Australian grains
Outlook for 2016–17 and industry productivity
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Overview

This publication summarises the forecasts presented in the December 2016 editions of ABARES
*Australian crop report* (ABARES 2016b) and *Agricultural commodities* (ABARES 2016a) as well
as material from an ABARES report on productivity in the Australian grains industry released in
October 2016 (Ashton, Oliver & Valle 2016). This publication was commissioned by the Grains
Research and Development Corporation (GRDC).

The world wheat indicator price (US no. 2 hard red winter, fob Gulf) is forecast to fall by
14 per cent in 2016–17 to average US$182 a tonne. The world indicator price continues to face
downward pressure from record high global supplies. The margin between the prices of milling
wheat grades and feed wheat grades is expected to grow in 2016–17 because of a forecast global
abundance of low-protein wheat.

The world coarse grain indicator price (US no. 2 yellow corn, fob Gulf) is forecast to average
8 per cent lower in 2016–17 at US$154 a tonne. The world indicator price for barley (France
feed barley, fob Rouen) is forecast to average 9 per cent lower at US$158 a tonne. Global coarse
grain production is forecast to reach record highs in 2016–17 and exceed world consumption,
despite world consumption (particularly for feed) increasing to record levels. Closing stocks are
forecast to grow and place downward pressure on prices.

The world oilseed indicator price (US no. 2 soybeans, fob Gulf) is forecast to average higher in
2016–17 (July to June) at US$390 a tonne. This is mainly the result of lower soybean supplies in
South America. The world canola indicator price (Europe Rapeseed, fob Hamburg) is forecast to
rise by 2 per cent in 2016–17 (July to June) to US$425 a tonne, reflecting a significant production
shortfall in the European Union and a forecast fall in supplies (production plus opening stocks)
in major exporting countries.

Favourable seasonal conditions in most cropping regions during spring boosted the production
potential of crops, which were generally in very good condition at the end of winter. Rainfall in
September was well above average in most regions in the eastern states (including South
Australia). This resulted in plentiful supplies of soil moisture available to crops during the
critical period for grain development. However, in some areas the September rainfall resulted in
flooding and waterlogged crops, adversely affecting grain development. In Western Australia,
spring rainfall was average to slightly below average, but timely, and aided grain development.
However, severe frosts adversely affected grain development in some growing regions.

Total Australian winter crop production is forecast to increase by 32 per cent in 2016–17 to a
new record high of 52.4 million tonnes, with higher production forecast for every state. For the
major winter crops, ABARES forecasts wheat production to rise by 35 per cent to a record high
of 32.6 million tonnes, barley production to rise by 24 per cent to a record high of 10.6 million
tonnes and canola production to rise by 22 per cent to 3.6 million tonnes, which would be the
third-highest on record. Among winter pulses, chickpea production is forecast to rise by
21 per cent to a record high of 1.2 million tonnes as a result of an estimated increase in planted
area and a forecast rise in the average yield.

The Bureau of Meteorology indicated in its latest three-month rainfall outlook (December 2016
to February 2017), issued on 24 November 2016, that the summer was likely to be drier and
warmer than average. This should aid harvesting of winter crops.
Total area planted to summer crops is forecast to rise by 15 per cent in 2016–17 to around 1.4 million hectares. Producers are expected to increase planted area in response to favourable levels of soil moisture early in the planting window and plentiful supplies of irrigation water. Total summer crop production is forecast to rise by 21 per cent in 2016–17 to around 4.6 million tonnes. However, area planted to grain sorghum is forecast to fall by 31 per cent in 2016–17, reflecting higher expected returns from growing cotton.

