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Australian grains Outlook for 2014–15 and industry productivity

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Overview

This publication summarises the forecasts presented in the September 2014 editions of ABARES *Australian crop report* and *Agricultural commodities* (ABARES 2014a and b).

The world wheat indicator price (US no. 2 hard red winter, fob Gulf) is forecast to average US\$285 a tonne in 2014–15, compared with US\$317 a tonne in 2013–14. The world supply of wheat is forecast to increase in 2014–15, driven by an increase in opening stocks. World wheat production is forecast to be largely unchanged.

The world coarse grains indicator price (US no. 2 yellow corn, fob Gulf) is forecast to average 16 per cent lower in 2014–15 at \$US185 a tonne. The world indicator price for barley (France feed barley, fob Rouen) is forecast to average 15 per cent lower in 2014–15 at \$US205 a tonne. These forecast lower prices largely reflect expected weak growth in demand for coarse grains and near record production in 2014–15. World stocks are forecast to be their highest in 15 years.

The world oilseeds indicator price (US soybeans, fob Gulf) is forecast to fall by 16 per cent in 2014–15 to average US\$460 a tonne, which if realised will be 14 per cent below the five-year average to 2013–14 in real terms (2014–15 US dollars). This forecast fall primarily reflects expected record supplies of soybeans.

The world canola indicator price (Europe rapeseed, fob Hamburg) is forecast to decline by 16 per cent in 2014–15 to average US\$440 a tonne. Forecast weaker soybean prices are expected to place significant downward pressure on canola prices as a result of substitution, despite a forecast decline in world canola production.

After a generally favourable opening to the 2014–15 Australian winter crop season, conditions over winter were mixed, resulting in mixed crop prospects. Production is forecast to increase in New South Wales but fall in Queensland, Victoria, South Australia and Western Australia.

For Australia as a whole, total winter crop production is forecast to fall by 12 per cent in 2014–15 to 38.6 million tonnes. For the major winter crops: wheat production is forecast to decline by 10 per cent in 2014–15 to 24.2 million tonnes, barley production is forecast to fall by 21 per cent to 7.5 million tonnes and canola production is forecast to fall by 10 per cent to 3.4 million tonnes.

The total area planted to summer crops is forecast to rise by 6 per cent in 2014–15 to around 1.2 million hectares, assuming sufficient and timely rainfall is received in the summer cropping regions during the planting window.

Productivity growth is a key mechanism for agricultural industries to remain competitive and for farmers to maintain profitability. Productivity growth reflects improvements in the efficiency with which farmers combine market inputs to produce outputs. Between 1977–78 and 2011–12, average productivity growth in the grains industry was 1.6 per cent a year, the highest rate of all broadacre agriculture industries. However, in more recent years, productivity growth in the grains industry has slowed, while growth has accelerated in other broadacre sectors (such as beef, sheep and mixed crop–livestock). This convergence reflects the run of relatively poor seasons for crop producers during the 2000s and ongoing structural change in the broadacre agriculture industry.

The world outlook

Wheat

The world wheat indicator price (US no. 2 hard red winter, fob Gulf) is forecast to average US\$285 a tonne in 2014–15, compared with US\$317 a tonne in 2013–14. The world supply of wheat is forecast to increase in 2014–15, driven by an increase in opening stocks. World wheat production is forecast to be largely unchanged.

A forecast fall in the supply of hard red winter wheat in the United States and quality downgrades in some other major wheat producing countries are expected to reduce downward pressure on the world indicator price. The forecast does not assume further downgrades in high protein, milling grade wheat in major producing countries in the northern hemisphere. Geopolitical tensions in Ukraine continue to cause price volatility and present a risk to the price outlook.

World wheat production is forecast to be largely unchanged in 2014–15 at 714 million tonnes. Forecast falls in production in the United States, Canada and Australia are expected to largely offset forecast increases in the Black Sea region (the Russian Federation, Ukraine and Kazakhstan), the European Union, Argentina, China and India.

World consumption of wheat is forecast to rise by just over 1 per cent in 2014–15 to 705 million tonnes, largely reflecting increased human consumption resulting from world population growth.

World closing stocks of wheat are forecast to rise by 5 per cent in 2014–15 to 200 million tonnes, following an increase of 10 per cent in 2013–14. The stocks-to-use ratio is expected to rise by around 1 percentage point to 28 per cent.

Combined closing stocks in the major exporting countries are forecast to rise by 9 per cent in 2014–15 to 60 million tonnes. However, the level of stocks is expected to be around 3 per cent below the 10-year average to 2013–14. In contrast to most other major exporting countries, a 30 per cent drawdown of stocks is expected in Canada in 2014–15.

