvesting and timber production. Royds has used holistic management, biological farming, biodiversity, natural sequence farming methods and Landcare to build an understanding to advantage environmental, economic and social systems.

Research on case study farms throughout Central and Northern Victoria as part of the Green Graze Project has shown grazing properties can be managed for better biodiversity as well as being profitable. Improving native vegetation can help produce more wool and meat.

Landcare is a community-based approach that has played a major role in raising awareness, influencing farming and land management practices. Landcare is a national network of more than 4,000 locally-based community groups. More than 40 per cent of farmers are involved in Landcare and many more practice Landcare farming. Landcare farmers make significant contributions to combating soil salinity and erosion through sound land management practices and sustainable productivity.
Stock water, soils, biodiversity, fire regimes and Aboriginal values

In desert Australia, the use of new technologies and awareness of water management has improved access to stock water for the pastoral industry. The WaterSmart Pastoral Production™ project across South Australia, Northern Territory and Queensland has produced a practical guide for stock water management for grazing lands in desert Australia.

Understanding soils, biodiversity, land clearing, rainfall, fire regimes, and Aboriginal values for managing land, is now the subject of a large data project on the grazing of rangelands.

While some of the tools and techniques of farming have changed, others have remained the same. Working dogs are as popular as high-tech farming equipment. The Australian farm dog is a tradition that has remained in modern farming because it is still an effective way to round up sheep and cattle.

THE CHALLENGE OF FUTURE FOOD PRODUCTION AND SUSTAINING COMMUNITIES

The United Nations Food and Agriculture Organization (FAO) has estimated that by 2050, food production worldwide will need to increase by 70 per cent (FAO, 2009) if:

All people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (United Nations, FAO, Declaration of the World Summit on Food Security, 2009)

Overall Australia remains a net exporter of food. In 2010-11, 67 per cent of Australia's wheat production, 70 per cent of sugar production and 57 per cent of the nation's barley production were exported. At the same time farmers provide 93 per cent of Australia's domestic food supply, with significant achievements in biosecurity and innovation, recognised in Australian Farmer of the Year awards.

Since the 1950s, international economic factors and changes in farming methods have led to a return of the larger farms of the mid 1800s, being more economically viable than small ones. While the average size of farms has increased, the number of farming families in Australia has steadily decreased.

Many modern individual family farmers find that they struggle to make a profit and some are forced to find extra work off the farm to supplement the farm income. Succession is now a priority business issue for farmers. Approximately one third of all farmers are women.

The Australian Agricultural Company remains the largest beef cattle company in Australia. As of July 2008 it had a staff of 500 and operated 24 cattle stations, consisting of over 565,000 beef cattle. It is Australia's oldest continuing operating company.

The challenge of technical efficiency and structural adjustment within the farming sector will be critically important to the future of Australia's farming communities as well as the ability of humankind to feed itself in the future.

USEFUL LINKS

Farming and production history

Farming for sustainability – natural resource management
- Australian Government, Biodiversity Fund.
- Greening Australia, The national vegetation knowledge service – in partnership with government, www.greeningaustralia.org.au
- Landcare, https://landcareaustralia.org.au

Government agency information and agriculture statistics

Information for young farmers

Farming organisations and networks
- The Country Women’s Association of Australia, www.cwaa.org.au
- National Farmers' Federation, www.nff.org.au
- Royal Agricultural Society of WA, www.raswa.org.au

Agricultural industry and heritage
- Sugar
  - Cane growers, Sugar cane industry in Queensland, www.canegrowers.com.au

The gross value of Australian farm production is forecast to increase by 8.3 per cent to a record $63.8 billion in 2016-17, easing slightly to $61.3 billion the following year.

ABARES Executive Director, Peter Gooday, said that even with the forecast decline in 2017-18, the gross value of farm production would be 17.3 per cent higher than the average of $52.3 billion over the five years to 2015-16.

“The exceptional value of farm production this year comes off the back of record crop production and strong performance across livestock industries,” Mr Gooday said.

“The gross value of crop production is forecast to increase by 20.2 per cent this financial year to $33.9 billion, following record production of wheat and barley.

“In 2017-18 we’re forecasting crop production to decrease to $30 billion, which would still be around 8 per cent higher than the average of $27.9 billion over the five years to 2015-16.

“The gross value of livestock production is forecast to decrease 2.6 per cent in 2016-17 as cattle and sheep numbers are rebuilt following high turn-off in recent years.

“The gross value of livestock production is forecast to increase by 4.4 per cent to $31.2 billion in 2017-18 as cattle slaughter rises after two years of declining turn-off and wool production rises.

“If realised, the gross value of livestock production in 2017-18 would be around 28 per cent higher than the average of $24.4 billion over the five years to 2015-16 – very strong performance indeed.

The exceptional value of farm production this year comes off the back of record crop production and strong performance across livestock industries.

“And the outlook for farm production in the medium term remains strong, with a gross value of $59.6 billion forecast for 2021-22, 8.6 per cent higher than the average over the five years to 2015-16.”

Mr Gooday said export earnings from farm commodities were forecast to reach a record $48.7 billion in 2017-18, topping the $47.7 billion forecast in 2016-17.

“Most of that increase has come from increased crop exports following an exceptional season,” Mr Gooday said.

In 2017-18 export earnings are forecast to rise for beef and veal (up 1 per cent), wool (10 per cent), dairy products (11 per cent), sugar (10 per cent), cotton (35 per cent), wine (5 per cent), lamb (3 per cent), live feeder/slaughter cattle (4 per cent), rock lobster (6 per cent) and mutton (1 per cent).

These forecast increases in 2017-18 are expected to be partly offset by expected declines in export earnings for wheat (down 9 per cent), coarse grains (11 per cent) and canola (6 per cent). Export earnings for chickpeas are also expected to decline 42 per cent as production volumes decline from record levels and international prices ease.

Further details can be found at: www.agriculture.gov.au/abares/publications

Land use and farm management

Summary information from *Agricultural Commodities, Australia, 2014-15*, reproduced courtesy of the Australian Bureau of Statistics

**LAND USE**
- At 30 June 2015 there were 385 million hectares of agricultural land in Australia, a 5% reduction compared with the previous year.
- Almost half of Australia’s total land area was used for agriculture. Of all the states and territories, Queensland had the highest proportion of agricultural land, with 79% of the state used for agricultural production, followed by New South Wales with 72%.

**FARM MANAGEMENT**
In 2014-15, key attributes of Australian farm management were:
- The number of male respondents greatly outweighed the number of female respondents, with 77% of respondents being male.
- The average number of years respondents were involved in farming was 34. Of the states and territories, both Victoria and Queensland had the highest average at 35 years and both Northern Territory and the Australian Capital Territory with the lowest at 25 years.
- The majority of business income for agricultural producers in 2014-15 was from agricultural production (74%), up from 70% in 2013-14.

**CROPS**
- National sorghum production increased 72% to 2.2 million tonnes driven by a 38% increase in areas sown following favourable rainfall in Queensland.
- Total cotton lint production decreased 52% to 421,600 tonnes, the lowest production level since 2009-10. Area sown nationally has also decreased, down 49% to 198,000 hectares. Decreases for both New South Wales and Queensland reflect limited water availability in both states.
- Production of wheat fell 6% in Australia to 24 million tonnes driven by a 12% decrease in Western Australia’s production (down to 8.8 million tonnes) and a 23% decrease in Victoria’s production (down to 2.6 million tonnes). Unseasonable conditions have contributed to the decrease in production in both states.

**VEGETABLES**
- Increased production was reported nationally across most fruit and nut commodities driven by a rise in grape production (up 12% to 1.7 million tonnes).
- Apple production increased by 28,000 tonnes (to 295,000 tonnes) from the previous season, returning to levels not seen since 2010-11. Pear production also rose (up 7% to 105,000 tonnes).
- Olives provided an offset to these rises, reporting a 23% (15,000 tonnes) decrease in production and orange production was also down 4% (12,000 tonnes), primarily due to loss of trees in South Australia (where there was a 16% reduction in trees of bearing age).
- Vegetable production also increased across a number of commodities in 2014-15.
- The production of processing tomatoes increased by almost 50% (to 234,000 tonnes) between 2013-14 and 2014-15 following the recent expansion of processing and canning plants in Victoria.
- Onion production increased 23% nationally driven by a 72% rise in South Australia following increases in area planted (up by 57%) and improved yields (up from 57.2 t/ha to 62.8 t/ha).

**LIVESTOCK**
- The national meat cattle herd declined 6% to 25 million head. This was largely driven by a decrease in the Queensland herd down 12% to 11 million head, due to unseasonable conditions and high export demand.
- Dairy cattle numbers remained steady in 2014-15. Favourable rainfall in Victoria, and herd expansion in Tasmania drove up herd sizes (up 2% and 8% respectively), offsetting declines in every other state.
- Total sheep and lambs reported for the 2014-15 year are down 2% to 71 million head. Declines were evident in all major states except South Australia. The largest decrease of sheep was reported in Victoria, with a reduction in the flock of 793,000 (or 5%).

The changing face of Australian agriculture

MICK KEOGH FROM THE AUSTRALIAN FARM INSTITUTE EXPLAINS

The average Australian farmer now manages a business with an asset value of close to five million dollars, and is now spending an increasing amount of time managing staff and talking to technical advisors, rather than actually doing all the physical work on the farm. These two changes have significant implications when considering what skills the ‘average’ farmer will need in the future, and how new farmers will get a start in the sector.

During a recent presentation to the GrowAg Conference held in Albury, I was asked to provide some information about the nature of farming in the future, and what sort of leadership the sector will need. In researching the topic, I came across two sets of statistics that paint a picture that is often at odds with the concept of what constitutes an ‘average’ farm.

The first were the statistics detailing the asset value of the ‘average’ farm, and how this has changed over time. The first graph above displays the inflation-adjusted value of the average broadacre farm in Australia over the past twenty-five years. What is very evident is the substantial increase in the value of farm land assets that occurred post-2000. The rapid increase peaked around 2006-07 but has again begun to increase over recent years. When the value of machinery and stock is added, the asset value of the average farm is now around $4.5 million.

Given that the ABARES data from which this information is derived included farm businesses with a minimum of $40,000 in turnover and that the sample from which these statistics are derived contains a large number of these smaller, non-commercial farms, the asset value of a commercial farm businesses is likely to now be well in excess of $5 million.

Understanding this is of considerable importance when considering issues such as the average age of farmers, and the ways in which new entrants might come into the farm sector. Put simply, acquiring sufficient capital or access to credit to get a start in farming for young people is considerably more difficult than it is for young persons to purchase real estate in Australia’s major capital cities.

Unless a young person is lucky enough to inherit a farm, then
new entrants to the industry will require very substantial assets, and are therefore probably more likely to enter farming as a second career. This obviously has implications for statistics like the average age of farmers, and suggests that the statistics reporting that the average age of farmers is increasing needs to be carefully interpreted before being considered an issue of concern.

The second set of statistics, which is not unrelated to the above, concerns the farm and closely related workforce. As the following graph shows, the number of farm owner-operators has been steadily decreasing at an average rate of around 1.5% per annum for the past fifty years. However, the number of employed workers (which includes farm employees and those employed providing services to farmers) has actually been increasing post the millennium drought which ended in 2010, to the extent that there are now approximately 1.5 employed persons per employer in the agriculture sector, and the number of employed persons is increasing steadily.

Careers in farming are increasingly likely to involve roles such as agronomists and animal health advisors, rather than owning and operating a farm as per the ‘traditional’ model that has prevailed over the past fifty years.

This statistic highlights that careers in farming are increasingly likely to involve roles such as agronomists and animal health advisors, rather than owning and operating a farm as per the ‘traditional’ model that has prevailed over the past fifty years. Reinforcing this, a major issue at the recent Australian agronomy conference was the lack of graduates available to take up agronomist positions.

Both these changes have important implications for policymakers and those industry leaders involved in making decisions about issues such as young farmer schemes and farm succession. They are also significant from the perspective of organisations such as universities that are involved in training young persons who are interested in a career in agriculture. While actually owning a farm might now be out of reach for many interested in a career in the sector, a professional advisory role could perhaps be just as rewarding and ‘hands-on’.

UK tops list of foreign investments in Australian farmland; China owns 0.5%

The Federal Government’s long-awaited farm register reveals investors from the United Kingdom have easily the biggest stake in foreign-owned farmland in Australia. By ABC News regional affairs reporter Lucy Barbour

The register, compiled by the Australian Tax Office, shows 13.6 per cent of Australia’s farmland is foreign-owned. UK-based investors own 27.5 million hectares or almost 53 per cent of that portion.

The United States is the second highest country on the register, followed by the Netherlands with almost 3 million hectares, Singapore with almost 2 million hectares, and China with 1.5 million hectares – or less than 0.5 per cent of total agricultural land across the country.

The Philippines, Switzerland, Jersey, Indonesia and Japan round out the top 10 foreign buyers.

Interests in the Philippines and Switzerland own 1 million hectares, while Jersey, Indonesia and Japan own just less than that with 0.9 million, 0.8 million and 0.7 million hectares respectively.

But the register does not specify where foreign governments or foreign government investors own land. Much of the public angst about foreign investment is linked to concerns over state-owned enterprises buying Australian farms.

Executive director of the Australian Farm Institute Mick Keogh said he was surprised China did not appear to own more.

“It may well be that the Chinese interest has been in industries like the dairy industry and farms in southern Australia, and again they are smaller acreages but perhaps more productive,” he said.

“But certainly you would have anticipated that Chinese interests would have been higher up the register than that.”

KEY FINDINGS OF FARM REGISTER

- Foreign ownership is 13.6% or 52.1 million hectares of Australia’s total agricultural land.
- Of these foreign-owned hectares, 9.4 million was freehold, 43.4 million hectares held as leasehold.
- Highest use of foreign-owned agricultural land by area was livestock production with 45.8 million hectares or 88% of the foreign-owned total.
- This is followed by cropping at 1.5 million hectares or 2.8% of the total.

“Foreign investment is integral to Australia’s economy. It contributes to growth, productivity and creates jobs, but the community must have confidence that this investment is in the national interest.”

Mr Keogh said the strong UK ownership could be attributed to Australia’s colonial past.

“This is what we mean by the phrase ‘vestiges are very prominent in ownership of land and also the major pastoral houses in Australia all had English origins, so I guess what we are seeing is a continuation of that historical link that has always been there,” he said.

Report shows ‘who owns what’

Acting Prime Minister Barnaby Joyce, who has been a long-term advocate for the register, said the report provided the basic transparency necessary to ensure oversight and confidence in agricultural investment.
This is the first comprehensive data on the actual level of foreign ownership of agricultural land in Australia,” he said in a statement.

“This common perception that the level of foreign ownership has been increasing seems confirmed.

Previous estimates by ABS surveys found at June 2013, 12.4 per cent or 49.6 million hectares out of 400 million hectares was foreign-owned.

“This has also increased on the December 2010 survey estimate of 11.3 per cent or 44.9 million hectares out of 398 million hectares being foreign-owned.”

But Treasurer Scott Morrison said “foreign investment is integral to Australia’s economy.”

“It contributes to growth, productivity and creates jobs, but the community must have confidence that this investment is in the national interest,” he said.

“But with more than $3 trillion worth of foreign investment in Australia today, we cannot afford to risk our economic future by engaging in protectionism.”

Maranoa MP wants productivity tests for foreign buyers

But if the Federal Government had approved the sale of the 10 million hectare cattle empire S Kidman and Co.* to a Chinese company, China would have placed second highest on the register. It is one reason there is a growing push within the National Party for tighter foreign ownership restrictions.

The Government has already reduced the thresholds for scrutiny of foreign investment in Australian farms and agribusinesses by the Foreign Investment Review Board (FIRB) significantly.

The newly elected member for the south-west Queensland seat of Maranoa, David Littleproud, said all foreign buyers should be forced to undertake a “productivity test” to demonstrate their “carrying capacity” and to specify exactly what the land would be used for.

“We would have the expertise on the (FIRB) to acknowledge whether that is reasonable or not and then it should be on the onus of those owners to continue to prove that to the FIRB year in year out, and there should be some dispossession powers given to the FIRB and to the Treasurer,” Mr Littleproud said.

“Because I am hearing at a local level that land has been locked up and [foreign buyers] have walked away, and in fact the environmental gains they are trying to get are for overseas.