Productivity in the Australian cropping industry reflects improvements in the efficiency with which inputs such as land, labour and capital are used to produce crop outputs. The cropping industry recorded the second-highest total factor productivity growth—at 1.8 per cent—of all broadacre industries between 2000–01 and 2013–14. Key drivers of cropping industry productivity growth include larger machinery and cropping equipment, new plant varieties, better water management and a better understanding of harvesting and planting strategies.
1 World outlook

Wheat

The world wheat indicator price (US no. 2 hard red winter, fob Gulf) is forecast to fall by 14 per cent in 2016–17 to average US$182 a tonne. The world indicator price continues to face downward pressure from record high global supplies. The margin between the prices of milling wheat grades and feed wheat grades is expected to grow in 2016–17 because of a forecast global abundance of low-protein wheat.

World wheat production is forecast to rise by 2 per cent to a record high of 750 million tonnes in 2016–17. Record average yields are expected to more than offset a forecast reduction in planted area. Higher yields and unfavourably wet conditions during grain fill and harvest adversely affected the protein and moisture levels in some northern hemisphere production regions, resulting in a greater proportion of wheat production failing to meet milling grade specifications.

World wheat consumption is forecast to increase by 2 per cent to 736 million tonnes in 2016–17. Human consumption is forecast to increase by 1 per cent to 494 million tonnes, in line with population growth. In 2016–17 feed wheat consumption is expected to rise by 3 per cent to 150 million tonnes. The abundance of low-protein wheat has put downward pressure on feed wheat prices, which is expected to drive global feed wheat use to the second-highest on record. However, the increase in feed wheat use is likely to be constrained by competition from other feed grains such as corn and barley, which are also expected to be in abundant supply in 2016–17.

World wheat trade is forecast to be 166 million tonnes in 2016–17, largely unchanged from the 2015–16 record. Most of the major exporting countries are forecast to have ample supplies available for export, but total world imports are expected to remain largely unchanged. Increased wheat imports in countries including Egypt, India, Morocco and Turkey are expected to be largely offset by lower imports into Indonesia and Sub-Saharan African countries.

Global wheat production is forecast to outpace global consumption in 2016–17, and closing world wheat stocks are forecast to increase by 6 per cent to a record 235 million tonnes. Stocks held in the major exporting countries are forecast to increase by 14 per cent in 2016–17, which would make it the fourth consecutive year of growth. Stocks in China are forecast to increase by 16 per cent in 2016–17 and comprise 39 per cent of world closing stocks. Stocks in the rest of the world are forecast to fall by 9 per cent.

Coarse grains

The world coarse grain indicator price (US no. 2 yellow corn, fob Gulf) is forecast to average 8 per cent lower in 2016–17 at US$154 a tonne. The world indicator price for barley (France feed barley, fob Rouen) is forecast to average 9 per cent lower at US$158 a tonne. Global coarse grain production is forecast to reach record highs in 2016–17 and exceed world consumption, despite world consumption (particularly for feed) increasing to record levels. Closing stocks are forecast to grow and put downward pressure on prices.
World production of coarse grains is forecast to increase by 6 per cent in 2016–17 to a record 1 323 million tonnes. Forecast strong growth in corn production in many countries, particularly the United States and Brazil, will more than offset a small expected fall in global production of barley. World corn production is forecast to increase by 7 per cent in 2016–17 to a record 1 031 million tonnes. Corn production is forecast to increase in all major producing countries except China. In 2016–17 corn production in China is estimated to have fallen by almost 10 million tonnes to 216 million tonnes. Area planted to corn fell in response to the Chinese Government’s March 2016 removal of the corn price support scheme in an effort to reduce corn stocks. World barley production is forecast to fall by 3 per cent in 2016–17 to 144 million tonnes, driven by falls in harvested area in the major northern hemisphere growing regions and in Argentina.

World coarse grain consumption is forecast to increase by 3 per cent in 2016–17 to 1 303 million tonnes, largely reflecting an expected increase in corn consumption. World consumption of corn is forecast to increase by 3 per cent in 2016–17 to 1 billion tonnes, largely because of expected growth in animal feed use. However, the increase will be constrained by competition from abundant supplies of low-priced feed wheat. World barley consumption is forecast to remain fairly flat in 2016–17 at 146 million tonnes. Barley consumption in China is expected to fall as a result of domestic corn prices becoming more price competitive against imported feed grains, while consumption in the European Union is forecast to increase with an expected increase in feed use.