Coarse grains

The world coarse grains indicator price (US no. 2 yellow corn, fob Gulf) is forecast to average 16 per cent lower in 2014–15 at \$US185 a tonne. The world indicator price for barley (France feed barley, fob Rouen) is forecast to average 15 per cent lower in 2014–15 at \$US205 a tonne. These forecast lower prices largely reflect expected weak growth in demand for coarse grains and near record production in 2014–15. World stocks are forecast to be their highest in 15 years.

World coarse grains production is forecast to fall by 1 per cent in 2014–15 to 1267 million tonnes. If realised, world coarse grains production will be the second highest on record. World corn production is forecast to be largely unchanged in 2014–15 at 985 million tonnes. Production in the United States, China and the European Union is forecast to increase, while production in Latin America and Ukraine is forecast to decline. World barley production is forecast to fall by 7 per cent in 2014–15 to 135 million tonnes, primarily reflecting expected lower production in the European Union, Canada and Turkey.

World coarse grains consumption is forecast to increase by 2 per cent in 2014–15 to 1251 million tonnes, driven by an increase in world corn consumption. World corn consumption is forecast to increase by 2 per cent in 2014–15 to 968 million tonnes, reflecting a 4 per cent increase in use of corn for feed to 594 million tonnes and a 1 per cent increase in use for food, seed and industrial purposes to 374 million tonnes. World barley consumption is forecast to fall by 2 per cent in 2014–15 to 138 million tonnes, reflecting a 5 per cent fall in the use of barley for feed to 92 million tonnes. Consumption of barley for food, seed and industrial purposes is forecast to rise by 3 per cent to 46 million tonnes.

World closing stocks of coarse grains are forecast to increase by 8 per cent in 2014–15 to 226 million tonnes. If realised, coarse grains stocks will be the highest in 15 years. This reflects forecast world production exceeding forecast consumption in 2014–15 by 16 million tonnes. World closing stocks of corn are forecast to rise by 9 per cent in 2014–15 to 188 million tonnes. World closing stocks of barley are forecast to fall by 9 per cent in 2014–15 to 22 million tonnes.

Oilseeds

The world oilseeds indicator price (US soybeans, fob Gulf) is forecast to fall by 16 per cent in 2014–15 to average US\$460 a tonne, which if realised will be 14 per cent below the five-year average to 2013–14 in real terms (2014–15 US dollars). This forecast fall primarily reflects expected record supplies of soybeans.

The world canola indicator price (Europe rapeseed, fob Hamburg) is forecast to decline by 16 per cent in 2014–15 to average US\$440 a tonne. Despite a forecast decline in world canola production, expected weaker soybean prices are expected to place significant downward pressure on canola prices as a result of substitution.

World oilseeds production is forecast to increase by 3 per cent in 2014–15 to 518 million tonnes, driven by an expected 20 million tonne increase in world soybean production. World soybean production is forecast to rise to record levels, but world production of canola and sunflower seed is forecast to decline.

World oilseed crush is forecast to rise by 3 per cent in 2014–15 to a record 435 million tonnes. World soybean crush is forecast to rise by 7 per cent to 257 million tonnes and canola crush by 3 per cent to 67 million tonnes.

World oilseeds consumption is forecast to increase by 5 per cent to 507 million tonnes, largely driven by rising demand for vegetable oils and protein meals. World use of vegetable oil is forecast to rise by 5 per cent in 2014–15 to 175 million tonnes, while world use of protein meals is forecast to rise by 6 per cent to 286 million tonnes.

A forecast 6 per cent increase in world oilseed supply in 2014–15 is expected to result in a 13 per cent increase in world closing stocks of oilseeds to a record 94 million tonnes. This forecast rise is largely attributable to an expected 18 per cent increase in world soybean closing stocks to around 82 million tonnes. Closing soybean stocks in the three major soybean exporting countries (the United States, Brazil and Argentina) are expected to account for around 70 per cent of closing stocks, and China is expected to account for most of the remainder.

Australian crop production in 2014–15

After a generally favourable opening to the 2014–15 winter crop season, conditions over winter were mixed, resulting in mixed crop prospects.

The outlook for winter crops in South Australia is positive, reflecting generally average rainfall during winter and high levels of soil moisture. In contrast, winter rainfall in Western Australia was generally below to well below average. In New South Wales, seasonal conditions were highly variable over winter, but on average crop yields are expected to improve from the well below average yields in 2013–14. Seasonal conditions were generally dry in Victoria over winter, particularly in the major growing regions of the Mallee and the Wimmera. In Queensland, rainfall was below average between May and July but generally above average in August. August rainfall benefited winter crops on the Darling Downs, but it was too late to benefit crops in central Queensland.

For Australia as a whole, total winter crop production is forecast to fall by 12 per cent in 2014–15 to 38.6 million tonnes. For the major winter crops: wheat production is forecast to decline by 10 per cent in 2014–15 to 24.2 million tonnes, barley production is forecast to fall by 21 per cent to 7.5 million tonnes and canola production is forecast to fall by 10 per cent to 3.4 million tonnes.