“The reality is they have got the land and they do not know what to do with it, and basically it is contributing nothing to this country.”

The farm register shows the greatest portion of foreign-owned agricultural land is in Queensland, followed by the Northern Territory, Western Australia and South Australia. Tasmania has the least amount of foreign-owned farmland.

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POSTSCRIPT: MAJOR LAND SALE TO CHINESE*

December 2016: After a controversial 20-month sale process, Treasurer Scott Morrison finally approved the sale of the Kidman cattle empire to mining magnate Gina Rinehart and a Chinese company.

Gina Rinehart’s Hancock Prospecting will own 67% of S. Kidman & Co with partner Shanghai CRED taking a one-third minority stake through their joint-venture company Australian Outback Beef (AOB).

S. Kidman & Co is a 117-year-old family company and Australia’s largest private landholder. It controls pastoral leases covering 101,000 km2 across Western Australia, the Northern Territory, Queensland and South Australia – 1.3% of Australia’s total land area and 2.5% of the country’s agricultural land.

The Kidman interests include 185,000 head of cattle for export as beef to Japan, US and South-East Asia.

The sale does not include the defence-sensitive Anna Creek Station or The Peake which will be sold to a local South Australian graziers, the Williams family.
Farm debt in Australia has increased by almost 75% over the past decade, from A$40.3 billion in 2004 to an estimated A$70 billion in 2014. Barnaby Joyce, the Federal Minister for Agriculture, has argued the government should take on $7 billion of the riskiest proportion of this debt.

The suggestion by Joyce is that a government Rural Reconstruction and Development Bank be established to buy up bad loans, making the government joint owner of some farm businesses until the loans are repaid.

The federal budget is in deficit by A$47 billion dollars, total net debt is approaching A$200 billion and interest repayments will soon exceed A$10 billion per year. It will be a hard sell to convince the government to take on $7 billion of risky debt, and Treasurer Joe Hockey has already poured cold water on the idea, arguing "there are swings and roundabouts in agriculture all the time".

Why help agriculture and not other industries?

At a time when the motor vehicle and fruit processing industries haven't received additional government help, why should the agricultural sector?

Agriculture is different to other industries in that it's characterised by long-term financial viability but short-term vulnerability. Its output and survival depend primarily on the weather, which is not something that most other industries face. Pests and disease also add additional uncertainty and risk.

Therefore it's reasonable to have short-term emergency funding from the government for periods of severe drought to support an industry that exports around two thirds of its output and is estimated to generate A$38 billion in export earnings in 2013/14. Further, the long-term outlook for agriculture is positive as the world's population grows, along with the increased demand for meat products from the growing middle-income classes in Asia.

The federal government has for decades provided emergency drought relief funding, and in 2013 the Farm Finance Concessional Loans Scheme came into effect. This provides A$420 million in low-interest loans (4.5%) to "eligible and viable" farm businesses. The key point here is that only "viable" farms can receive assistance.

Equity levels are high

Debt is an important source of funding for investment in agriculture, for expansion, improved machinery, technology and techniques.

Debt is not usually a problem if sufficient equity is held. Because the value of agricultural land has been rising, the ratio of debt to equity hasn't changed significantly over the past decade. For example, the average price per hectare in a broadacre farm (crops and/or livestock) was around A$270 in 2000 and is around A$470 per hectare today. While debt has grown significantly, so too have average farm values. It's similar to owning a home that has increased in value which enables more borrowing against its value to occur.

Equity ratios in Australian broadacre farms are high, averaging around 88%. This rate is similar to 10 years ago (89%), and a little higher than in 2010 (87%). Banks do not usually lend to a farm with an equity ratio of less than 70%.

Land purchase is the largest single contributor to the increases in farm debt over the past two decades.
Drought – a recurring feature of the Australian landscape – is one of the biggest challenges farmers face and has a significant impact on agricultural output, productivity and on-farm incomes. The Australian Government is committed to supporting farm families, farm businesses and rural communities who are doing it tough.

In recent years, the Australian, state and territory governments have been working together to reform drought policy to make sure farmers are better supported to prepare for drought, as well as providing in-drought assistance when needed. You can read about the history of reform on our drought policy page at www.agriculture.gov.au/ag-farm-food/drought/drought-policy. Building on the reform process and the range of assistance already available, in July 2015 the Australian Government announced the Agricultural Competitiveness White Paper (www.agwhitepaper.agriculture.gov.au), which includes a number of additional measures to help farmers prepare for, manage through and recover from drought. These measures cover a range of activities including concessional loans, taxation measures, enhanced social support and local community infrastructure projects. Farmers can use many of the new, practical White Paper initiatives not only to manage drought, but the broad range of production and business risks they face. While most of these measures are being delivered by other government agencies such as the Department of Human Services, the Department of Social Services, and the Australian Taxation Office. Some programmes are also being delivered by state and territory governments. Contact details for the organisations delivering each measure is available at the Drought Assistance Contacts page (www.agriculture.gov.au/ag-farm-food/drought/drought-assistance-contacts).


Who’s really affected?

70% of farm debt is held by only 12% of farms. These are mainly larger operations that produce over 40% of total broadacre output and can service their debt.

Around 6% of farms are estimated to be at high risk. This is of great concern, but is lower than the 10.3% of high-risk farms in the early 1990s, which occurred due to extremely high interest rates in 1988-89. More than 80% of broadacre farms hold more than 80% of the equity in their businesses and almost 70% have equity that exceeds 90%.

The problem is long-term viability

The current severe droughts in northern Queensland and parts of New South Wales, have led to calls for increased government assistance. In Western Australia, recent droughts in some regions led to similar financial stress. A good season in 2013 meant that many farms recovered, but some farms on the eastern parts of the wheat belt region didn’t receive rain and are suffering long-term drought. The concern is that droughts may also be long-term in parts of Queensland.

Banks won’t lend to farms in this situation as the likelihood of repayment is low. Land values plummet in areas of prolonged drought, and as the land has few or no alternative uses, the situation is dire. Farmers either sell their land at a low price, or cannot find buyers at all. Further, farmers are forced to sell animal stock at low prices.

In these extreme circumstances, more government loans or the government buying the bad debts and assuming co-ownership is unlikely to contribute to long-term viability. Other farms have large debts as they bought more land when interest rates were low in the 2000s. Land purchase is the largest single contributor to the increases in farm debt over the past two decades. In 2012, 44% of debt was due to land purchases. If financial stress is occurring today, when interest rates are at historic lows, repayments will become even more difficult when interest rates rise. Taking on more debt today is not likely to help those in this situation.

Clearly several drought-affected regions are facing severe financial pressure. Smaller operations have been surviving for years only due to earning off-farm income. But the farm sector has healthy equity ratios and positive long-term prospects. Drought assistance and short-term loans are important, but government high-risk loans totalling $7 billion are not good use of taxpayers’ money and are not likely to increase long-term farm viability.

Anne Garnett is Senior Lecturer in Economics, Murdoch University.
HELP FARMERS WITH DIRECT ASSISTANCE RATHER THAN SUBSIDIES

Australians sympathise with farmers, but governments need to choose policy carefully, warns John Freebairn

Droughts, seasonal fluctuations, and changing commodity prices are a given and unchangeable characteristic of farming. Farmers voluntarily invest in agriculture and expect that the good times will more than balance the bad times. Most deliberately follow strategies to set aside windfall gains in good times to support them over the bad times.

Adjusting to business risks in farming is not dissimilar to adjusting to risks in other areas of small business, including mechanics, restaurants and tourist operators.

It is inevitable that poor seasonal conditions or low commodity prices will result in some farmers and their households experiencing a period of poverty. Of course, other small businesses and the unemployed also experience poverty too.

Australia has a strong political and social consensus for governments to provide a safety net of a minimum income and access to education, health and other services for all its citizens.

What’s proposed

The proposed Farm Household Allowance (FHA) announced in the 2013 federal budget seeks to provide very low-income farming households with financial support equivalent to the Newstart allowance provided to unemployed people.

A condition of receipt of the FHA is that the farmer review the future viability and management of the farm to better recognise the effects of future droughts. This form of household-based income support can be considered an arm of government and society’s anti-poverty or equity goal.

There are challenges in assessing whether a farm household is in poverty and deserving FHA, as is the case for any small business operator. Over what period is income to be measured, when farming involves reasonable incomes during periods of good seasons and high commodity prices, and low or negative incomes during droughts and low commodity prices? Many low-income households, while income poor are asset rich, although farm values become depressed during drought periods. Inevitably, compromises with some deficiencies will be required.

While most Australians sympathise with the plight of farmers facing drought, governments need to be careful in choosing policy. Droughts and other natural disasters are a given characteristic of the farming industry.

The case against subsidies

By contrast with direct support of households considered to be in poverty, most other forms of drought assistance are effectively farming industry subsidies. These subsidies include low-interest rate loans not available to other industries, and subsidies for the transport of water, fodder and livestock.

Farming industry subsidies effectively raise returns...
in the drought times with no claw-back in the good times. They have the effect of raising average returns from farming, which “privatises the gains and socialises the losses”, and they also reduce the variation of returns over time. Both effects lead to a redistribution of scarce national resources from higher value uses to lower value uses, much as subsidies do to the motor vehicle construction industry.

Subsidies in times of drought reduce the incentives for some farmers to plan for the effects of the natural adverse conditions, and they can slow down the necessary structural adaptation of the farming sector.

Inevitably, some farm families will find themselves in temporary poverty, and here direct income support to these households can be justified to meet society equity goals.

Expectations that government subsidies will be provided in droughts encourage some, and only some, farmers to overstock during good seasons, to put aside less fodder, and to spend more of the windfall income earned during good seasons. Importantly, the subsidies raise the reservation prices less well-managed farms seek from other better managed farms in the transfer of farms to larger and better managed farms.

Farm subsidies are not an effective way to meet household poverty alleviation objectives relative to direct grants to households, such as the proposed Farm Household Allowance. The amount of debt, or of fodder, water and livestock transported, and the subsidy received, is a very poor measure of household income need. To a large extent the subsidy becomes capitalised as a one-off increase in farm land value. While the higher asset value may help the current farmers, it does not assist those in the next drought.

While most Australians sympathise with the plight of farmers facing drought, governments need to be careful in choosing policy. Droughts and other natural disasters are a given characteristic of the farming industry. Farmers voluntarily invest their labour and capital in farming, rather than other parts of the economy, because they believe on average they will earn a reasonable income. Subsidies for production or inputs distort the allocation of resources and farming decisions with a loss of national income.

Inevitably, some farm families will find themselves in temporary poverty, and here direct income support to these households can be justified to meet society equity goals.

John Freebairn is Professor, Department of Economics, University of Melbourne.

Six young Australian farmers on why they stay despite ongoing drought

Why do young Australian farmers stay on the land despite battling ongoing drought and a poor seasonal outlook? ABC Rural asked six primary producers for their perspective on running a farm business in drought, what makes the experience more bearable and whether they’ve considered leaving the land.

Our contributors include:
Will Treloar – cattle producer, ‘Boothulla’ at Cooladdi, Queensland
Jody Tully – Canaway Downs Station, Queensland
Lloyd Polkinghorne – rice grower and crop producer, Moulamein, southern NSW
Paul Doneley – sheep producer, ‘Dunraven’ at Barcaldine, Queensland
Claire Kapernick – grazer and lucerne producer, South Burnett, Queensland
Ben and Oona Banks – sheep and cattle producers, ‘Riverton’ at Blackall, Queensland.

What keeps you on your farm during drought? Have you considered leaving?
It is easy to drop your bundle and be very unproductive, but if you stay motivated you can achieve a lot and be better prepared to capitalise when the rains come.

Ben and Oona Banks: This is our job, our career and our profession. You don’t just quit when the chips are down.

There is just as much to do around the station through a drought as in a normal season. There are plenty of maintenance jobs that you put off when you are stocked up.

It is easy to drop your bundle and be very unproductive, but if you stay motivated you can achieve a lot and be better prepared to capitalise when the rains come.

We have certainly not considered leaving permanently, but continually look for opportunities outside our immediate business to supplement our income and progress.

Lloyd Polkinghorne: To remain on the farm for me wasn’t up for negotiation. Being on a farm isn’t like having the ability to turn a switch on and off. There are jobs to be done and animals to feed even tho you’re not making money.

Don’t get me wrong, it’s hard.

Unlike big businesses who pass on fees and charges to diversify their income stream, effectively setting fees and charges to diversify their income stream, effectively setting a fixed price. Normally destocking was made easy as prices received were welcoming. However, with the beef crash caused by the live export ban, the stock sold were barely making a profit. Now we have destocked, the country we are trying to spell is still being heavily grazed by an ongoing plague of kangaroos.

Paul Doneley: I left Brisbane to come back to the property to take over from my parents who are long in the tooth.

In Brisbane I had a good job building where I had worked for 10 years. Since returning four years ago we have been in drought and the end is not in sight.

The choice of moving back to the bush was an easy one for me as I love the people and the way of life. My family and the joy that I take out of the life of your children”, and this is so true.

I have not considered leaving the property but have been working [building] in local towns and on other properties while running the property back home at the same time.

It has been a large burden to handle both, but with our low stocking numbers I have been able to juggle it and having to find another income to pay my bills. The property has no income to pay my wage.

Claire Kapernick: We stay on our farm because it is home. We have a very deep metaphorical tap root. We haven’t considered going anywhere else.

What business decisions have you made to help manage drought? What has worked?
As soon as the dams get low and bogggy and the water quality decreases the cattle struggle more. You don’t want them having to walk massive distance from feed to water either.

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Jody Tully, Canaway Downs Station.

Will Treloar: This drought has been a difficult one. Everything that normally works didn’t.

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• Just before the drought started we began controlled joining. Identifying non-productive females has made destocking easier. However putting this pressure on our females for their fertility in a drought is proving difficult and with poor prices two years ago we have been lenient.

• Early weaning of calves. By doing this the cows have been able to lift their condition without any extra supplement from us. The calves look good with the help of a feed mix. This has been a cheaper option to feed one small animal than two animals together.

• The water infrastructure rebate has been a real winner. Being able to take water to new areas of paddocks to utilise additional feed has been amazing.

• We have kept a very open line with our bank manager keeping them up to date with what is happening out here.

Jody Tully: Each bad season you look back at what has worked, what hasn’t, what has made life easier, what hasn’t, which dams are the boggiest or don’t fill, which paddocks can’t the feed be utilised due to inadequate waters.

You can’t hit a good season not do anything to combat those problems, as there is always another drought around the corner.

Good, accessible clean water is vital. As soon as the dams get low and boggy and the water quality decreases the cattle struggle more. You don’t want them having to walk massive distance from feed to water either.

With the assistance of the drought subsidies we have extended our pipelines and have water piped to almost every paddock on the place and troughs spaced out so feed can be utilised. We still have a little more left to do.

By doing this we have also been able to discontinue using most of the worst dams, at a cost that is a lot less (both $ and time) than de-silting. Now if the stock are poor they can access good, clean water. One less worry!

We are in the process of building a vermin proof “cluster” fence which should allow us to manage our pastures better.

Ben and Oona Banks: Every decision in a drought seems to be a bad one and the decisions that are bad seem to be amplified.

I think it is important to set dates and milestones and stick to them. In our business we decided if it hadn’t rained by the second week in January, that we would sell our entire herd of cattle.

This is what I would call a high risk decision, as traditionally our two wettest months of the years were still to come.

We received fantastic money and didn’t get our summer rain, so it turned out to be the right decision. It meant we could carry the rest of the sheep through till shearing in May. We are presently destocking the last of them.

These were not necessarily the right decisions but we felt it was what we had to do.

Lloyd Polkinghorne: As the quote goes ‘if you’ve finished changing you’re finished’.

In our enterprise we are reliant on irrigation water. Our annual rainfall is about 11 inches so when the water stops, we stop.

We are blessed with a fantastic system our forefathers developed, with no energy input, from source to farm through the wonders of gravity.

I feel that access to affordable water for production is reducing, so I’m changing big time, a change forced sooner than I thought due to a traumatic brain injury.

I’m downsizing, turning my back on debt and going off the grid. I’ve had two years of hell sitting here yearning to work and unable to and I’ve realised the tail is wagging the dog.

The quote, ‘I farm for the lifestyle’ is lost on me. One hundred hours a week for what?