World trade in coarse grains is forecast to increase by 12 per cent in 2016–17 to 182 million tonnes. Increased corn exports driven by the United States and Argentina are expected to more than offset forecast falls in barley and grain sorghum exports. The forecast fall in barley exports reflects an expected large fall in import demand in China as livestock producers switch to domestic corn for animal feed.

World coarse grain closing stocks are forecast to increase by 4 per cent in 2016–17 to 254 million tonnes. A forecast increase in closing stocks of corn is expected to exceed forecast falls in closing stocks of barley and grain sorghum. Closing stocks of corn in China are forecast to fall by 6 per cent because of an estimated fall in production and a forecast increase in consumption following the removal of price support mechanisms.

**Oilseeds**

The world oilseed indicator price (US no. 2 soybeans, fob Gulf) for 2016–17 (July to June) is forecast to rise by 5 per cent to average US$390 a tonne. This is mainly the result of lower soybean supplies in South America and a higher world price in the first quarter of the year compared with the previous year.

The world canola indicator price (Europe Rapeseed, fob Hamburg) is forecast to rise by 2 per cent in 2016–17 (July to June) to US$425 a tonne, reflecting a significant production shortfall in the European Union and a forecast fall in supplies (production plus opening stocks) in major exporting countries. These factors are expected to outweigh a forecast fall in imports into China resulting from an expected run-down in vegetable oil stocks in that country.
World oilseed production is forecast to rise by 6 per cent in 2016–17 to 551 million tonnes, primarily reflecting an expected increase in soybean production. Production of most other oilseeds and palm oil is also expected to rise. In contrast, world rapeseed (including canola) production is forecast to fall by 3 per cent to 67 million tonnes in 2016–17, largely because of a fall in production in the European Union and Ukraine resulting from unfavourable seasonal conditions.

World oilseed consumption (mainly crush) is forecast to rise by 3 per cent in 2016–17 to 544 million tonnes, largely because of an expected increase in the consumption of soybeans. The United States is one of the largest consumers of soybeans. In 2016–17 its soybean consumption is forecast to rise by 3 per cent to 57 million tonnes because of strong demand for meal and oil. The increase in demand for meal is expected to be driven by livestock production and for oil by increases in human consumption and biodiesel production.

In contrast to soybeans, world consumption of rapeseed (including canola) is forecast to fall by 3 per cent to 68 million tonnes—reflecting lower supplies available for crushing. The consequent fall in canola oil production is forecast to be partially offset by an expected increase in production of oil from other oilseeds and oil palm fruit.

World oilseed exports are forecast to increase by 3 per cent in 2016–17 to 158 million tonnes—reflecting higher world demand, the forecast growth in global crush and an expected increase in soybean production in major exporting countries. World soybean exports are forecast to increase by 4 per cent in 2016–17 to 137 million tonnes, with a forecast rise in soybean meal demand in China expected to be met by higher production in Brazil and the United States. Rapeseed (including canola) exports are forecast to fall by 6 per cent in 2016–17 to 14 million tonnes because of a forecast fall in supplies (opening stocks and production) in Canada and Ukraine.

World closing stocks of oilseeds are forecast to rise by 8 per cent in 2016–17 to 96 million tonnes, driven by a forecast 7 per cent increase in soybean stocks to 83 million tonnes. World rapeseed (including canola) closing stocks are forecast to fall by 12 per cent to 6 million tonnes. This reflects the decline in EU production, which is expected to result in a drawdown in stocks.
2 Australian crop prospects

Favourable seasonal conditions in most cropping regions during spring boosted the production potential of crops, which were generally in very good condition at the end of winter. Rainfall in September was well above average in most broadacre cropping regions of New South Wales, Victoria, Queensland and South Australia, which resulted in plentiful supplies of soil moisture being available to crops during the critical period for grain development. Mild temperatures during late spring helped extend this critical development period. However, in some areas the September rainfall resulted in flooding and waterlogged crops, adversely affecting grain development. In Western Australia, spring rainfall was average to slightly below average but timely and aided grain development. However, severe frosts adversely affected grain development in some growing regions.