Given the generally hot and dry conditions experienced over winter in some areas, sufficient and timely rainfall during spring is critical to realising the forecast winter crop production, particularly in areas where soil moisture levels are low.

The area planted to summer crops in 2014–15 is forecast to rise by 6 per cent to around 1.2 million hectares. This reflects a 26 per cent increase in the area planted to grain sorghum, to around 623 000 hectares, and a 20 per cent increase in area planted to rice, to 91 000 hectares. In contrast, the area planted to cotton is forecast to fall by 28 per cent to around 282 000 hectares. This largely reflects reduced availability of irrigation water following three years of plentiful water supplies.

Later winter rainfall increased upper level soil moisture levels in major summer cropping regions, but lower level soil moisture remained largely below average. Sufficient and timely rainfall will be needed in the lead up to, and during, the grain sorghum planting window for the forecast planted areas to be achieved.

Assuming the forecast planted areas are realised and average yields are achieved, total summer crop production is forecast to increase by 12 per cent in 2014–15 to around 4.1 million tonnes.

TABLE 1 Winter crop production, Australia

Crop	NSW kt	Vic. kt	Qld kt	SA kt	WA kt	Tas. kt	Australia kt
Wheat							
2009–10	5 350	2 995	1 346	4 001	8 114	27	21 834
2010–11	10 488	4 412	1 524	5 949	5 005	32	27 410
2011–12	8 473	3 943	1 886	4 525	11 045	32	29 905
2012–13	7 365	3 423	1 614	3 679	6 744	30	22 856
2013–14 s	6 612	3 541	1 200	5 128	10 500	32	27 013
2014–15 f	7 020	3 147	1 100	4 536	8 400	32	24 234
Barley							
2009–10	1 236	1 865	113	2 068	2 554	29	7 865
2010–11	2 194	1 945	146	2 122	1 549	39	7 995
2011–12	1 425	2 005	191	1 816	2 761	23	8 221
2012–13	1 286	1 952	170	1 794	2 252	17	7 472
2013–14 s	1 179	2 178	138	2 225	3 800	25	9 545
2014–15 f	1 139	1 854	127	1 888	2 511	27	7 547
Canola							
2009–10	281	331	1	260	1 031	2	1 907
2010–11	805	476	2	359	715	1	2 359
2011–12	1 092	689	1	413	1 232	1	3 427
2012–13	1 495	866	1	415	1 364	1	4 142
2013–14 s	900	618	0	442	1 800	0	3 760
2014–15 f	904	569	0	396	1 518	1	3 388
Total winter crop							
2009–10	7 789	5 892	1 618	7 036	12 944	72	35 352
2010–11	14 786	7 629	1 822	9 317	8 045	82	41 681
2011–12	11 955	7 348	2 330	7 368	16 599	65	45 666
2012–13	11 127	6 879	2 157	6 468	11 241	56	37 928
2013–14 s	9 476	7 086	1 645	8 603	17 231	65	44 106
2014–15 f	9 840	6 288	1 457	7 594	13 358	70	38 607

f ABARES forecast. s ABARES estimate.

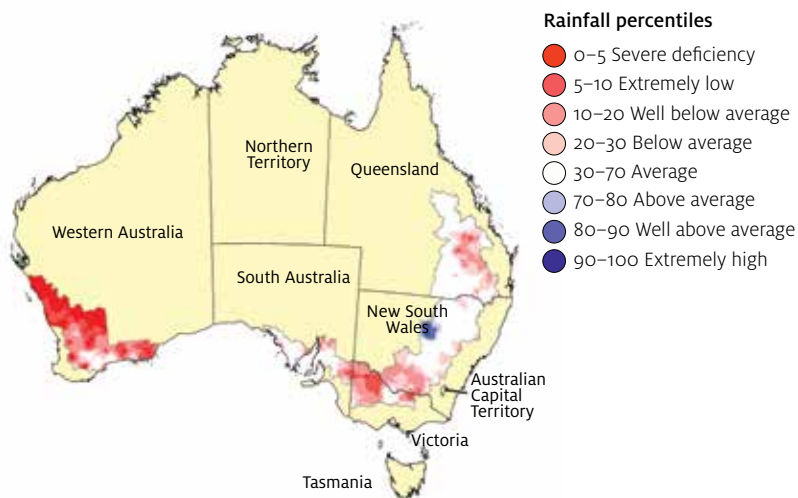
Note: The total winter crop includes barley, canola, chickpeas, faba beans, field peas, lentils, linseed, lupins, oats, safflower, triticale and wheat. Total for Australia also includes small volumes in the Northern Territory and the Australian Capital Territory.