My children need a father, my community needs my help and input, not me hidden away on a tractor. Big businesses don’t need my money. Helping others works for me. It brings me greater wealth than money.

Paul Doneley: We made the decision to destock most of our place keeping only a nucleus of sheep and cattle breeders and feeding those remaining stock through the drought till it rains.

It hasn’t rained, so time will tell if the decision to keep the nucleus of breeders will pay off. The cost of keeping them alive comes at a financial cost. Most of what we have kept has survived so far but if the drought does not break soon we will have made the wrong decision. You have to be an optimist living on the land!

We have put a good feeding practice in place where we supplement
feeding our stock with new age feeders, feed trailers and access to feed consultants, where in the past that would have been unheard of.

Through this drought the state and federal government’s water rebate was fantastic and we were able to put in poly pipe from bores into paddocks there was no water, allowing us to utilize the feed and to make ourselves more drought proof in times like this and for future droughts.

Claire Kapernick: We are diversifying to help in the dry times. Our business is comprised of hay production and sales (good in the dry) and cattle production (good in wetter times).

We have also begun more accurate fodder budgeting and reducing numbers early to reduce feeding costs by avoiding supplementary feeding, and using holistic management grazing techniques.

**What does drought feel like to you?**

_Drought creeps up on you and slowly saps your optimism. It’s a progressive loss of hope._

Claire Kapernick, grazer and lucerne producer in Queensland.

Will Treloar: The drought has been draining and frustrating. We have so many plans and ideas to make the business better but are unable to act because of the restrictions of the drought.

Jody Tully: Not sure, it’s just another season. Yes it is tough but it’s life. There is a difference between drought in winter and drought in summer though.

At least in winter you get a chance to draw your breath a little. In summer it is a constant draining slog.

Ben and Oona Banks: It seems to go on and on with no end in sight. Everyone always says the rain is one day closer but it is a little hard to believe when the sun is shiny against a bright blue sky.

Like the wild dog issue, it consumes us. We talk about it at the dinner table, we talk about it at the pub. It basically takes over most conversations. It is not always possible but it is fantastic to get off property for a weekend and think about and see something different.

Lloyd Polkinghorne: Drought to me feels like a weight hanging over you, having a sense of no control. I sowed in hope and prayer and a few years in a row got not even seed back. Chemical bills, diesel bills and fertiliser still had to be paid. We fed more barley to the sheep than I’d like to admit to, but how long was it supposed to last?

So you can add failure to the list of emotions.

Paul Doneley: Drought is mentally draining and this affects you, family, employees, and your social life.

Drought is tedious. You do as much as your body can handle but know this doesn’t change the outcome, and there can be no end in sight. Since returning to the bush I haven’t had a wet season and this plays on my mind.

The hardest thing about drought is death. Stock that you have been feeding, pulling out of dams, or wild dogs kill them. It plays on your mind.

Could I have done something differently and if so what? This leads to many sleepless nights and much stress over something that is just out of your control.

Claire Kapernick: Drought creeps up on you and slowly saps your optimism. It’s a progressive loss of hope.

**What makes the experience of drought more bearable?**

_Positivity. Making sure you look on the bright side, have positive people around you and make sure you give yourself a chance to laugh._

Jody Tully, Canaway Downs Station in Queensland

Will Treloar: Knowing it will rain and good seasons are around the corner and knowing how good it’ll be when it does! Supportive family and off-farm income.

Jody Tully: Positivity. Making sure you look on the bright side, have positive people around you and make sure you give yourself a chance to laugh. Have fun with the kids, make sure you get together with neighbours, go into town for the events, ask for a hand when you need it. Keep looking at the future.

Ben and Oona Banks: Knowing you are not the only ones going through it. There is always someone in a worse situation than you. And it is very humbling when charities and individuals acknowledge and appreciate our efforts.

Lloyd Polkinghorne: I’m not sure, but talking to someone can help. Although nothing compares to watching helplessly the things you love and worked so hard for, fall apart.

Paul Doneley: Knowing that it can’t get any worse and that it has to get better. Being able to talk to others in your local area who are in the same predicament you are in. Asking how they are coping and exchanging ideas of how to combat the drought.

Being able to get away from the property for a holiday or just a weekend can give you new perspective on the situation.

Having outside activities has been an important part of coping with the drought like playing football or coaching, going to the races, taking part in local events, and most importantly having something to look forward to in the future, such as going to the Rugby World Cup this year in England. It has given me something to look forward to and an outlet from the drought.

Claire Kapernick: Our belief that God has a bigger picture in mind. A strong faith. Any ability to keep a patch of lawn green near our house. A good network of friends and helping others. Having a little bit of control in things like irrigation and stored feed.

**How do you talk to your friends about living with drought?**

_Imagine telling someone not from a rural background that they had to turn up to work every day of the year but they wouldn’t get paid for it. They just don’t get it._

Ben and Oona Banks, Rivington, Blackall in Queensland

Will Treloar: A lot of your friends are from properties, so being open...
about what we are doing and asking what is working for others, to see if there is a better way to do things, to be more cost effective.

Jody Tully: Friends on the land and out here understand. You don’t necessarily talk about the drought, you might talk about what’s working for you but in general it’s a quick ‘wish it would bloody rain’, and you know what’s going on behind the scenes.

For those not out here or friends in the city, it’s hard to explain just what it’s like. You can tell them what that day was like, the cows you dragged out, the ones you had to put out of their misery, that another dam is dry. But unless they come out and do the water and lick runs with you for at least a week in the summer, they don’t quite get it and you can’t begrudge them that.

I don’t think there are many farmers who would mind not knowing what a drought is like.

Ben and Oona Banks: It is easy to talk to your friends that are going through the same thing. It is hard to explain to people that haven’t been in this situation. Imagine telling someone not from a rural background that they had to turn up to work everyday of the year but they wouldn’t get paid for it. They just don’t get it.

Lloyd Polkinghorne: With farming friends we wouldn’t dwell on it too much, I think we all knew the pain. With non-farm people I found it quite a worthless exercise, the notion that you won’t get paid for three years and still have to pay fixed charges, is lost on them.

Paul Doneley: I find it very difficult to talk to my city-based friends as they have very little understanding of the drought.

We love having friends and family out to our property to show them the way of the bush and how we operate. Everyone that has visited our place takes an interest in the weather conditions and take the time to make a phone call to see how everything is and if we have had any rain.

Just knowing that people are thinking of you and talking to you helps you through this difficult time. It is a big help to you mentally.

Claire Kapernick: The ones that are experiencing drought too, we talk to over a meal and a glass of wine or two. Friends that aren’t in drought have no comprehension of it. You can’t unless you experience it.

How has drought changed your perspective on farming?

For the survival of this new generation of farmers, the future lies in taking the old farm and the old operating procedures and implementing new technology and innovations to make farms more profitable. Without profitability, young people won’t stay and others will not be enticed to come to the land.

Paul Doneley, sheep producer at Barcaldine

Will Treloar: It’s a reality check that’s for sure. But we are a dry continent and within that dry continent we live in a semi-arid area. Drought happens.

We need to build businesses that can withstand the harsh time Mother Nature throws at us.

Jody Tully: I’m only new to it all, not born and bred, but for Gerard it has been a part of life on the land his whole life, just another season to manage. Droughts are not abnormal here, not that that makes it easier, but he has learnt what to look for, when to start feeding lick, when to move cattle, when to sell, what needs doing for next time.

Ben and Oona Banks: They always say that during a good season you have to prepare for a bad one, they were not lying. We have certainly learnt a lot from this drought. We have been in the agricultural industry for twelve years now and coped two of the worst droughts on record, it certainly dampens the dream.

Western Queensland is certainly booming and bust country and we need to capitalise on the ‘boom’ years.

Lloyd Polkinghorne: Yes it has and for me it’s flawed. I’ve lost faith in the system. I’ve seen my community decimated by knee jerk government decisions. I’ve spoken to many politicians who really couldn’t give two hoots because it’s not in their electorate.

I’ve watched banks force people’s hand and I continue to see that money gets things to happen. Not the sort of money rural Australia has but those of certain lobby groups and corporate interests. Too many people are falling through the cracks as the money men fall over themselves to make the next buck!

Paul Doneley: For the survival of this new generation of farmers, the future lies in taking the old farm and the old operating procedures and implementing new technology and innovations to make farms more profitable. Without profitability, young people won’t stay and others will not be enticed to come to the land. Unless we get the youth back to the bush, I can see the demise of agriculture in remote areas.

Just in the last few years I have seen young local families move away. The average age of graziers is on the increase and there are not the youth to take their place.

Claire Kapernick: Drought has reinforced that we need to be ready for some pretty wild extremes. It shows the importance of building a resilient landscape and business. Really looking after soil health to take advantage of what rain does fall, and making best use of perennials like fodder trees. It shows the importance of keeping our business overheads down.

This drought has been exceptionally hard as our hay business was completely wiped out in 2011 and then again in 2013 and then the tap was turned off. Financially we found ourselves in such a deep hole that we are slowly trying to pull ourselves out of. Thankfully through careful management we have been able to hold on to our breeders and we are now seeing improvement in cattle prices. Drought is still an issue, but we are coping using management techniques we have learnt.

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Mental health in rural and remote Australia

The reported prevalence of mental illness in rural and remote Australia appears similar to that of major cities. Access to mental health services is substantially more limited than in major cities, and country people are less likely to seek help. Tragically, rates of self-harm and suicide increase with remoteness.

People in rural and remote areas face a range of stressors unique to living outside a major city. These include a greater prevalence of some chronic conditions and disability, and generally poorer health. Rates of smoking, risky drinking and illicit drug use are also higher. There are fewer employment opportunities leading to lower incomes and less financial security. There is greater exposure and vulnerability to natural disasters, while rates of overcrowding, housing stress, and homelessness are higher. Despite this, the prevalence of people experiencing mental illness is similar across the nation: around 20 per cent. However, rates of self-harm and suicide increase with remoteness suggesting that there are very significant mental health issues to be addressed in rural and remote areas.

In rural areas there are higher levels of civic participation, social cohesion, social capital, and volunteering and informal support networks between neighbours, friends and the community.

These positive dimensions to rural life do not negate the need for professional mental health services. In 2014-15 MBS funded GP mental health encounters per 1,000 people, were 739 in major cities, rising slightly to 758 in rural areas with a significant decline to 338 in remote areas. However, there is less access to specialised mental health care in rural areas (Table 1). The numbers of psychiatrists, mental health nurses and psychologists in rural/regional areas in 2014 were, respectively, 34 per cent, 82 per cent and 55 per cent that in major cities, with even poorer comparisons in remote areas.

<table>
<thead>
<tr>
<th>Table 1: Mental health professionals, full-time equivalent, by remoteness, 2014</th>
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<tbody>
<tr>
<td>FTE per 100,000 population</td>
</tr>
<tr>
<td>Psychiatrists</td>
</tr>
<tr>
<td>Mental health nurses</td>
</tr>
<tr>
<td>Psychologists</td>
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</table>


In rural areas there can often be apprehension around help-seeking and a fear of the stigma sometimes associated with mental illness – particularly in smaller communities where individuals are more visible and confidentiality may be less assured. ‘Rural stoicism’, resilient attitudes and lower educational levels can also influence help-seeking behaviour, readiness to engage with mental health services, and adherence to preventative advice. Lower incomes also make it more difficult to afford mental health care, and limited or non-existent public transport is also a barrier to accessing mental health services. These factors combine to increase the risk and sense of social isolation, especially for those who are physically unwell, unemployed or living with a disability.

Timely diagnosis, treatment and ongoing management of a mental health condition in rural and remote areas is likely to occur later or not at all, often resulting in an increased likelihood of hospitalisation and sometimes leading to the most tragic of outcomes – self-harm and suicide.

The rate of hospitalisation from mental health conditions (Table 3) as well as drug and alcohol use and intentional self-harm (i.e. which includes cases where persons have intentionally hurt themselves, but not necessarily with the intention of suicide) increases with remoteness.

In 2013-14, the overall mental health overnight hospitalisation rates were 11 and 26 per cent higher in rural and remote areas respectively (960 and 1,100 hospitalisations per 100,000 population) as compared to metropolitan areas (870 per 100,000). While data indicates significant difference in the rates of hospitalisation in rural and remote Australia compared with major cities, it also reveals significant variation within regions – the rates of hospitalisation in some towns can be almost 8 times higher than for other towns of the same remoteness.

The in remote and very remote Australia (Table 4) is almost double the rate in major cities. This rate is...
even higher for particular groups.

The rate of suicide in rural areas is about 40% higher than in major cities. This statistic is worth noting given it reflects rates in a population that is ten times greater than that in remote areas.

### Table 3: Incidence of suicide, age standardised, 2009-13

| Source: www.aihw.gov.au/deaths/mort/ |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Rate per 100,000 population |
| Major cities (high SES*) | Major cities (mid SES*) | Major cities (low SES*) | Inner regional | Outer regional | Remote |
| All mental health disorders | 856 | 873 | 874 | 946 | 991 | 1,096 |
| Intentional self-harm | 125 | 132 | 147 | 174 | 191 | 231 |


Young people in rural and remote areas often face pressure to conform to locally acceptable patterns of behaviour. A sense of pessimism about future prospects, unemployment, loneliness, and the loss of relationships can exacerbate the risk of mental health problems. A lack of understanding in some rural communities for same-sex preferences, and the high use of alcohol and other drugs, add to the problem.

The rate of suicide among men aged 15-29 years who live outside major cities is about double that in major cities. Greater availability of lethal means of self-harm contributes to this.

Aboriginal and Torres Strait Islander communities in rural and remote Australia face a number of challenges associated with socio-economic disadvantage. Given the importance of the connection between the health of their ‘country’ and their cultural, mental and physical wellbeing, any changes to the physical environment (e.g. climate change, land clearing, deforestation) can have a major influence on the mental health of Aboriginal and Torres Strait people. Some experts argue that there is a lack of ‘fit’ between Aboriginal and Torres Strait Islander concepts of social and emotional wellbeing and mainstream concepts of mental health and illness which have informed mental health service provision.

The rate of suicide among Aboriginal and Torres Strait Islander people is 2.0 times higher than that of non-indigenous people, rising to 3.7 times higher for indigenous compared with non-indigenous 15-24 year olds.

Farm incomes, which directly and indirectly underpin the livelihoods of many people in rural and remote areas, are influenced by weather conditions, commodity and fuel prices, and exchange rates, and many of them can vary unexpectedly. This variability is likely to be further exacerbated by climate change.

Older people in rural and remote areas are more likely to be living with a chronic condition, chronic pain or disability, either singularly or in combination. They are also more likely to experience challenges around mobility, social isolation – partly attributable to the lack of public transport – and access to pain management and palliative care.

The rate of suicide among men aged 85 years and over who live outside major cities is around double that of those living within them.

### Help in rural areas

There are a number of phone and web-based support services enabling access to expertise without the costs of travel, and reducing concerns associated with stigma and confidentiality.

The Alliance has prepared a Rural Mental Health Help Sheet – a guide to information: www.ruralhealth.org.au/factsheets

CRANApplus’ Bush Support Line provides telephone (24/7) counselling for rural and remote health service providers and their families. It is staffed by registered psychologists who have experience working in rural and remote areas.

Call 1800 805 391.

Mindframe has guidelines and support for journalists who report on suicide and mental illness: www.mindframe-media.info

Given appropriate and timely intervention and treatment, mental illness can be successfully managed. Many people who experience mental illness are able to lead healthy and fulfilling lives. With strong national leadership, adequate resources flexibly used and local service planning, mental illness can be well managed in rural and remote areas as well as in major cities.

Data references are available upon request from nrha@ruralhealth.org.au
CHAPTER 2
Economic and environmental outlook

AUSTRALIA’S ‘FIVE STRONG PILLAR ECONOMY’: AGRICULTURE

Agriculture remains a major employer in Australia but the challenges of competition, food security and climate change are on the horizon, observes Peter Batt.

In his 2013 election campaign, Tony Abbott promised his government would build a world-class “five pillar economy”, encompassing manufacturing, agriculture, services, education and mining. Two years later, as his government prepares its second federal budget, just how are these sectors faring?

Agriculture has always been and is likely to remain for some time, an important component of the Australian economy. While agriculture contributes just 2.3% of GDP, its diminishing importance is not the result of any reduction in output but rather to the growth in manufacturing and the service-based sectors of the economy.