By late spring, harvesting was underway in most cropping regions. However, this was around one month later than usual as a result of wet and cool spring conditions slowing crop development.

The Bureau of Meteorology indicated in its latest three-month rainfall outlook (December 2016 to February 2017), issued on 24 November 2016, that summer was likely to be drier and warmer than average. This should aid harvesting.

Total Australian winter crop production is forecast to increase by 32 per cent in 2016–17 to a new record high of 52.4 million tonnes, with higher production forecast for every state. This forecast represents a 14 per cent upward revision from the forecast ABARES published in the September 2016 edition of Australian crop report.

For the major winter crops: wheat production is forecast to rise by 35 per cent to a record high of 32.6 million tonnes; barley production is forecast to rise by 24 per cent to a record high of 10.6 million tonnes; and canola production is forecast to rise by 22 per cent to 3.6 million tonnes, which would be the third-highest on record.

Among winter pulses, chickpea production is forecast to rise by 21 per cent to a record high of 1.2 million tonnes as a result of an estimated increase in planted area and a forecast rise in the average yield. Producers increased planted area in response to favourable prices earlier in the year. Crop losses resulted from severe spring storms in key growing regions, but this is expected to be more than offset by high yields in unaffected regions.

Total area planted to summer crops is forecast to increase by 15 per cent in 2016–17, reflecting favourable levels of soil moisture early in the planting window and plentiful supplies of irrigation water. However, late planting of summer crops in central Queensland is expected to be limited because warm and dry conditions in late spring reduced soil moisture levels. Area planted to grain sorghum is forecast to fall by 31 per cent in 2016–17 to 471 000 hectares, the lowest in 24 years. This reflects higher expected returns from growing cotton.

Total summer crop production is forecast to increase by 21 per cent to around 4.6 million tonnes, primarily reflecting expected increases in cotton and rice production. Grain sorghum production is forecast to fall by 29 per cent to 1.4 million tonnes.
## Table 1 Winter crop production, Australia, 2011–12 to 2016–17

<table>
<thead>
<tr>
<th>Crop</th>
<th>Unit</th>
<th>New South Wales</th>
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<th>Queensland</th>
<th>South Australia</th>
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<td>16 126</td>
<td>52 437</td>
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</table>

f ABARES forecast. s ABARES estimate.

Note: Includes barley, canola, chickpeas, faba beans, field peas, lentils, linseed, lupins, oats, safflower, triticale and wheat. Total for Australia also includes small volumes in Tasmania, the Northern Territory and the Australian Capital Territory.
3 Seasonal conditions

Conditions during winter and early spring were wetter than average in most regions in 2016, mainly because of a strong negative phase of the Indian Ocean Dipole and La Niña–like conditions. The Bureau of Meteorology described this in its Special climate statement 58—record September rains continue wet period in much of Australia (BOM 2016).

Temperatures during winter 2016 were generally close to average for most cropping regions, but cold conditions in Western Australia during September resulted in severe frost events in some regions. Mild temperatures and abundant soil moisture levels during October and early November added up to a month to the growing season across much of eastern Australia.

Rainfall for November was generally below average across most cropping regions (Map 1). The main exceptions were cropping regions in southern New South Wales and eastern Victoria, where rainfall was close to average. November rainfall was drier than average across summer cropping regions in Queensland and northern New South Wales, with rainfall for most regions at between 20 per cent and 40 per cent of the November average. In contrast, some parts of summer cropping regions in southern New South Wales received above average rainfall.

Map 1 Rainfall percentages, Australia, November 2016

Note: Rainfall percentages are displayed for wheat–sheep zone only. Spatial rainfall percentage analyses are based on historical monthly rainfall data provided by the Bureau of Meteorology. Percentages between 0 per cent and 100 per cent indicate lower than average rainfall, and percentages greater than 100 per cent indicate higher than average rainfall. Rainfall percentage maps are generated from monthly means, which were calculated for each calendar month from 1961 to 1990.
Source: Bureau of Meteorology
Map 2 and Map 3 show the relative levels of modelled upper layer (surface to 0.1 metres) and lower layer (~0.1 to ~1 metre) soil moisture for cropping zones across Australia as at 27 November 2016. Upper layer soil moisture responds quickly to seasonal conditions and often shows a pattern that reflects rainfall and temperature events in the days leading up to the analysis date. Lower layer soil moisture is a larger, deeper store that is slower to respond to seasonal conditions and tends to reflect the accumulated effects of events over longer periods.

As at 27 November 2016, upper layer soil moisture was well below average to extremely low for summer cropping regions in southern Queensland and northern New South Wales (Map 2). Conversely, upper layer soil moisture was average to above average in southern New South Wales and the northern cropping zone in Queensland.

As at 27 November 2016, lower layer soil moisture was close to average in Queensland summer cropping regions—with the exception of extremely low levels in north-eastern regions. In New South Wales, lower layer soil moisture was generally above average in summer cropping regions (Map 3). Crop development in areas of above-average lower layer soil moisture will be less reliant on rainfall during summer.
The latest Bureau of Meteorology rainfall outlook for summer 2016–17 indicates that drier than average conditions are more likely for summer cropping regions in New South Wales and Queensland (Map 4).

The temperature outlook shows that summer 2016–17 is likely to be hotter than average in cropping regions in New South Wales and Queensland. The combination of hotter and drier conditions may increase the risk of moisture stress for summer crops in areas where soil moisture levels are already limited.
Map 4 Rainfall outlook, New South Wales and Queensland, December 2016 to February 2017

Note: Rainfall outlook is displayed for summer cropping regions only. Shows the likelihood of exceeding the 1981–2010 median rainfall. Median rainfall is defined as the 50th percentile calculated from the 1981–2010 reference period.
Source: Bureau of Meteorology
4 Crop conditions and production by state

New South Wales

Many cropping regions in New South Wales had above average rainfall in September, after a wetter than average winter in most parts of the state. This rainfall increased soil moisture levels, which is expected to result in record high yields in many regions. However, in some areas, the above average rainfall resulted in flooding and waterlogged crops, particularly in central and southern New South Wales. Yields and crop quality in these areas are expected to be adversely affected by the wet conditions.

Total winter crop production in New South Wales is forecast to increase by 32 per cent in 2016–17 to a record high of 15.0 million tonnes. Production of wheat and barley is expected to rise, reflecting the record high yields expected for these crops in many regions. Protein levels for wheat crops harvested to date have been unexpectedly good given the conditions, while much of the barley crop harvested to date has been feed grade. For canola, earlier-sown crops in well-drained areas tolerated the wetter than average seasonal conditions better than later sown crops and crops that were inundated, which were also adversely affected by disease. In some cases, inundated crops were totally lost.

Area planted to summer crops in New South Wales is forecast to increase by 51 per cent in 2016–17 to around 658 000 hectares, reflecting a significant increase in area planted to cotton as a result of higher expected returns relative to sorghum. Area planted to grain sorghum is forecast to fall by 17 per cent in 2016–17 to 150 000 hectares. Total summer crop production is forecast at 2.6 million tonnes in 2016–17, and grain sorghum production is forecast to fall by 18 per cent to 480 000 tonnes.