Today, more than 307,000 people are employed in agriculture. Agriculture is the biggest employer in rural and regional communities, but if we consider all those employed in the input and output sectors, food manufacturing and processing, distribution and retail, agriculture provides employment for more than 1.6 million Australians.

Today, Australia’s 135,000 farmers produce enough food to feed 80 million people. Not only do they provide 93% of the domestic food supply, but it supports an export market valued at more than A$41 billion per annum – that’s over 13% of export revenue.
food to feed 80 million people. Not only do they provide 93% of the domestic food supply, but it supports an export market valued at more than A$41 billion per annum – that’s over 13% of export revenue, according to the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).

By value, ABARES figures show the major commodities are grains and oilseeds (29.8%), meat (24.0%), the industrial crops (sugar, cotton and wine) (13.5%), wool (7.0%), dairy (6.6%) and horticulture (4.5%).

With population growth and rising personal income, the emerging middle class in Asia provides the major market for over 60% of Australian agricultural exports. Not surprisingly, China (22.0%) is Australia’s single most important market, but sales to Japan (9.4%), Indonesia (7.3%), Korea (5.8%), Malaysia (3.0%) and Singapore (2.8%) continue to grow.

Trade agreements and protection
However, in supplying the increasing demand for food in the region, Australia faces some serious competition and some major institutional impediments. While Australia accounts for just 1% of global agriculture production according to the Food and Agriculture Organization of the United Nations (FAOStat), despite the emergence of the World Trade Organisation in 1995, the majority of sovereign states have sought exemptions for agriculture and food.

Rather than to rely on global markets, most of the world’s most wealthy industrialised countries have sought to protect their farmers from competition through maintaining high import tariffs, import quotas and direct price support mechanisms.

Today, the OECD estimates that producer support estimates amount to more than US$257 billion per annum. While European farmers receive the bulk of the support (US$116 billion), and farmers in Japan, the US and Korea receive US$54 billion, US$31 billion and US$22 billion respectively, farmers in Australia receive just US$960 million in government support.

Recently negotiated bilateral free trade agreements will provide some relief in the mid to long-term, but the sector continues to struggle with falling commodity prices and declining profitability. Perhaps more than any other sector of the economy, agricultural productivity in Australia is highly dependent on seasonal variations in rainfall.

Challenges to the industry
Climate change is influencing both the intensity and duration of rainfall and thus redefining the suitability of many areas for farming. For some farmers, this will inevitably mean surrendering their farms as the level of farm indebtedness becomes unsustainable.

For others, significant investments in infrastructure and technology will provide the key, but as agriculture is and will always remain a high risk industry, the sector often fails to attract the required investment capital. Historically, farmers have responded to their eroding terms of trade by increasing productivity. For many farmers, consolidation provided immediate gains from the economies of scale, but over the last decade, productivity has begun to decline.

Today, agriculture in Australia faces an acute shortage in skilled labour. Our farmers are ageing and the uncertainty in returns associated with year-to-year variations in rainfall and price volatility present an image that too few university graduates find appealing.
Today, agriculture in Australia faces an acute shortage in skilled labour. Our farmers are ageing and the uncertainty in returns associated with year-to-year variations in rainfall and price volatility present an image that too few university graduates find appealing.

While commodity prices are trending downwards, increasing costs are putting more pressure on profit margins. However, it’s the cost escalation post farmgate that continues to put most pressure on Australia’s international competitiveness.

The Australian Export Grains Innovation Centre (AEGIC) recently estimated that bulk handling charges, freight and port charges amounted to 25-30% of the costs of grain production. The high value of the Australian dollar hasn’t helped either.

**Holding onto our advantage**

Recent falls relative to the US dollar have provided some relief, but a low dollar will inevitably result in an increase in input costs for chemicals, fertilisers and farm machinery.

But as a commodity, food is fundamentally undervalued. The FAO suggests that as much as 35% of the food produced is wasted along the food chain. As a society, we need to ensure that the prices we pay at a retail store truly reflect all the costs of production including our environmental footprint.

Australian farmers are world leaders in dryland farming, natural resource management and sustainable agriculture, but it’s hard to be green when you’re in the red.

Consumers are showing much greater interest in food quality, and food safety is paramount. In this respect, Australia has an enviable reputation. However, to protect that reputation, a whole of supply chain approach must be adopted.

While many lament the Australian government’s rigid approach to “fortress Australia”, biosecurity must prevail to protect Australia’s clean and green image and our reputation for producing safe, nutritious food.

Peter J. Batt is Adjunct Professor, Curtin Business School, Curtin University.
AUSTRALIAN AGRICULTURAL EXPORTS

Australian Agriculture makes an important contribution to the Australian economy. Australia is a competitive net agricultural exporter, with around two thirds of total production exported. In 2015, Australian agriculture and food exports totalled $46.5 billion, 14 per cent of the total value of Australia's goods and services exports for that year.*

WORLD TRADE ORGANIZATION (WTO) AND AGRICULTURE

The Uruguay Round of trade negotiations called for the creation of the World Trade Organization (WTO) and with it a better outcome for agriculture. Under the WTO, the Agreement on Agriculture was negotiated and came into force on 1 January 1995. The Agreement on Agriculture provides the basic legal framework governing agricultural trade.

The Agreement on Agriculture recalls WTO Members’ long-term objective to establish a fair and market-oriented agricultural trading system.

It focuses on three main pillars:

• Market access – dealing with rules and commitments on the trade of goods, it looks at expanding markets and reducing tariffs; and includes special safeguards and tariff rate quotas.

• Export competition – Government-funded export subsidies and related measures.

• Domestic support – payments or other support that Governments provide to producers.

TRADE REFORM AND GLOBAL FOOD SECURITY

Australia is committed to global food security yet millions of farmers around the world, both in Australia and in many developing countries, are unfairly disadvantaged by ongoing distortions in world agriculture and food markets which can impede the achievement of long-term food security.

Trade and production distorting measures lead to greater price volatility and can create a disincentive for farmers to increase output and productivity, such measures can also encourage wasteful surplus production that in turn weakens commodity prices and returns to farmers.

Further agricultural trade policy reform is important to Australian food and agriculture sectors, and to ensure that global food security objectives are pursued in ways that do not undermine the livelihoods of farmers around the world.

WORLD AGRICULTURAL MARKETS – PURSUING BETTER ACCESS FOR AUSTRALIAN EXPORTERS

As part of its comprehensive agricultural trade policy agenda, the Australian Government continues to pursue multilateral agricultural trade reform. Read more on Australian bilateral and regional negotiations; including together with other Cairns Group members, at www.dfat.gov.au/trade/agreements.

AUSTRALIA’S TOP 10 AGRICULTURAL EXPORTS (BY VALUE) – 2015 CALENDAR YEAR

<table>
<thead>
<tr>
<th>Major agriculture export products</th>
<th>CY2015 A$m</th>
<th>Share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>9,296</td>
<td>19.9</td>
</tr>
<tr>
<td>Wheat</td>
<td>5,812</td>
<td>12.5</td>
</tr>
<tr>
<td>Meat (excl. beef)</td>
<td>3,738</td>
<td>8.0</td>
</tr>
<tr>
<td>Wool &amp; other animal hair (incl. tops)</td>
<td>2,911</td>
<td>6.2</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>2,387</td>
<td>5.1</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1,931</td>
<td>4.1</td>
</tr>
<tr>
<td>Live animals (excl. seafood)</td>
<td>1,896</td>
<td>4.0</td>
</tr>
<tr>
<td>Fruit and nuts</td>
<td>1,805</td>
<td>3.9</td>
</tr>
<tr>
<td>Sugars, molasses and honey</td>
<td>1,783</td>
<td>3.8</td>
</tr>
<tr>
<td>Barley</td>
<td>1,740</td>
<td>3.7</td>
</tr>
</tbody>
</table>

* Based on the WTO definition of agriculture, which excludes fisheries, forestry and rubber. The value of Australian fisheries, forestry and rubber exports in 2015 was $49.4 billion.

AUSTRALIA’S MAJOR AGRICULTURE EXPORT MARKETS (BY VALUE) – 2015 CALENDAR YEAR

<table>
<thead>
<tr>
<th>Major agriculture export products</th>
<th>CY2015 A$m</th>
<th>Share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total all countries</td>
<td>42,093</td>
<td>%</td>
</tr>
<tr>
<td>China</td>
<td>9,817</td>
<td>21.0</td>
</tr>
<tr>
<td>United States</td>
<td>5,269</td>
<td>11.3</td>
</tr>
<tr>
<td>Japan</td>
<td>4,376</td>
<td>9.4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>3,258</td>
<td>7.0</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>2,971</td>
<td>6.4</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1,527</td>
<td>3.3</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1,408</td>
<td>3.0</td>
</tr>
<tr>
<td>India</td>
<td>1,400</td>
<td>3.0</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1,265</td>
<td>2.7</td>
</tr>
<tr>
<td>Hong Kong (SAR of China)</td>
<td>1,179</td>
<td>2.5</td>
</tr>
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Source: DFAT STARS Database; based on ABS Cat No 5368.0, June 2016 data; ABS Special Data Service.
At the tenth WTO Ministerial Conference held in Nairobi 15-18 December 2015, WTO Members agreed to a significant package of measures in export competition. The most important element of this was the agreement to eliminate all agricultural export subsidies. These subsidies harm farmers around the world and have a negative impact on world prices, agricultural investment, and rural wages – all factors which contribute to poverty and undermine food security in developing countries and especially least developed countries. The elimination of these subsidies is an important step to correct and prevent trade restrictions and distortions in world agricultural markets.

The Australian Government is actively working to reduce distortions in global agricultural trade and to provide better market access for Australian exporters. An important part of the Cairns Group’s contribution to the WTO’s agriculture agenda has been its technical work in the negotiations. The Cairns Group develops detailed negotiating proposals. Cairns Group officials meet regularly in Geneva to discuss negotiating positions and share information. The Cairns Group website (www.cairnsgroup.org) provides further details, including communiqués from ministerial meetings.

The Government’s next reform priority is to address global imbalances created by excessive agricultural subsidies.

Trade-distorting support practices disrupt global agricultural markets by encouraging excess production, depressing prices, and locking producers out of markets. Major subsidisers, like the US, EU, Japan, India and China, spend well over $100 billion per year on trade distorting subsidies. Substantial subsidies provided by governments in economically stronger countries discourage the efficient production of food and undermine global food security. Farmers in least-developed countries suffer the most, but all farmers are impacted and the global economy is weaker as a result.

Australia has reduced its own tariff levels and other trade-distorting protections on agricultural and food products since the early 1970s. Australia’s simple average applied tariff on agriculture is 1.2 per cent. This reinforces a competitive and productive agricultural sector and ensures Australian farmers can provide high quality products to world markets without the high levels of financial support, protection and other trade-distorting practices used by other countries. For example, support for producers accounts for less than 2 cents in every dollar earnt by Australian farmers. This compares to some other countries where producer support accounts for 62 cents for every dollar earnt. This kind of excessive domestic support distorts trade and reduces global competitiveness, leaving Australian farmers at a disadvantage.

Recently, WTO Members have expressed an unprecedented level of interest in an outcome on trade distorting support in WTO agricultural negotiations. As Chair of the Cairns Group, Australia is leading discussions on reform and would like to deliver an outcome on trade-distorting domestic support at the 11th Ministerial Conference (MC11), which will take place 11-14 December 2017 in Buenos Aires, Argentina.

To support this reform agenda, the Australian Permanent Mission to the WTO in Geneva has developed a Calculator which allows WTO Members to quickly and easily calculate the impact of various domestic support reform proposals. The Agricultural Trade Distorting Support Calculator is an important tool for negotiators and policymakers to assess trade distorting support measures and find suitable reform models for adoption at MC11.

Progressive agricultural trade policy reforms have resulted in Australia being one of the world’s most efficient agricultural producers. This is demonstrated by the Producer Support Estimate (PSE) produced by the Organization for Economic Cooperation and Development (OECD). Australia’s PSE in 2015 was only 1.3 per cent, down from 2.7 per cent in 2012, and remains the second lowest among OECD countries.

AUSTRALIA continues to lose market share in global agricultural markets

The report highlights that over the period from 1996 to the end of 2014 (the latest date for which comprehensive global trade data are available) the value of global agricultural trade has grown at an average compound annual growth rate (CAGR) of 7% per annum. Over the same period, the value of agricultural imports by nations in Central and South Asia, ASEAN and Africa and the Middle East region have grown at a rate in excess of 14% per annum.

Yet over the same period, the value of Australian agricultural exports has only increased by an average of 5.2% per annum, meaning Australian agriculture is continuing to lose market share.

On a region by region basis, the data shows that Australian agriculture is holding market share in the North Asia and Oceania regions, but underperforming in some of the fastest growing markets including the ASEAN, Africa and Middle East, and Central and South Asian regions.

The review reveals that part of the region for Australia’s under-performance lies in the fact that the largest growth categories of imports in the ASEAN and South Asian regions has been oilseeds and coarse grains, especially feed grains for livestock. Australia is not a major exporter of these products, especially given the limited availability of arable land suitable for cropping in Australia.

However, the review highlights that the main reason that Australian agriculture has lost market share is the limits that apply to land and water availability in Australia which prevent any major expansion in output occurring. In fact, it is likely that despite growing global opportunities, the value of Australian agricultural exports will be reduced in coming years due to a reduction in the size of the national cattle herd and sheep flock, and a reduction in dairy output caused by sharply reduced global prices.

The review reinforces once again the fact that Australian agriculture cannot realistically hope to increase production volumes in the short term, and nor is Australian agriculture cost-competitive with the emerging agricultural exporting nations of Eastern Europe, Asia and South America.

In addition, the proximity of Australia to fast growing markets in Asia provides only a limited advantage, because advances in the efficiency of global shipping, packaging that extends the shelf life of fresh produce and a global oversupply of shipping capacity has greatly reduced global shipping costs and extended the distance that fresh produce can be shipped.

The review results reinforce the need for Australian agriculture to increase the focus on increasing the value of agricultural exports, as well as the volume.

The two main avenues available to increase volume are a lift in agricultural productivity, and the expansion of agriculture in northern Australia. Governments and the agricultural sector should redouble efforts to pursue both objectives. Neither of these will deliver immediate results, but will be essential to improve the long-term wealth that the sector generates for the Australian economy.
Agriculture has always played an important role in the success of our nation – it touches all Australians. The White Paper is the outcome of discussions with industry: farmers, people in the supply chain, exporters and everyday Australians. The White Paper outlines the initiatives and commitment by the Government to Australia’s agriculture sector. It represents a $4 billion investment in our farmers and in the future of our nation.

Agriculture is at the heart of the Australian identity. Our history and economy was ‘built on the sheep’s back’. Today agriculture continues to play a pivotal role in building the wealth of Australia; this is why the sector is one of the five pillars of the Australian economy and why the Government has made agriculture a priority.

The opportunities for the sector are enormous. We sit on the edge of the strongest growing region in the world, we have a developed agriculture sector with sound prospects for expansion, we have food safety and environmental credentials that are world-class, we develop and have access to up-to-date technology, we have a strong economy with a sound financial system and we have a well-educated and skilled workforce.

The agriculture sector is well placed to prosper, and will do so through the endeavours of farmers and the maintenance of an open and competitive business environment.

The Government has laid the foundations for a stronger agriculture sector. We have reduced regulation, removed the Carbon Tax, increased export market access, invested in infrastructure and refined the settings for foreign investment.

And through this White Paper we are going further to set the environment needed to drive better returns for farmers. Better returns will see increased investment, job creation, stronger regional communities and economic growth.

Our vision is to build a more profitable, more resilient and more sustainable agriculture sector to help drive a stronger Australian economy.

The Government is focused on agricultural policies that will achieve nine principles (Figure 1), with better returns at the farm gate being the primary focus. To achieve this, the Government is committed to five key priorities:

1. A fairer go for farm businesses, to keep families on the farm as the cornerstone of agriculture, by creating a stronger business environment with better regulation, healthier market competition,

![FIGURE 1: AUSTRALIAN GOVERNMENT AGRICULTURE POLICY PRINCIPLES AND PRIORITIES](image-url)
Agriculture’s importance to the Australian economy

Agriculture is a significant contributor to the Australian economy, according to the Agricultural Competitiveness White Paper produced by the Australian Government.