The Bureau of Meteorology, in its latest three-month rainfall outlook (December 2016 to February 2017), issued on 24 November 2016, forecast a 70 per cent to 80 per cent chance of below average rainfall across most of eastern Australia. Summer temperatures are forecast to be warmer than average. Drier and warmer seasonal conditions may negatively affect dryland summer crops.

Queensland

Winter crops in Queensland have benefited from mostly favourable seasonal conditions throughout the growing season. September rainfall was above average to very much above average in almost all of the state’s cropping regions, which boosted yields in central and south-west Queensland. However, flooding in parts of south-east Queensland reduced yields and in some instances resulted in total crop loss.

Total winter crop production in Queensland is forecast to rise by 25 per cent in 2016–17 to 2.7 million tonnes, largely driven by a record high area planted to chickpeas and above average yields in central and south-west Queensland. Yields in south-east Queensland were closer to average. Total area planted to winter crops rose by 4 per cent to 1.3 million hectares.
Area planted to summer crops in Queensland is forecast to fall by 6 per cent in 2016–17 to 681 000 hectares. Area planted to grain sorghum is expected to fall by 36 per cent in 2016–17 to 320 000 hectares. A significant increase in supply of irrigation water available to cotton growers and higher expected returns from growing cotton are expected to result in a significant shift in planted area from grain sorghum to cotton. The recent reduction in soil moisture and an assumed hotter and drier summer are expected to curb plantings in the latter half of the planting window. Total summer crop production is forecast to fall by 10 per cent to 1.9 million tonnes. Grain sorghum production is forecast to decrease by 34 per cent to just under 1 million tonnes. The Bureau of Meteorology, in its latest three-month outlook (December 2016 to February 2017), issued on 24 November 2016, forecast a 75 per cent to 80 per cent chance of below average rainfall and hotter than average temperatures.

Victoria

Seasonal conditions in the major cropping regions in Victoria were very favourable for crop development during spring. Spring rainfall was above average, which increased soil moisture levels, and temperatures were cooler than average. However, waterlogging and lodging (fallen crops) adversely affected crops in some regions. Frost events adversely affected some crops in frost-prone regions, but this is not expected to affect state production significantly.

Russian wheat aphids were first detected in western Victoria in early June but wet and cool conditions resulted in low insect numbers, which had little impact on the wheat crops.

Total winter crop production in Victoria is forecast to double in 2016–17 to 8.7 million tonnes, largely driven by expected large increases in average yields from the low yields of the previous season. Planted area is estimated to have increased by around 2 per cent to 3.3 million hectares.

Seasonal conditions were ideal for producing a high volume of grain in Victoria. However, the longer than average growing season and forecast high yields for wheat and barley crops are expected to result in below average protein levels this year. This is expected to be partially offset by the use of residual nitrogen in the soil left over from last year’s poor crop. Statewide average screenings are not expected to be high this season, which benefits overall quality.

Canola crops were also prone to damage from lodging because of shallow root systems. Disease pressures, including blackleg and sclerotinia stem rot, were high because of prolonged wet conditions during flowering and a shortage of fungicide in the south of Victoria.

South Australia

Seasonal conditions were very favourable during spring and boosted prospective yields of winter crops in South Australia. Spring rainfall was very much above average, particularly during September.

Seasonal conditions were generally favourable in South Australia, but spring weather events adversely affected crops in some regions. These included several frost events and two severe storms with strong winds, hail and heavy rainfall. However, the effect of these events on state production is expected to be minimal.

Total winter crop production in South Australia is forecast to increase by 37 per cent in 2016–17 to 9.8 million tonnes, primarily driven by expected large increases in average yields. Planted area is estimated to have increased by 2 per cent to 3.6 million hectares.
Quality in early harvested crops is generally around average and this is expected to continue. Protein levels were not significantly affected by the long maturing period and large yields. Some discolouration is expected in some early sown cereal crops but this is not expected to be significant across the state. Seasonal conditions have been favourable for high oil content canola.