The value of farm production was $51 billion in 2013-14 (ABARES 2015a). Agriculture contributed around two per cent of Australia’s gross domestic product (GDP) and 15 per cent of total Australian merchandise exports (ABARES 2014). Agriculture underpins Australia’s largest manufacturing industry – food, beverage and tobacco processing – which added $25 billion to the economy in 2013-14 (25 per cent of manufacturing GDP) (ABS 2015a). As the mining construction boom moderates it will be important to foster growth in other export sectors, including agriculture.

The success of agriculture over the past two centuries is a result of the sector’s ability to innovate, adapt and continuously respond to economic, social and technological advancements. Australian agriculture is characterised by its diversity; our climate ranges from tropical to temperate, with vast stretches of arid land. The Australian landscape is also characterised by extreme weather events, including droughts, floods, tropical cyclones, severe storms and bushfires.

Agriculture makes up 53 per cent of Australia’s land mass or 406 million hectares (ABS 2015b). There are 115,000 businesses that cite agriculture as their primary activity and a further 13,900 as their secondary activity (ABS 2014a). Of the total number of agricultural businesses in Australia 99 per cent are fully Australian-owned (ABS 2013a). Around 97 per cent of farms are classified as small businesses – having annual turnover of less than $2 million (ABS 2013b).

International markets perform a significant role with around 65 per cent of Australian agricultural production exported (ABARES 2015b). In 2013-14 farm exports were worth $41.2 billion (ABARES 2015a). Australia exports agricultural products to more than 100 countries. By value, our top three agricultural export destinations in 2013-14 were China ($9 billion), Japan ($3.5 billion) and the United States ($3 billion) (ABARES 2015a). By region, Australia exported agricultural products worth around $17 billion to North Asia, around $8 billion to South-East Asia, and over $3 billion each to the Middle East, the Americas and Europe (ABARES 2014).

Agriculture is a significant employer, particularly in regional areas. Around 270,000 people are employed in the sector with a further 223,000 in food, beverage and tobacco manufacturing (ABARES 2015a). Advancements in technology have resulted in an overall decrease of people employed in the sector over time. Farm employment has declined from 8 per cent of total employment in 1966-67 to just over 2 per cent in 2013-14. This reflects increased automation and other productivity gains. This trend is expected to continue. At the same time changing technologies and markets mean there is a need for a more diverse and highly skilled workforce with skills across a wide range of disciplines.


...more competitive supply chains and an improved tax system.

2. Building 21st century water, transport and communications infrastructure that supports efficient movement of our produce, access to suppliers and markets, and production growth.

3. Strengthening our approach to drought and risk management, including providing the tools to facilitate more effective risk management by farmers and a long-term approach to drought that incorporates provision of enhanced social and community support for farming families and rural communities, and business initiatives for preparedness and in-drought support.

4. A smarter approach to farming based on a strong research and development system that underpins future productivity growth; and effective natural resource policy that achieves a cleaner environment as part of a stronger Australia.

5. Access to premium markets through the availability of a large number of premium export markets open to our produce and a strong biosecurity system that maintains our favourable plant and animal health status.

Government action in the five priority areas will help the sector to grow and take advantage of future opportunities. They will also serve to improve resilience to market downturns and adverse seasonal conditions.

Based around these priorities, the White Paper delivers a $4 billion package to grow agricultural competitiveness. It’s a comprehensive roadmap for delivering a more competitive and profitable agriculture sector. It outlines the actions that will take agriculture forward to realise its future potential. And it is based on what you told us was needed.

The White Paper provides the framework for future governments to use to ensure that the sector takes advantage of opportunities and remains resilient to challenges.

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Stronger farmers, stronger economy
Agriculture has always played an important role in the success of our nation – it touches all Australians.

The Government is committed to strengthening the sector and ensuring it remains as competitive as possible, because stronger farmers mean a stronger Australian economy.

The opportunities for the sector are enormous. We sit on the edge of the strongest growing region in the world, have a developed agriculture sector, have world-class food safety and environmental credentials, possess modern technology, have a strong economy and employ skilled labour.

The agriculture sector is well placed to prosper.

For the past 18 months the Government has listened to the challenges that farmers are facing and discussed what is required for them to be successful on the land. From this feedback we have developed the Agricultural Competitiveness White Paper.

The White Paper outlines the initiatives and commitments by the Australian Government for each of our five priority areas for action. It is a $4 billion investment in our farmers.

Our vision is to build a more profitable, more resilient and more sustainable agriculture sector to help drive a stronger Australian economy.

Priority 1: A fairer go for farm businesses
The Australian Government is helping farmers achieve a better return at the farm gate.

Fairer competition for farm produce
We are investing:
- $11.4 million to boost ACCC engagement with the agricultural sector including a new Commissioner dedicated to agriculture. A more farm-savvy and proactive ACCC will encourage fair-trading and strengthen competition in agricultural supply chains.
- $13.8 million in a two year pilot programme to provide knowledge and materials on cooperatives, collective bargaining and innovative business models. This will help farmers to establish alternative business models (including cooperatives) and manage contract negotiations.

Better regulation
We are committed to reducing red tape from the economy by $1 billion a year. Less red tape makes business easier for farmers.
- $20.4 million is allocated to further streamline agricultural and veterinary chemicals approvals. Farmers will get access to new farm chemicals more quickly, reducing the cost of doing business.
- Productivity Commission reviews into reducing regulation for the Australian agriculture, marine fisheries and aquaculture industries. This will let farmers and fishers get on with their business.
- Improved country of origin labelling to let consumers know where food is grown and processed.

A better tax system for farm businesses
- Farmers will be able to opt back into income tax averaging after 10 years.
- Farmers will be able to double their Farm Management Deposits (FMDs) to $800,000.
- Banks can allow farmers to use FMDs as a loan offset, reducing interest costs. ABARES has estimated that, if all FMD holdings are used to offset loans, the benefit to the farm sector in interest savings could amount to $50 million a year.
- Accelerated depreciation for fencing has been simplified – farmers are able to immediately deduct the cost of new fencing in the year of purchase.
- The Growing Jobs and Small Business package announced in the Budget will benefit 97 per cent of farmers.
- Through the Tax White Paper the Government will deliver taxes that are lower, simpler and fairer.

Priority 2: Building the infrastructure of the 21st century
We are planning ahead and thinking innovatively when it comes to our infrastructure.

- $500 million National Water Infrastructure Fund for farmers’ future water security. The Fund is comprised of $50 million to undertake the detailed planning necessary to inform future water infrastructure investment decisions and $450 million to construct national water infrastructure, in partnership with State and Territory governments and the private sector.
- CSIRO’s TRAnsport Network Strategic Investment Tool (TRANSIT) will be expanded to support future decisions on transport infrastructure investment to benefit agriculture.

The Government is already delivering on its commitment to invest $50 billion for current and future infrastructure. The Government is also already investing an additional $60 million on top of the $100 million Mobile Black Spot Programme to improve mobile coverage across regional Australia.
The Government is delivering on the $29.5 billion National Broadband Network (NBN) rollout. Improved access to technology will give farmers more market options, and therefore a stronger position to negotiate on price.

Priority 3: Strengthening our approach to drought and risk management

Drought is one of the biggest challenges farmers face and it has a significant impact on agricultural output, productivity and farm incomes. Farmers can use many of the new, practical White Paper initiatives not only in drought, but to manage the other risks they face.

Prefering for drought

- $3.3 million to give farmers more accurate, more local and more frequent seasonal forecasts.
- Immediate tax deduction of the cost of new water facilities for farmers and depreciation of capital expenditure on fodder storage assets over three years.
- $29.9 million over four years for farm insurance advice and risk assessment grants to help farmers evaluate options.

In-drought support

- Up to $250 million in Drought Concessional Loans each year for 11 years.
- $22.8 million to increase Farm Household Allowance case management for farmers.
- $50 million to boost Australia’s emergency pest and disease eradication capability.
- $50 million to give farmers better tools and control methods against pest animals and weeds.

The Government is already helping farmers access skilled and reliable labour by:

- Focusing on better training through the $664.1 million Industry Skills Fund.
- Making visa programmes more flexible by expanding the Seasonal Worker Programme Australia-wide, and the Working Holiday Maker (417 and 462) visas in northern Australia.
- Establishing a new Ministerial Advisory Council on Skilled Migration to review the list of occupations available for sponsorship under the 457 visa.

The Government is also supporting farmers and other land managers to tackle practical environmental projects. This includes the $1 billion National Landcare Programme, while the $700 million commitment to the Green Army will provide training in conservation management.

Priority 4: Farming smarter

The agriculture sector needs access to the most advanced technologies and practices to continue to ‘farm smarter’.

- $100 million extension of the Rural R&D for Profit Programme to 2021-22 to get research onto the farm.
- $1.4 million research boost to match industry levies and contributions in the export fodder and tea tree oil industries.
- $1.2 million to the Rural Industries Research and Development Corporation for small industries.
- New RD&E priorities to direct levy funds to areas that will improve farm gate returns.
- Reduce RDC administration costs to leave more money for RD&E.

- $50 million to modernise Australia’s food export traceability systems to further enhance our food safety credentials.

Farm groups have welcomed the Federal Government’s plan for Australia’s agricultural future, particularly tax reforms and changes to Farm Management Deposits (FMD).

The National Farmers’ Federation said it would give the Agriculture White Paper “a 7 or 8 out of 10”, but was disappointed not to see plans for an inland rail link between Melbourne and Brisbane in the document.

All the same, NFF chief executive Simon Talbot said he believed most farmers would be pleased with what they saw in Saturday’s announcement.

The changes to FMDs are already generating some buzz; farmers have long called for reforms to the FMD scheme to make it easier to access and more flexible.

The White Paper reveals that from July next year, farmers will be able to double their FMDs to $800,000, and use those deposits to offset business loans and reduce interest costs.

The government said that will save farmers up to $150 million a year. Drought-affected farmers will also be able to access their FMDs without losing their tax concessions.

Victorian Farmers’ Federation president Peter Tuohey called that “a fantastic idea”.

NSW Farmers’ Association president Fiona Simson agreed, saying the FMD reforms are “very innovative” and will be a big help to her members living through drought.

She also welcomed the continuation of concessional loans for drought-hit farmers, but said the association “wants to have some more conversations with government about the structure of those loans.”

Ms Simson is one of many farm leaders who have criticised the concessional loans schemes that are currently available for drought-affected farmers.

More to do beyond White Paper’s plans for multi-peril crop insurance

There had been speculation that the White Paper would include provisions to establish a comprehensive multi-peril crop insurance program in Australia, to give farmers new avenues for mitigating the risk of drought or other crop failures.

Common overseas but not in Australia, multi-peril crop insurance would allow farmers to insure the cost of putting a crop in the ground. In the event of a failed season, whether through drought, hail or a storm, farmers would then be able to claim the cost of their seed, fuel, fertiliser and other inputs.

The White Paper does include almost $30 million for “farm insurance advice and risk assessment grants”.

But the NSW Farmers’ Association is disappointed that so far, federal and state governments have concentrated on what’s needed in preparation for taking out insurance, rather than what a diverse and competitive
insurance market might look like.

“It’s good that [multi-peril crop insurance] is at least mentioned in this White Paper, and I think there’s a lot more work to do,” Ms Simson said.

“We think that there is a bigger discussion to have around making sure that we get a competitive marketplace for multi-peril crop insurance, making sure that we have plenty of products on the market with a good premium for farmers, and making sure, ultimately, that we can expand that product to cover all products and not just grains.

“At the moment we very much see multi-peril (crop insurance) as critical for farmers around taking on some risk themselves, but there’s a lot more conversations that need to be done.”

Victorian Farmers’ Federation president Peter Tuohey said the grants for multi-peril crop insurance advice and assessment are “a good segue into what’s going to happen” next.

“The unfortunate part is that I think we do need government backing,” he said.

“We need something that is particularly going to help young farmers, they’re the ones most at risk. When you go to a bank now, banks nearly expect you to provide some sort of risk cover for a drought.

“This year’s going to be a tough year and we need to make sure that people can put a crop in and cover themselves – they’ve got to meet their loan commitments, they’ve got to meet their repayments.

“A product that meets that is pretty important for the next generation of young farmers.”

Biosecurity, R&D, trade and dams initiatives welcomed

The NSW Farmers Association welcomed the White Paper’s extra spending on biosecurity, and the appointment of an expert Agriculture Commissioner at the Australian Competition and Consumer Commission. Ms Simson noted her association has, “certainly raised the point that the ACCC doesn’t have a good understanding about agriculture, our agricultural markets or supply chain.”

NFF chief executive Simon Talbot welcomed the White Paper’s extra spending on R&D, noting “it was outlined very clearly that [the government] want to see commercial outcomes quite quickly.

“There’s been quite a bit of R&D done in the past that’s sat on the shelf. What we want to see is more R&D that goes back into farm gate pockets, that goes into marketing, branding and accessing Asia.”

The NFF has also welcomed the appointment of five agriculture counsellors in overseas markets, and the additional spending on biosecurity.

The VFF also praised the government for “talking about building dams”.

“They’re a great piece of infrastructure, we’ve never heard that sort of language from any government for a long time,” Mr Tuohey said.

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Free trade agreements fail to boost Australian agriculture and food manufacturing

The balance of trade positions of Australian agriculture and food manufacturing have deteriorated since FTAs with New Zealand, the United States and Thailand have come into play, according to Mark McGovern.

Many claims are made that Free Trade Agreements (FTAs) with select trading partners will benefit Australian agriculture. OECD statistics say otherwise. The balance of trade positions of Australian agriculture and food manufacturing have deteriorated since FTAs with New Zealand, the United States and Thailand have come into play.

The longstanding 1983 New Zealand arrangement shows growing imports of processed food products, especially since 2000. Australian food exports to New Zealand have levelled off since 2011 with a US$600 million Australian deficit on food products in 2014. Agricultural goods have been close to balance with just over US$270 million of raw or minimally processed product flowing each way.

The net result (shown in green) has been a persistent and generally worsening deficit for Australia in its agriculture and food trade with New Zealand for the whole period.

The agreement with the United States came into effect in 2005. Again agricultural products are close with Australian imports of US$210 million slightly exceeding exports since 2007. Australian food exports have always exceeded imports but the surplus halved between 2004 and 2013. The basis for the almost doubling of food exports in 2014 is unclear, but meat products driven by beef herd rundown in drought affected Queensland would be part of what may be a one-off spike.

The net result (again shown in green) has been a persistent but generally narrowing surplus for Australia in its agriculture and food trade with the US since the FTA came into play. The Australian 2014 surplus of around US$2 billion appears likely to settle back to around US$700 million or less in the years to come.

Thailand also signed a bilateral agreement in 2005 and the result has been a generally worsening agriculture and food trade deficit.

There has been no improvement evident in the agriculture and food trade position under any of the three agreements. Rather, deterioration has been evident in each case.

Author developed using OECD STAN bilateral trade in goods database.
but after this, agricultural exports rose markedly for three years before falling back. The rise and then fall of commodity prices explain much of this hump.

Clearly, these three FTAs have failed to deliver. There has been no improvement evident in the agriculture and food trade position under any of the three agreements. Rather, deterioration has been evident in each case.

Turning now to the world, Australia’s agriculture and food balance has been a persistent and generally growing surplus. This is the opposite effect. Australian trade performance has been better with non-agreement partners. Again commodity price effects are evident in recent years for agriculture exports.

New Zealand, USA and Thailand account for about 30% of the rising food imports but only around 15% of rising food exports to the world. They also account for only around 5% of agricultural exports but 35% of imports.

Further analysis can be undertaken, but on these figures, FTA partners have clearly been able to outperform Australian enterprises. On the other hand, where no Agreements have been struck, Australian enterprises have outperformed partners to record a generally improving agriculture and food trade surplus.

How might things change with three new North Asian trade, regulation and investment agreements (Japan, Korea and China), and perhaps a Trans-Pacific Partnership? History suggests no necessary gains and trending losses on merchandise trade for both food manufacturing and agricultural industries.

It seems we should be more closely monitoring the realities of trade, not fixating on rhetoric and so far empty promises. There is nothing ‘free’ about these trade agreements.

Mark McGovern is Senior Lecturer, QUT Business School, Economics and Finance, Queensland University of Technology.

New free trade agreement with China

China is Australia's largest agriculture, forestry and fisheries export market, worth around $10 billion in 2015-16, an increase of $5 billion since 2010-11. China’s demand for high-quality agriculture and food products is growing rapidly, and is expected to further increase under the China-Australia Free Trade Agreement (ChAFTA). The Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) predicts China will account for 43 per cent of global growth in agricultural demand by 2050.

**China-Australia FTA enters into force**
20 December 2015: The landmark China-Australia Free Trade Agreement (ChAFTA) officially entered into force, allowing more than 86 per cent of Australia’s goods exports to China will enter duty free (worth more than $90 billion), while tariffs on billions of dollars worth of other goods exports will be reduced. Once the agreement is fully implemented 96 per cent of Australian goods will enter China duty free.

Tariffs have been cut on a range of important Australian agricultural exports – including dairy, beef, lamb, wine, seafood, fruit and vegetables – as well as processed foods, vitamins and health products. Tariffs on coking coal have been eliminated, while the phased elimination of tariffs on non-coking coal also starting.

The agreement is expected to stimulate new levels of growth in the two-way investment relationship which is currently worth around $121 billion.

**China-Australia FTA process after a year**
20 December 2016: The first anniversary of the ground-breaking China-Australia Free Trade Agreement (ChAFTA).

According to the Government, for the past year ChAFTA has given Australian businesses a competitive advantage that is driving Australian exports and creating new jobs. In the first three quarters of 2016, as tariffs were cut, the value of Australian exports to China at least doubled for products including fresh cherries, fresh and chilled abalone, and unwrought zinc. Over the same period, export values of fresh table grapes jumped six-fold to $102 million, exports of medicaments for therapeutic use grew more than 90 per cent to $523 million, milk powder exports grew almost 80 per cent to $127 million, bottled wine exports grew more than 40 per cent to $309 million, fresh navel orange exports grew 55 per cent to $51 million, and fresh cheese exports grew 28 per cent to $33 million.

A third round of tariff cuts under ChAFTA occurred on 1 January 2017, enabling premium Australian products like bottled wine, various pharmaceuticals, nuts, ice cream and seafood to face a tariff less than half that paid by major competitors like France, the US and Canada. Every year, those tariffs will be cut again for Australia until they reach zero, which is expected to build on the competitive edge ChAFTA is already providing, according to the Government.

**SOURCES**
How migrant workers are critical to the future of Australia’s agricultural industry

Australia takes in about half of all working holidaymakers who enter OECD countries, many of whom work on farms with labour shortages, observes Jock Collins.

More than 900,000 immigrants on permanent and temporary visas enter Australia each year. Most live and work in Australian capital cities; immigrants are more urbanised than the average Australian today.

Immigrant workers add substantially to productivity in the agricultural industry.

However, in the last decade or so, new visa pathways have opened up to attract new immigrant workers and their families to the Australian bush. Increased chances of selection attracts permanent skilled immigrants to accept employment in regional and rural towns.

At the same time, increasing numbers of temporary migrants on working holiday, student and skilled 457 visas are attracted to the bush. A new program for Pacific Seasonal Workers has also been introduced.

Immigrant workers add substantially to productivity in the Agricultural industry, a new report reveals (New immigrants Improving Productivity in Australian Agriculture, Rural Industries Research and Development Corporation).

Growth and benefits

For policymakers, the attraction of getting migrants to rural areas is that it helps reduce labour shortages – particularly during seasonal harvesting peaks – and counteracts the trend of population movement away from the bush to the metropolis.

Immigrants, including refugees, play a critical role in the Australian agricultural industry. Some of these immigrants become entrepreneurs, opening up a business. Skilled immigrants in the agricultural sector were also much more likely to have set up their own business (15%) than those in other industries (9.6%).

When set against the Australian average rate of entrepreneurship (those in the workforce who are self-employed or employers) of 10%, this propensity for immigrant entrepreneurship in the Australian agricultural sector is very encouraging, since entrepreneurs drive employment and productivity growth in the industry.

457 visa skilled workers find

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Issues in Society | Volume 422

A. BY STATE AND TERRITORY

B. BY REMOTENESS AREA

employers in the bush eager to sponsor their immigration application, particularly in professional and technical occupations. Working holidaymakers fill critical jobs during harvesting and picking seasons. Seasonal workers from the Pacific are eager to supplement the income of their families back home via remittances. They also get to learn new skills.

Immigrant farmers fill the growing intergenerational gap in farm succession and bring with them new technologies and innovations to Australian farming. Zimbabwean immigrant Nicky Mann and her husband introduced hydroponic rose-growing at their NSW central coast operation. Vietnamese and Chinese market gardeners have introduced many new vegetables to expand Australians’ food horizons.

Australia takes in about half of all working holidaymakers who enter OECD countries. They can work and travel around Australia from job to job. The carrot is a 12-month extension to their visa if they work more than 88 days in the bush. The agriculture, forestry and fishing industries receive the greatest benefit from this arrangement.

Working holidaymakers come from more than 20 countries. The UK, South Korea, Ireland, Germany, Taiwan and France provide the largest numbers. Fieldwork with Korean working holidaymakers found the majority arrived with the intention of working in the agricultural industry.

Most reported that the best thing about their experience was that they had good relations with the non-Koreans they worked with in Australia, learned new skills, had the opportunity to improve their English, and received good wages. The Pacific seasonal workers program allows workers from East Timor, Nauru, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu to work in low-skilled jobs for up to seven months in a 12-month period. Most work in the horticultural industry.

The annual intake has grown from around 400 in 2010-11. It is now an uncapped, demand-driven immigration stream that has expanded to jobs in the broader agriculture industry – including the accommodation sector.

Many permanent and temporary immigrants in the bush, particularly those who work in the agricultural industry, report receiving a warm welcome. This undermines existing stereotypes.

Many skilled permanent immigrants report strong local connections through sporting, community, school and religious social activities in their regional, rural and remote towns.

Those who work in the agricultural industry report a higher level of social engagement – with the exception of sporting activities – than do other immigrants.

However, working holidaymakers had more than three times the rate...
of finalised Fair Work Ombudsman complaints compared to all other workers in 2013-14. This suggests a high incidence of exploitative work arrangements.

The research also noted numerous examples over time of exploitation of temporary migrants on temporary student, skilled work, working holiday or Pacific Seasonal worker visas. Examples of co-ethnic exploitation are also common.

The research does not clarify the extent to which temporary migrants working in agriculture experience exploitation. However, experiences of migrant worker exploitation do jeopardise future migrant flows into agricultural jobs.

International migration decisions are often based on the experiences of friends and family around the world. This means that unscrupulous employers can undermine the benefits of migrant employment programs for the majority of Australian employers who provide appropriate pay and work conditions.

Jock Collins is Professor of Social Economics, UTS Business School, University of Technology, Sydney.
FEEDING A HUNGRY NATION: CLIMATE CHANGE, FOOD AND FARMING IN AUSTRALIA

The price, quality and seasonality of Australia’s food is increasingly being affected by climate change with Australia’s future food security under threat, a new Climate Council report has revealed.

Australia’s food supply chain is highly exposed to disruption from increasing extreme weather events driven by climate change, with farmers already struggling to cope with more frequent and intense droughts and changing weather patterns.

KEY FINDINGS

1. Climate change is making weather patterns more extreme and unpredictable, with serious consequences for Australia’s agricultural production.
   - Climate change is driving an increase in the intensity and frequency of hot days and heatwaves in Australia, changing rainfall patterns, increasing the severity of droughts, and driving up the likelihood of extreme fire danger weather.
   - Average rainfall in southern Australia during the cool season is predicted to decline further, and the time spent in extreme drought conditions is projected to increase.
   - Water scarcity, heat stress and increased climatic variability in our most productive agricultural regions, such as the Murray Darling Basin, are key risks for our food security, economy, and dependent industries and communities.
   - Climatic challenges could result in imports of key agricultural commodities such as wheat increasingly outweighing exports.

2. More frequent and intense heatwaves and extreme weather events are already affecting food prices in Australia.
   - Climate change is increasing the variability of crop yields.
   - Food prices during the 2005-2007 drought increased at twice the rate of the Consumer Price Index (CPI) with fresh fruit and vegetables the worst hit, increasing 43% and 33% respectively.
   - Reductions of livestock numbers during droughts can directly affect meat prices for many years.
   - Rainfall deficiencies in parts of Western Australia and central Queensland are projected to reduce total national crop production by 12% in 2014-15, and the value of beef and veal exports by 4%.
   - Cyclone Larry destroyed 90% of the North Queensland banana crop in 2006, affecting supply for nine months and increasing prices by 500%.
   - The 2009 heatwave in Victoria decimated fruit crops, with significant production losses of berry and other fruit crops.

3. Climate change is affecting the quality and seasonal availability of many foods in Australia.
   - Up to 70% of Australia’s wine-growing regions with a Mediterranean climate (including iconic areas like the Barossa Valley and Margaret River) will be less suitable for grape growing by 2050.
Higher temperatures will continue to cause earlier ripening and reduced grape quality, as well as encourage expansion to new areas, including some regions of Tasmania.

- Many foods produced by plants growing at elevated CO2 have reduced protein and mineral concentrations, reducing their nutritional value.
- Harsher climate conditions will increase use of more heat-tolerant breeds in beef production, some of which have lower meat quality and reproductive rates.
- Heat stress reduces milk yield by 10-25% and up to 40% in extreme heatwave conditions.
- The yields of many important crop species such as wheat, rice and maize are reduced at temperatures more than 30°C.

4. Australia is extremely vulnerable to disruptions in food supply through extreme weather events.
   - There is typically less than 30 days supply of non-perishable food and less than five days supply of perishable food in the supply chain at any one time. Households generally hold only about a 3-5 day supply of food. Such low reserves are vulnerable to natural disasters and disruption to transport from extreme weather.
   - During the 2011 Queensland floods, several towns such as Rockhampton were cut off for up to two weeks, preventing food resupply. Brisbane came within a day of running out of bread.

5. Australia’s international competitiveness in many agricultural markets will be challenged by the warming climate and changing weather patterns.
   - Australia is projected to be one of the most adversely affected regions from future changes in climate in terms of reductions in agricultural production and exports.
   - Climate impacts on agricultural production in other countries will affect our competitiveness, especially if warmer and wetter conditions elsewhere boost production of key products such as beef and lamb.

   

Australia’s food supply chain is highly exposed to disruption from increasing extreme weather events driven by climate change, with farmers already struggling to cope with more frequent and intense droughts and changing weather patterns.

6. If the current rate of climate change is maintained, adaptation to food production challenges will be increasingly difficult and expensive.
   - By 2061, Australia’s domestic demand for food could be 90% above 2000 levels, with a similar increase in export demand.
   - Transitioning to a new, low-carbon economy is critical to avoiding the most dangerous impacts of climate change.
   - The longer action on climate change is delayed, the more likely it is that progressive, small-scale adaptive steps to cope with climate change will become increasingly inadequate and larger, more expensive changes will be required.

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AUSTRALIA’S LAND CLEARING RATE IS ONCE AGAIN AMONG THE HIGHEST IN THE WORLD

Deforestation threatens much of Australia’s extraordinary biodiversity and, if not redressed, will blight the environmental legacy we leave future generations, warn scientists including Richard Kingsford, Martine Maron and Brendan Wintle

Rema...
Hastens erosion and reduces fertility of Australia’s ancient and fragile soils
Increases the risk of soils becoming saline
Exacerbates drought
Reduces numbers of native pollinators and many wildlife species (such as woodland birds and insectivorous bats) that control agricultural pests
Reduces shade for livestock from heat and wind.

Continued and increasing removal of forests, woodlands and grasslands increases the cost of restoring landscapes and reduces the chance of success. For example, the Australian Government has committed to plant 20 million trees by 2020. Yet many more than 20 million trees are cleared every year in Queensland alone.

Forest and woodland destruction increases the threat to some of Australia’s most iconic environmental assets. Coral health on The Great Barrier Reef has declined precipitously from the effects of high temperatures associated with climate change, poor water quality, and the flow-on impacts it triggers (such as crown-of-thorns outbreaks). Native vegetation removal from catchments that flow into the Great Barrier Reef liberates topsoil and contaminants, reducing water quality and threatening the health and resilience of the Great Barrier Reef. Governments have already spent hundreds of millions of dollars on this problem, with estimates of the full cost of restoring water quality as high as AUD$10 billion.

Native vegetation is a major carbon sink. Forest and woodland destruction is the fastest-growing contributor to Australia’s carbon emissions, as it transfers the carbon that was stored in the vegetation to the atmosphere. Hence, Australia’s increasing forest and woodland destruction threatens its ability to meet its commitments under four major international treaties: the Convention on Biological Diversity, the World Heritage Convention, the Convention to Combat Desertification, and the Framework Convention on Climate Change.

**Urgently needed solutions**

- Develop and implement a strategy to end net loss of native vegetation, and restore over-cleared landscapes
- Recognise all biodiversity, not just threatened species, in policy and legislation for the management of native vegetation
- Establish clear, transparent and repeatable national reporting of clearing of native vegetation
- Use rigorous biodiversity assessment methods for assessing clearing requests, accounting for all potential impacts, including cumulative and indirect impacts
- Identify habitats that are of high conservation value for complete protection
- For unavoidable losses of native vegetation, require robust and transparent offsets that meet the highest standards and improve biodiversity outcomes.

Thirteen years ago, scientists from across the world expressed their grave concern about ongoing high rates of land forest and woodland destruction in the Australian State of Queensland. For a while, the warning was heeded, and the Queensland state government acted to bring land clearing to historically low levels.

The progress made then is now being undone. Forest and woodland destruction has resumed at increasingly high rates. This return of large-scale deforestation to Australia risks further irreversible environmental consequences of international significance.

**Of the eleven world regions highlighted as global deforestation fronts, eastern Australia is the only one in a developed country. This problem threatens much of Australia’s extraordinary biodiversity and, if not redressed, will blight the environmental legacy we leave future generations.**
FARMING IN 2050: STORING CARBON COULD HELP MEET AUSTRALIA’S CLIMATE GOALS

What is it that Australians really want from our land? Brett Bryan from the CSIRO assesses a range of potential pathways for Australia’s agricultural land.

Australia’s agricultural lands help to feed about 60 million people worldwide, and also support tens of thousands of farmers as well as rural communities and industries.

But a growing global population with a growing appetite is placing increasing demands on our agricultural land. At the same time, the climate is warming and in many places getting drier too.

Agriculture, and particularly livestock, is currently a major contributor to greenhouse gas emissions. But new markets and incentives could make storing carbon or producing energy from land more profitable than farming, and turn our agricultural land into a carbon sink.

How might these competing forces play out in changing Australian land use? Our research, published in Global Environmental Change, assesses a range of potential pathways for Australia’s agricultural land as part of CSIRO’s National Outlook.

Changing landscapes

The only constant in landscapes is change. Ecosystems are always changing in response to natural drivers such as fire and flood.

 Humans have complicated things. Indigenous Australians manipulated the Australian landscape and climate through burning for millennia, sustaining a population of around 750,000 and underpinning a culture.

European colonisation brought a different and more pervasive change, clearing land, building cities, damming rivers and establishing an increasingly mechanised and industrialised agriculture.

These iconic but changed landscapes inspired the romantic art of Arthur Streeton and poetry of Banjo Paterson among many others – and helped forge a young nation’s identity.

Change can happen surprisingly quickly. Often before we know it we’ve gone too far and need to scramble for fixes that are so often costly, slow and ultimately inadequate.

For example, in South Australia, researchers in the early 1960s raised the alarm that the feverish post-war period of soldier resettlement, land clearance and agricultural development threatened entire native plant and animal communities with extinction. The government’s response over the following 30 years was to expand greatly the conservation reserve network and eventually prohibit land clearing.

History repeating?

Agricultural lands produce a range of goods and services. But in many places the focus on agricultural productivity has come at the expense of ecosystems. Biodiversity, soil and water are all on downward trends.

Is the balance right? Opinion varies. Many would say no, and consider the status quo to be stacked strongly against the environment.

Others see agriculture as entering a boom time, driven by growing population and rising food prices. Substantial interest from overseas investors in Australian agricultural land reflects this opportunity.