**Western Australia**

Spring rainfall in Western Australia was average to below average but timely and supported winter crop prospects. Below average maximum and minimum temperatures resulted in crops developing over a longer than average period, which is expected to boost yields in most regions. However, severe frosts in September adversely affected grain development in some areas, particularly in the south-eastern parts of the central cropping zone. Some locations recorded their lowest September temperatures on record and frost on around 15 days in September and October. Crops further south were less affected by these frost events because they were less developed and less susceptible to frost damage at the time.

Total winter crop production in Western Australia is forecast to increase by 10 per cent in 2016–17 to 16.1 million tonnes, driven by expected increases in average yields. The average yields for wheat and barley are both forecast to increase but the higher average yield for barley will be offset by a reduction in planted area. Canola prospects were less affected by frost than those of wheat, barley and oat crops. Early harvested yields and oil content were high, particularly in the northern cropping zone.
Table 2 Australian crop production, 2014–15 to 2016–17

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area planted</th>
<th>Yield</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>12 934</td>
<td>12 384</td>
<td>12 793</td>
</tr>
<tr>
<td>Barley</td>
<td>3 872</td>
<td>4 078</td>
<td>4 105</td>
</tr>
<tr>
<td>Canola</td>
<td>2 741</td>
<td>2 897</td>
<td>2 357</td>
</tr>
<tr>
<td>Chickpeas</td>
<td>525</td>
<td>425</td>
<td>661</td>
</tr>
<tr>
<td>Faba beans</td>
<td>191</td>
<td>164</td>
<td>282</td>
</tr>
<tr>
<td>Field peas</td>
<td>250</td>
<td>237</td>
<td>238</td>
</tr>
<tr>
<td>Lentils</td>
<td>186</td>
<td>189</td>
<td>232</td>
</tr>
<tr>
<td>Lupins</td>
<td>492</td>
<td>443</td>
<td>490</td>
</tr>
<tr>
<td>Oats</td>
<td>772</td>
<td>854</td>
<td>832</td>
</tr>
<tr>
<td>Triticale</td>
<td>104</td>
<td>82</td>
<td>117</td>
</tr>
<tr>
<td>Summer crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum b</td>
<td>650</td>
<td>732</td>
<td>681</td>
</tr>
<tr>
<td>Cottonseed c</td>
<td>380</td>
<td>197</td>
<td>270</td>
</tr>
<tr>
<td>Cotton lint c</td>
<td>380</td>
<td>197</td>
<td>270</td>
</tr>
<tr>
<td>Rice (paddy)</td>
<td>77</td>
<td>70</td>
<td>23</td>
</tr>
<tr>
<td>Corn (maize)</td>
<td>65</td>
<td>60</td>
<td>67</td>
</tr>
<tr>
<td>Sunflower</td>
<td>25</td>
<td>25</td>
<td>23</td>
</tr>
</tbody>
</table>

a Five-year average to 2015–16. b Grain sorghum. c Cotton area is estimated harvested area. f ABARES forecast. s ABARES estimate.

Note: Crop year refers to crops planted during the 12 months to 31 March.

Sources: ABARES; Australian Bureau of Statistics; Pulse Australia
5 Productivity in Australia’s cropping industry

Productivity is an important measure of performance for the Australian cropping industry because it reflects improvements in the efficiency with which inputs such as land, labour and capital are used in crop production. Productivity growth is important for maintaining international competitiveness and profitability given long-term declines in Australian farmers’ terms of trade.

Productivity growth is determined as an increase in output beyond any associated increase in input (or a decrease in the quantity of inputs needed to produce a unit of output). ABARES measures productivity using total factor productivity (TFP), which takes into account the full range of inputs and outputs that are generated on farm. Productivity growth is generally measured over the long term because it is treated as an indicator of technological progress, which can involve significant time lags in on-farm implementation and realised benefits. Further, short-term variability in productivity can reflect seasonal conditions rather than shifts in underlying technology or efficiency.