Parts of Australia’s agricultural land continue to change fast. Lessons hard-learned by South Australia seem to have been forgotten. Rates of land clearance in Queensland are rising again since 2010 after a long-term trend of decline.

In the 1990s, new financial incentives led to the planting of over 1 million hectares of forest in southern Australia. Now a failed business model, many of these plantations are being returned to agriculture.

Demand for more secure sources of energy has generated rapid expansion of coal seam gas and wind power generation, and the development of northern Australia remains a bipartisan priority.

Worldwide, Australia is not alone – many international examples also exist of recent, massive, rapid and accelerating changes in how land is used.

Australia has historically taken a hands-off approach to managing land use change, instead focusing on increasing the productivity and competitiveness of agriculture. Apart from a handful of planning and environmental regulations, the use of land has been subject to minimal governance or strategic direction.

Where to from here?

What is it that Australians really want from our land? We know what we don’t want: wall-to-wall crops, pasture, buildings, gas wells, mines, wind farms or trees.

We can expect healthy debate around the margins, but, in general, diversity, productivity and sustainability seem to be widely valued. Most of us want to leave the place in decent condition for future generations.

Europe has had this conversation and knows what it wants from its landscapes – and it’s not afraid to pay for it (for instance, through agricultural subsidies). A deep aesthetic and cultural heritage is the central objective, with a balance of recreation opportunities, tourism, a clean and healthy environment and high-quality produce all being high priorities.

Once we know what we want, we can work out how to get there.

That’s where science can help. We now have the ability to project changes in land use in response...
to policy and global change, and the environmental and economic consequences.

CSIRO’s recent National Outlook mapped Australia’s potential future pathways. A companion paper in *Nature* found that it is possible to achieve strong economic growth and reduce environmental pressure, if we put the right policies in place now. It provides a glimpse of how our rural lands might respond to coalescing future change pressures.

**Farming carbon**

In our modelling, carbon sequestration in the land sector plays a key role of Australia’s future. Land systems can help with the heavy lifting required to hold global warming to 2°C as recently agreed in Paris.

There are several factors that could drive this change, including climate, carbon pricing, global food demand and energy prices.

We modelled the economic potential for land use change and its impacts in over 600 scenarios (full data available at http://doi.org/10.4225/08/5604A2E8A00CC), combining a suite of global outlooks and national policy options.

A carbon price, which enables landholders to make money from storing carbon in trees and soils (often much more money than from farming), may increase pressure to shift farmland to restored forests.

Who knows? A pay rise while watching trees grow could be an attractive proposition for our ageing farmers. Complementary biodiversity payments could also help arrest declines in wildlife and help it adapt to climate change.

If we redouble our focus on productivity, by 2050 agriculture will produce more than today, even as farmland contracts. The least productive areas are less able to compete with reforestation and other new land uses, leaving the most efficient agricultural land in production.

But trade-offs are likely. Trees use a lot more water than crops and pasture, so we will need to think carefully about managing water resources.

Australians care about their land and are more aware than ever about what is happening to it. While we can have some control over the future of our land, and we do exercise this control in certain circumstances (such as urban planning), our long-term approach to rural land has been to let environmental and economic forces play out and let the invisible hand of economics determine what will be.

Given the pace at which change can happen, a smarter approach will be to start the conversation, work out what it is we want from our land, and put the policies and institutions in place to get us there.

**Brett Anthony Bryan** is Principal Research Scientist, Environmental-economic integration, CSIRO.
AUSTRALIA HAS A BIG ROLE TO PLAY IN FEEDING THE WORLD

Research and technology can improve the yield and sustainability of our crops, write Joanne Daly, Rachel Ankeny, Richard Richards, Sally Gras and Stephen Powles

This article is part of a series from The Conversation on the Science and Research Priorities announced by the Federal Government.

Joanne Daly
CSIRO Fellow and former Group Executive of Agribusiness and Chief of Division at CSIRO.

Agricultural and food industries are an important part of the Australian economy and national identity. They are set to remain so as global demand for food rises over the next four decades.

While not seen as a major part of Australia's GDP, these industries provide employment across both rural and urban Australia.

They sustain rural communities, provide the majority of food consumed in Australia, and underpin our retail and food services industries. They also provide important export earnings, while having important interactions with our environment's water, soil and biodiversity resources.

Research and technological innovation have long been integral to the success of our agricultural and food industries. Our hard-won reputation for high quality, safe and clean food is founded upon this bedrock.

Research and innovation continue to grow in importance, as our industries look to respond to increasing global demand for food. Producers will need to overcome major environmental challenges due to climate change, land degradation and biosecurity threats while also sustaining and increasing rates of productivity growth. Processors will need to remain competitive with low cost competitors and imports.

The science and research priorities for food recognise the need for research into three broad areas: supply chains; barriers to accessing healthy food; and enhanced food production.

Agricultural and food industries are so pervasive in our society that the other eight research priorities – particularly Soil and Water, Transport, Advanced Manufacturing, Environmental Change and Health – will also have significant implications.

A recurring theme across the Food priorities is the integration of knowledge and cutting-edge technologies. This enhances connections between producers and processors to respond to ephemeral market opportunities and changing consumer preferences.

It allows us to better target inputs in production and processing, not only for profitability but also to better manage land, water resources and biodiversity resources. And it enables reduction and reuse of waste streams.

The new research priorities address key issues facing Australian food producers, spanning primary production, post-farm gate manufacturing, distribution and export.

Food safety, stability and shelf life are essential for the export of Australian food products to distant markets across Asia. Research could improve fresh and long life food products, such as yogurt and UHT milk, while new packing and preservation technologies could assist both domestic distribution and export.

Research on provenance and clean, sustainable production could also assist Australian manufacturers to compete on food quality rather than price, potentially accessing higher value markets.

New methods to recover water and byproducts may improve the profitability and sustainability of manufacturing. Food waste could also be reduced and recycled across the supply chain. Energy consumption is not directly mentioned in the Food priorities, but novel technologies could be used to increase energy efficiency, while the Environmental Change priorities may also assist industry adaptation.

The Advanced Manufacturing priority highlights the need to de-risk, scale up and add value to Australian manufactured products – research that could stimulate both product and process innovation. The focus on healthy Australian foods also encompasses some aspects of nutrition.

The priorities are well aligned with the new Food and Agribusiness Growth Centre, which aims to improve access to global supply chains and international markets. The priorities also build on the research networks and strengths established through the Australian Research Council’s Industrial Transformation Research Program, and will allow broad multidisciplinary contributions.

Stephen Powles
Director of the Australian Herbicide Resistance Initiative at the University of Western Australia, and grain farmer, Kojonup, Western Australia.

I applaud and welcome that Food and Soil & Water are among the national research priorities. As never before, food is needed for a rapidly growing world. Australia already is a major food exporter, and being underpinned by research and development, we are
poised to make substantially greater contributions to feeding the world.

Australia has competitive advantages in clean and green high quality grains, dairy and meats for global markets, especially booming Asia. However, there are many challenges and much R&D will be required if we are to sustainably deliver much higher quantities of quality Australian food.

Only through creative R&D will we be able to sustainably lift production from our fragile soil and our very limited water assets. Adverse climate change requires we attain even greater water use efficiency in our rain-fed Australian agriculture.

Conversely, in irrigated agriculture we have much to learn to better use water and to unlock the clear irrigated agricultural potential in northern Australia. Momentum is building to lift food production in northern Australia, and there are real opportunities but many challenges and underpinning R&D is essential.

At the post-farm gate level, Australia must establish how to build, label and capitalise on our clean, green, ethical and nutritious foods. With our high costs, sectors must develop and embrace all technologies to be competitive, including robotics in production and manufactured food items.

In my view, it is research and technologies in precision agriculture and robotics that require greatest attention if Australia is to substantially and sustainably lift food production and help feed the world.

Rachel Ankeny
Professor in the School of Humanities and convener of the Food Values Research Group at the University of Adelaide.

These priorities outline key issues facing the food industry if we view foodstuffs as products and expectations as primarily economic. They call for research on social, economic and other barriers to access to healthy Australian foods, which is to be applauded.

But what is largely missing are the challenges associated with human beings: producers, processors, retailers and distributors of food; consumers who make choices about what to purchase and eat; and policymakers who regulate the industry.

Also lacking is any explicit discussion about food security. In the narrowest sense, Australia is food secure; there is enough food per person on average. But there are deep social, political and pragmatic problems with making nutritious foods available, particularly in remote communities. Hence we experience food insecurity.

To build healthy and resilient communities (also covered in the Health priority), we must use (social) science to investigate the diverse barriers to food access and consumption.

Agricultural communities face challenges to their resilience, in part due to threats to their “social license to operate”. Sectors of the public are increasingly anxious about contemporary agricultural practices and their potential impacts on health, animal welfare and the environment.

They view efforts to make agriculture more efficient and sustainable as in conflict with historic shared values underlying traditional and small-scale family farming.

Hence the call to develop production capacity requires scrutiny not just as a technical problem, but in its broader socio-cultural context. “Sustainable” can refer to environmental, economic, and/or social sustainability. “High intensity” production, and especially novel technologies, are frightening to many and may continue to erode their trust in the food system.

Education alone is not sufficient. Understanding of technological and scientific issues associated with...
agriculture involves a mixture of values, attitudes, and knowledge. Many opportunities exist if we read between the lines of the priorities about the types of research and ingenuity that are required to meet the challenges: social science is needed.

Richard Richards  
Program Leader of the High Performance Crops for Australia group at CSIRO.

Australia has been a world leader when it comes to food production in challenging environments. We have an enviable record, particularly in improving crop water-use efficiency whilst maintaining our clean and green image. The opportunities globally will open up for Australia if we can maintain this record as the challenges ahead globally are immense.

We must double global crop production by 2050 to feed 9 billion people. This must be done on less land area than we currently crop, with less water available and in the face of climate uncertainty. Food produced must not be at the expense of land degradation and it must be affordable, reliable and of high quality.

To achieve the productivity gains required by 2050, we must firstly close the gap between the theoretical potential yield at any location and any season based on temperature, water, sunlight and soil, and the current farm yield. This gap for our major food crops currently varies from 20% to 80%.

We must also aim to increase the potential or theoretical yield by increasing total photosynthesis and biomass. Ideally this will be achieved by increasing crop duration and light capture as well as improving the underlying biochemistry of photosynthesis. This will not only increase potential yield but also water-use efficiency.

This challenge is only achievable if there is additional investment in agricultural research. The rewards for Australia and the world are immense. Continuing economic prosperity for Australia will be one but also important will be reduced malnutrition, poverty, environmental sustainability and improved global stability.

Joanne Daly is CSIRO Fellow, CSIRO.  
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Richard Richards is CSIRO Fellow, CSIRO.  
Sally Gras is Director ARC Dairy Innovation Hub and Associate Professor, University of Melbourne.  
Stephen Powles is Director Australian Herbicide Resistance Initiative, University of Western Australia.

THE CONVERSATION

A hungrier, wealthier, choosier, smarter, riskier world: five challenges for Australian agriculture

Australian agriculture has a bright future, if it can avoid the clouds on the horizon, report Sandra Eady and Stefan Hajkowicz

You don’t need a crystal ball to know Australia’s rural industries will face significant change at global, national and local levels over the coming decades. This will create opportunities and challenges for small and large farms, and will affect rural lifestyles, agricultural landscapes and Australia’s society and economy.

In a new report, we describe this future through a series of interlinked ‘megatrends’ set to hit Australia over the coming 20 years. As we describe below, each prompts some serious questions (or ‘conversation-starters’, as we have termed them) for Australian farmers. We don’t yet know the answers, but we do know they will be crucial for how the industry fares in the future.

The world will get hungrier
We know that the world is going to require more food as populations grow – about 70% more by 2050, according to the United Nations. This will come primarily from increasing yields, along with some expansion of agricultural land.

The target is achievable but should not be taken for granted. There are competing uses of land for biofuels and urbanisation; in some places land is degrading; and we don’t have good predictions yet of the effect of climate change on agriculture. As a significant exporter of food, Australia has a vital role to play in supplying world food markets and buffering supply shocks.

Will farms be able to scale up production and performance to meet this challenge?
What is a sensible investment in innovation, and how should it be funded?

The world will get wealthier
Some 1.02 billion people will move out of poverty and into the middle classes in the developing Asia region alone by 2040. Along with wealth comes the ability to diversify food choices – wealthier households will consume more meat, dairy and vegetable oils.

Is Australia better off focusing on commodity markets that have provided solid export earnings, or should it be working hard to respond to the demand for a more diverse range of boutique, luxury and niche food and fibre goods?

Does Australia have the infrastructure and the persistence to get a wider range of desirable agricultural products into Asian markets competitively?

Customers will get pickier
The consumer of the future will be increasingly able and motivated...
to choose food and fibre products with certain characteristics. This has impacts both within and beyond the farm gate. Information technology will increasingly enable the consumer to access, share and validate information about products along the whole supply chain from farm to fork.

Health is likely to become a particularly prominent driver of food choice and consumption patterns – be that from a desire for food safety or to help prevent chronic disease. Many people’s lives are being cut short by poor diets, and at current trajectories government budgets could become crippled by unsustainable growth in healthcare expenditure.

The issues of environment, provenance and ethics will also play a vital role. The consumer of the future will have greater expectations for these qualities in the food and fibre products they choose to buy. Consumers will be ‘information-empowered’ and rural industries stand to gain or lose market share based on this increase in consumers’ knowledge.

In the face of soaring diet-related health costs, will governments increase control of the components of food and diets?

How does agriculture in Australia build and safeguard its clean, green reputation?

Technologies will transform farm life

Advances in digital technology, genetics and materials science will change the way food and fibre products are created and transported. Many plant productivity breakthroughs will be from gene technology. Big data systems and digital technologies will bring better risk-management approaches to Australian agriculture; weather and yields will be much more predictable and farmers will have sophisticated tools to assist with decision making.

Knowledge about land use and framing practices will increasingly move into the public domain as remote monitoring, be it from drones or satellites, makes available new data in a highly interconnected world. Business and capital models will change with the introduction of ‘disruptive’ technologies such as peer-to-peer lending.

Will market perceptions hold back Australian agriculture by restricting access to advanced technologies being used by our major competitors?

How will farmers manage a higher level of scrutiny of their operations?

The rollercoaster of risks will get bumpier

Risk is an ever-present characteristic of Australian agriculture. However, the coming decades will see changes in the global climate, environmental systems and the world economy which will create new and potentially deeper risks for farmers.

Australian agriculture has shown a strong capacity to adapt and respond to risks in the past. But as trade globalises and we rely more on imported inputs such as fertiliser and fuel, the risk of supply chain shocks increases.

More international trade and passenger travel brings greater biosecurity risks. Climate change impacts are not well understood, and the need to cut greenhouse gas emissions will set up competing land uses for both biofuels and carbon storage.

Do we understand the likely implications of a global price on carbon of US$50-100 per tonne?

Is the agriculture sector at risk of complacency and underinvestment when it comes to risk management?

Overall, there is a bright future for Australian agriculture, laden with deep and diverse opportunity. The future outlined above will be a challenge for some producers and industries but an opportunity for others. The effectiveness with which Australian agriculture captures these opportunities and avoids the risks will largely come down to innovation.

Through centuries past, repeated innovation has allowed Australian farmers to expand into new land areas, develop water resources and increase crop and pasture yields. As we look to the decades ahead, innovation becomes ever more important. In a world of exponential growth in both technology and global trade, it’s about working smarter, not just harder.

Sandra Eady is Principal Research Scientist, CSIRO Agriculture, CSIRO.
Stefan Hajkowicz is Leader – CSIRO Futures, CSIRO.

WORKSHEETS AND ACTIVITIES

The Exploring Issues section comprises a range of ready-to-use worksheets featuring activities which relate to facts and views raised in this book.

The exercises presented in these worksheets are suitable for use by students at middle secondary school level and beyond. Some of the activities may be explored either individually or as a group.

As the information in this book is compiled from a number of different sources, readers are prompted to consider the origin of the text and to critically evaluate the questions presented.

Is the information cited from a primary or secondary source? Are you being presented with facts or opinions?

Is there any evidence of a particular bias or agenda? What are your own views after having explored the issues?

CONTENTS

BRAINSTORM 54
RESEARCH ACTIVITIES 55
MULTIPLE CHOICE 56
Brainstorm, individually or as a group, to find out what you know about farming and agriculture in Australia.

1. What is agriculture?

__________________________________________________________________________

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2. Briefly explain the economic, environmental and cultural significance of agriculture to Australia.

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3. What economic and environmental factors impact on annual farm production in Australia?

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__________________________________________________________________________
Complete the following activity on a separate sheet of paper if more space is required.

There have been many changes in farming methods over the last 200 years and Australian farmers have had to be adaptable as well as resilient and inventive. The challenges of access to fresh water, the legacy of high amounts of fertilisers, massive clearing, over grazing, a tyranny of distance, transport costs and feral animals, have tested Australian farmers to their limits.

Australian Government, Australian farming and agriculture – grazing and cropping.

How have Australian farmers responded to these changes? Write a few paragraphs identifying at least three (3) case studies of how these challenges have been met through mechanisation, technology and/or holistic approaches to improve sustainability in agricultural practices.

Drought – a recurring feature of the Australian landscape – is one of the biggest challenges farmers face and has a significant impact on agricultural output, productivity and on-farm incomes.

Department of Agriculture and Water Resources, Drought and rural assistance.

Write a few paragraphs outlining the recorded history of major droughts in Australia. Write a few paragraphs identifying the various farm-based, personal and financial struggles farmers and farming communities face in times of drought.
MULTIPLE CHOICE

Complete the following multiple choice questionnaire by circling or matching your preferred responses. The answers are at the end of this page.

1. What percentage of Australia’s total land area is currently used for agriculture?
   a. 20%
   b. 30%
   c. 40%
   d. 50%
   e. 80%
   f. 90%

2. Rank Australia’s 10 major agricultural export products, from highest to lowest, by value:
   a. Alcoholic beverages
   b. Barley
   c. Beef
   d. Fruit and nuts
   e. Live animals (excl seafood)
   f. Meat (excl beef)
   g. Sugars, molasses and honey
   h. Vegetables
   i. Wheat
   j. Wool and other animal hair

3. Rank Australia’s 10 major agricultural export markets, from highest to lowest, by value:
   a. China
   b. Hong Kong
   c. India
   d. Indonesia
   e. Japan
   f. Malaysia
   g. New Zealand
   h. Republic of Korea
   i. United States
   j. Vietnam

6. Respond to the following statements by circling either ‘True’ or ‘False’:
   a. China is the country with the biggest stake in foreign-owned farmland in Australia (2016).
   b. According to the Agricultural Competitiveness White Paper (2015), around 270,000 people are employed in the agricultural sector, with a further 223,000 employed in food, tobacco and beverage manufacturing.
   c. Immigrant workers add substantially to productivity in Australia’s agricultural industry.
   d. Australia’s food supply chain is highly exposed to disruption from increasing weather events driven by climate change.

MULTIPLE CHOICE ANSWERS

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There have been many changes in farming methods over the last 200 years and Australian farmers have had to be adaptable as well as resilient and inventive. The challenges of access to fresh water, the legacy of high amounts of fertilisers, massive clearing, over grazing, a tyranny of distance, transport costs and feral animals, have tested Australian farmers to their limits. In response, farming has become more mechanised and reliant on technologies, as well as holistic as it seeks to become more sustainable (Wells, K, *Australian farming and agriculture – grazing and cropping*). (p.1)

Most of Australia’s land, about two-thirds, is given over to farming production. About 90% of farm land is for grazing cattle and sheep on native pastures, occurring mostly in the arid and semi-arid zones (*ibid*). (p.11)

Even with the forecast decline in 2017-18, the gross value of farm production would be 17.3 per cent higher than the average of $52.3 billion over the five years to 2015-16. The exceptional value of farm production this year (2016) comes off the back of record crop production and strong performance across livestock industries (Department of Agriculture and Water Resources, *Agricultural Commodities, Australia, March 2017*). (p.8)

The average Australian farmer now manages a business with an asset value of close to five million dollars, and is now spending an increasing amount of time managing staff and talking to technical advisors, rather than actually doing all the physical work on the farm (Keogh, M, *The changing face of Australian agriculture*). (p.10)

Careers in farming are increasingly likely to involve roles such as agronomists and animal health advisors, rather than owning and operating a farm as per the ‘traditional’ model that has prevailed over the past fifty years (*ibid*). (p.11)

In 2016, 13.6% of Australia’s farmland was foreign-owned. UK-based investors own 27.5 million hectares or almost 53% of that portion. The United States is the second highest country on the register, followed by the Netherlands with almost 3 million hectares, Singapore with almost 2 million hectares, and China with 1.5 million hectares – or less than 0.5% of total agricultural land across the country. The Philippines, Switzerland, Jersey, Indonesia and Japan round out the top 10 foreign buyers (Barbour, L, *UK top list of foreign investments in Australian farmland; China owns 0.5 per cent, ABC News*). (p.12)

People in rural and remote areas face a range of stresses unique to living outside a major city. These include a greater prevalence of some chronic conditions and disability, and generally poorer health. Rates of smoking, risky drinking and illicit drug use are also higher. There are fewer employment opportunities leading to lower incomes and less financial security. There is greater exposure and vulnerability to natural disasters, while rates of overcrowding, housing stress, and homelessness are higher (National Rural Health Alliance Inc., *Mental health in rural and remote Australia*). (p.22)

While agriculture contributes just 2.3% of GDP, its diminishing importance is not the result of any reduction in output but rather to the growth in manufacturing and the service-based sectors of the economy (Batt, P, *Australia’s five strong pillar economy: agriculture*). (p.24)

Today, more than 307,000 people are employed in agriculture. Agriculture is the biggest employer in rural and regional communities, but if we consider all those employed in the input and output sectors, food manufacturing and processing, distribution and retail, agriculture provides employment for more than 1.6 million Australians (*ibid*). (p.22)

Australia’s 135,000 farmers produce enough food to feed 80 million people. Not only do they provide 93% of the domestic food supply, but it supports an export market valued at more than A$41 billion per annum – that’s over 13% of export revenue (*ibid*). (pp. 24-25)

Agriculture in Australia faces an acute shortage in skilled labour. Our farmers are ageing and the uncertainty in returns associated with year-to-year variations in rainfall and price volatility present an image that too few university graduates find appealing (*ibid*). (p.26)

Australia has reduced its own tariff levels and other trade-distorting protections on agricultural and food products since the early 1970s. Australia’s simple average applied tariff on agriculture is 1.2 per cent. This reinforces a competitive and productive agricultural sector and ensures Australian farmers can provide high quality products to world markets without the high levels of financial support, protection and other trade-distorting practices used by other countries (Department of Foreign Affairs and Trade, *Agriculture*). (p.28)

In its *Agricultural Competitiveness White Paper* (2015), the Government is committed to five key priorities: a fairer go for farm businesses; building 21st century water, transport and communications infrastructure; strengthening our approach to drought and risk management; a smarter approach to farming; and access to premium markets (Commonwealth of Australia, *Agricultural Competitiveness White Paper*). (pp. 30-31)

Australia’s food supply chain is highly exposed to disruption from increasing extreme weather events driven by climate change, with farmers already struggling to cope with more frequent and intense droughts and changing weather patterns (Hughes, L, and Steffen, W, *Feeding a Hungry Nation: Climate change, food and farming in Australia*). (p.42)

We are well positioned – both in terms of geography and comparative advantage – to supply overseas markets. And while Australia can’t hope to feed Asia or the world, with astute R&D investment it can increase production and exports. How well we step up to that challenge depends largely on our ability to maintain a price competitive position and continue to improve yields (Eady, S and Hajkowicz, S, *Hungrier, wealthier, choosier, smarter, riskier world: five challenges for Australian agriculture*). (p.51)
**Agricultural competitiveness**
In its 2015 *Agricultural Competitiveness White Paper*, the Government committed to five key priorities: a fairer go for farm businesses; building 21st century water, transport and communications infrastructure; strengthening our approach to drought and risk management; a smarter approach to farming; and access to premium markets.

**Agricultural exports**
Agriculture makes an important contribution to the Australian economy. Australia is a competitive net agricultural exporter, with around two-thirds of total production exported.

**Agriculture**
Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets. Agriculture provides most of the world’s food and fabrics.

**Biosecurity**
Biosecurity relates to procedures intended to protect humans or animals against disease or harmful biological agents. Farm biosecurity is a set of measures designed to protect a property from the entry and spread of pests and diseases. Biosecurity is a critical part of the government’s efforts to prevent, respond to and recover from pests and diseases that threaten the economy and environment.

**Climate change**
Climate change describes a global change in the balance of energy absorbed and emitted into the atmosphere. This imbalance can be triggered by natural or human processes. It can cause either regional or global changes in weather averages and frequency of severe climatic events.

**Drought**
A prolonged chronic deficiency of water, compared to typical rainfall patterns including seasonal variations during which the soil water content is reduced to such an extent that plants suffer from lack of water.

**Environmental sustainability**
The way we live and make decisions about how we produce and consume. It involves transforming the way we utilise our land, water, mineral and energy resources through a better understanding of human and environmental systems and the use of new technologies. Sustainability is the ability to live life and organise society so as to minimise degradation of the natural environment and not exploit or exhaust the non-renewable resources needed for healthy living.

**Farming**
Farming is the activity or business of growing crops and raising livestock.

**Food security**
When people have access to sufficient, safe and nutritious food that meets their dietary needs for an active and healthy life.

**Free trade**
A situation where there are no artificial barriers to trade imposed by governments for the purpose of shielding domestic producers from foreign competitors.

**Land clearing**
Land clearing destroys plants and local ecosystems, and removes the food and habitats on which native species rely. Land clearing also helps weeds and invasive species to spread, affects greenhouse gas emissions and can lead to soil degradation, including erosion or salinity, which in turn can harm water quality. While land clearing is of significant threat to terrestrial biodiversity, it can also provide economic benefits, such as developing new areas for agriculture, and helps to meet the needs of a growing population.

**Protectionism**
Protection of domestic producers by impeding or limiting the importation of foreign goods and services through government policies that give domestic producers an artificial advantage over foreign competitors. The key methods of protection are: tariffs, subsidies, local content rules, quotas and export incentives.

**Subsidies**
Government grants to businesses to encourage production of a good or service and influence the allocation of resources in an economy. They are often granted to businesses to help them compete with overseas produced goods and services.

**Sustainability**
In agriculture, sustainable practices are those which are, and will remain, profitable for farmers; that will conserve soil and water resources and protect the environment; and that will assure adequate and safe food supplies.

**Sustainable agriculture**
A set of goals or objectives for agricultural systems. It is about managing the land with a healthy ecological balance, a sensitivity to the land’s capabilities, using technologies and practices which have minimal impact while maintaining production and economic viability.

**Tariffs**
Taxes on imported goods imposed for the purpose of protecting Australian industries.

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Websites with further information on the topic

ABC News – Rural  www.abc.net.au/news/rural
Australian Bureau of Statistics  www.abs.gov.au
Australian Farm Institute  http://farminstitute.org.au
Australian Farmers  www.farmers.org.au
Department of Agriculture and Water Resources  www.agriculture.gov.au
National Centre for Farmer Health  www.farmerhealth.org.au
National Farmers’ Federation  www.nff.org.au
National Rural Health Alliance Inc  www.ruralhealth.org.au

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▷ Australian Farm Institute
▷ Australian Bureau of Statistics
▷ Department of Agriculture and Water Resources.

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INDEX

A
Aboriginal and Torres Strait Islander people 1-4, 7, 23, 46

Agricultural Competitiveness White Paper 30, 32-33, 34-35
agriculture 1-23, 24-26, 27-28, 29, 32-33, 34-35, 36-37, 38, 39-41, 46, 49-50
challenges 3, 4, 5-6, 7, 24, 25-26, 49, 51-52
changing face of 10-11
future of 34, 39-41, 47
investment in 14, 16
practices 1, 3-4
role of 30-31, 32

B
barley 7, 8, 27
beef 1, 3, 5, 6, 7, 8, 27, 36, 42, 43
biodiversity 5, 6, 7, 44, 46-47, 48
biosecurity 7, 26, 29, 31, 33, 35, 48, 52

C
cattle 1, 3, 4, 6, 7, 8, 9, 19, 20, 29
China 12-13, 27, 38
climate change 23, 24, 25, 42-43, 45, 46-47, 48, 49, 51, 52
cropping 1-7, 12, 29
crops 1, 3, 4, 6, 9, 14, 25, 42, 46, 47, 48, 50 see also yields

dairy 3-4, 8, 9, 12, 25, 29
debt 14-15, 17, 19, 25
deforestation 5-6, 23, 44-45 see also land clearing
drought 2, 3, 4, 6, 11, 14-15, 16-17, 18-21, 31, 33, 34, 42
assistance 14-15
experiences of 18-21
support 31, 33

economy 1, 6, 7, 13, 17, 24-51
five pillar 24-26, 30
employment 1, 11, 22-23, 24, 31, 39-41, 48 see also workforce
environment 4, 6, 13, 23, 24-51
erosion 3, 5-6, 45
exports 1, 4-5, 8, 14, 25, 27-28, 31
agricultural 25, 27-28, 29
food 5, 7, 27, 33, 36, 48

F
farm
broadacre 10, 14-15
gate 30, 32, 33, 35, 52
management 9, 30
ownership, foreign 12-13
production, value of 1, 8, 31
Farm Household Allowance 16-17
farming 1-7, 16-17, 21, 25, 31, 33, 40, 42-43, 46-47
fire-stick 1, 3
future of 10-11, 34-35, 46-47
holistic 1, 6
methods 1, 6, 7
techniques 2, 7
Farm Management Deposits 32, 34
food
production 7
safety 30, 32, 33
security 24, 27, 28, 42
supply 7, 25
free trade agreements 25, 36-37, 38
fruit 2, 3-4, 9, 27, 42

G
grains 1, 25, 26, 29
greenhouse gas emissions 46, 52

H
horticulture 3, 25, 40

I
imports 5, 25, 29-31, 36, 48
agricultural 29-31, 36-37, 42
food 36-37
Indigenous Australians see Aboriginal and Torres Strait Islander people
insurance 33, 34-35
investment
agricultural 12-13, 28, 30, 50, 51
foreign 12-13, 14, 30, 32
irrigation 4, 19, 20, 49

L
lamb 5, 8, 9, 43
land
clearing 1, 2, 7, 23, 44-45, 46 see also deforestation
degradation 48, 50, 51
management 3, 6-7
ownership, foreign 12-13
use 9, 46-47, 52
livestock 1-3, 8, 9, 12, 14, 16-17, 29, 42, 45, 46

M
market gardeners 2, 3
meat 9, 25, 27
mental health 22-23
migrant workers 39-41
mutton 2, 5, 8

N
natural resource management 6, 26
nuts 3-4, 9, 27

P
pests 1, 5-6, 14, 33, 45
policy 5, 27, 30-31, 39, 49
primary producers 5, 18, 48

R
rabbits 5-6
risk management 31, 33, 52

S
salinity 3, 5, 6
sheep 1, 3, 4, 5, 7, 8, 9, 19, 29
subsidies 4, 16-17, 27-28, 46
case against 16-17
export 27-28
sugar 4, 7, 8, 25, 27
suicide 22-23
supply chain 26, 30, 35, 42, 43, 52
sustainability 5, 6, 26, 48-50

T
tariffs 4-5, 25, 27, 28, 38
reducing 27, 28
technology 6, 7
advances in 31, 33, 51-52
trade 2, 5, 25, 27, 28, 29, 33, 35, 36-37, 38, 52
balance of 36-37
free 25, 36-37, 38
global 28, 29, 31, 52
transport 4, 16-17, 31, 32, 43, 52
costs 1, 3

U
United Kingdom 12-13

V
vegetables 2, 3, 9, 27, 42
visas 39-41

W
water 4, 5, 6, 7, 16-17, 18-21, 31, 32, 33, 42, 46, 47, 48-49, 50, 52
access 1, 4, 6, 19
availability 4, 29
management 7, 47, 48
wheat 1, 2, 3, 7, 8, 9, 27
belt 3, 15
wool 1, 4, 5, 6, 8, 25, 27
industry 2, 5
workers
Aboriginal 1, 2, 4
migrant 39-41
workforce 1, 11, 30, 31, 39-41 see also employment

Y
yields, crop 9, 42, 43, 48-49, 50, 51, 52
see also crops

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