Drivers of productivity within the cropping industry include climate conditions, structural adjustment, research and development, increasing farm size and management ability. For the cropping industry to achieve ongoing productivity growth, it must be able to continue adopting new technologies and management practices that generate improvements in efficiency.

Trends in cropping industry productivity

The cropping industry has the highest long-term TFP growth of all industries and, with the exception of the sheep industry, had the highest productivity growth in the past decade. Average TFP growth of cropping specialists (1.5 per cent a year) exceeded that for mixed crop–livestock (0.9 per cent a year) between 1977–78 and 2013–14 (Table 3).

Table 3 Input, output and total factor productivity growth, broadacre cropping industries, by region, Australia, 1977–78 to 2013–14

<table>
<thead>
<tr>
<th>Region</th>
<th>Input growth (%)</th>
<th>Output growth (%)</th>
<th>Productivity growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropping specialists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1.1</td>
<td>2.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Southern region</td>
<td>1.0</td>
<td>2.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Northern region</td>
<td>0.6</td>
<td>1.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Western region</td>
<td>2.2</td>
<td>3.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Mixed crop–livestock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>–1.7</td>
<td>–0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Southern region</td>
<td>–1.5</td>
<td>0.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Northern region</td>
<td>–1.4</td>
<td>–1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Western region</td>
<td>–2.4</td>
<td>–1.3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: ABARES Australian Agricultural Grazing Industries Survey
The Grains Research and Development Corporation (GRDC 2016) identifies three broad grain growing regions: northern, southern and western. The regions are differentiated by their climate conditions, soil types and farming characteristics. Productivity growth in the southern region averaged 1.9 per cent a year between 1977–78 and 2013–14 (Table 3). This was driven by strong output growth that outpaced growth in input use. Average productivity growth in the northern and western regions was slightly slower, at 1.4 per cent a year on average, although the drivers of this growth were different between the regions. In the western region, productivity growth was driven by a relatively large expansion in output and input use; in the northern region, growth in inputs and outputs was somewhat more constrained.

Despite periods of adverse climatic conditions driving short term fluctuations in cropping industry productivity (Figure 1), total output from specialist cropping farms grew on average at around 2.6 per cent a year over the period 1977–78 to 2013–14, as a result of increasing input use (1.1 per cent a year) and productivity growth (Table 3). In contrast, total output from mixed crop–livestock farms declined by 0.8 per cent a year between 1977–78 and 2013–14, driven by a significant decline in input use (1.7 per cent a year) and partly offset by productivity gains. This slowing of growth reflects a shift in the broadacre sector away from mixed crop–livestock enterprises towards more specialised cropping or livestock operations.

Figure 1 Input, output and total factor productivity growth, cropping specialists, Australia, 1977–78 to 2013–14

Source: ABARES Australian Agricultural and Grazing Industries Survey

Jackson (2010) and Knopke, O’Donnell and Shepherd (2000) attributed productivity growth in the cropping industry to developments in technology such as larger machinery and cropping equipment, new plant varieties, better water management and a better understanding of harvesting and planting strategies.

In some regions, productivity growth in the cropping industry has been constrained by land degradation, such as dryland salinity and loss of top soil, as well as increased cropping in more marginal growing areas. Consequently, the level of output has reduced given the same amount of inputs. Resistance of weeds and pests to herbicides and pesticides can also constrain productivity growth.
The cropping and mixed crop–livestock industries had much higher productivity growth between 1977–78 and 1988–89 than in the two subsequent decades (Figure 2). This has been attributed to drought, the slower spread of new technology, a decline in the increment of technological progress, knowledge constraints, the loss of a profitable break crop and broader focus for research and development investment beyond productivity-related factors.

Figure 2 Productivity growth, by broadacre industry, 1977–78 to 2013–14

Source: ABARES Australian Agricultural and Grazing Industries Survey
References

Unless otherwise indicated, ABARES publications listed here are available at agriculture.gov.au/abares/publications.