Climatic and soil moisture conditions

Winter (June to August) 2014 rainfall was generally average across cropping regions in South Australia, central and northern New South Wales and parts of Queensland. Winter rainfall was below average to severely deficient over large parts of the cropping zone in Western Australia, Victoria, central Queensland and the southern cropping region of New South Wales (Map 1).

Rainfall in June 2014 was at least average over most of Australia's winter cropping regions. However, rainfall in Western Australia was severely deficient to extremely low. During July 2014, rainfall in much of eastern Australia was below average and in Western Australia and South Australia was mostly average. During August 2014, rainfall ranged from severely deficient to below average across most cropping regions in Victoria, South Australia, Western Australia and southern New South Wales. Cropping regions in northern New South Wales and Queensland generally recorded average to above average falls.

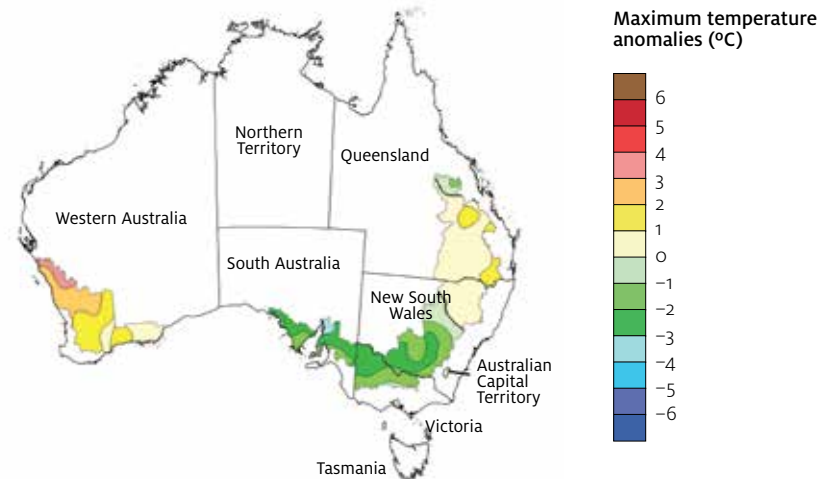
MAP 1 Australian rainfall percentiles, 1 June 2014 to 31 August 2014



Note: Rainfall percentiles are displayed for cropping regions only.
Source: Bureau of Meteorology

Well below average temperatures across widespread areas of eastern Australia were recorded during early August 2014 (Map 2). In contrast, well above average temperatures were recorded across much of Western Australia. For August 2014, minimum temperature anomalies of between two and four degrees below average were recorded across the wheat–sheep zones of New South Wales, Victoria and South Australia. A number of crop growing regions experienced a severe frost in the first two weeks of August.

MAP 2 Australian minimum temperature anomalies, August 2014



Note: Minimum temperature anomalies displayed for cropping regions only.
Source: Bureau of Meteorology

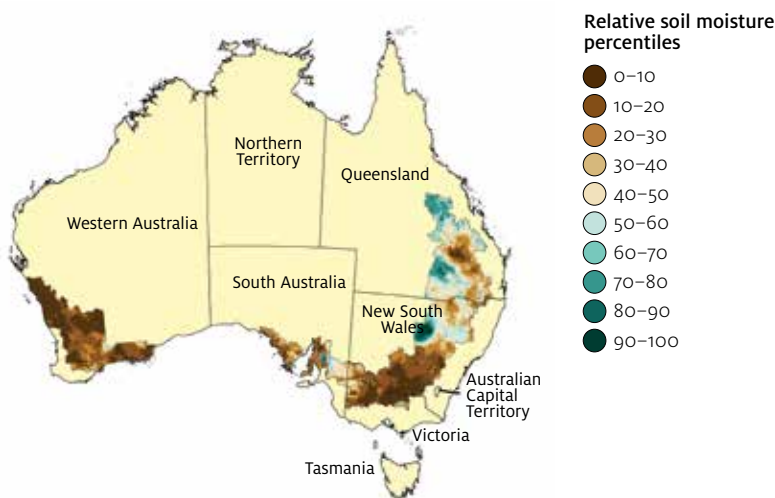
Maps 3 and 4 show the relative levels of modelled upper layer (~0.2 metres) and lower layer (~0.2 to ~1.5 metres) soil moisture for cropping zones across Australia during August 2014. Soil moisture estimates are relative to the standard climatological 1961–90 reference period and presented in percentiles.

Moisture estimates from the long-term record are ranked in percentiles. The 90th to 100th percentile indicates where the estimated soil moisture level for August 2014 fell into the wettest 10 per cent of estimated soil moisture levels for that month during the 1961–90 reference period. The zero to 10th percentile indicates where the estimated soil moisture levels for August 2014 fell into the driest 10 per cent of estimated soil moisture levels for that month during the 1961–90 reference period. Data were from a Bureau of Meteorology, Commonwealth Scientific and Industrial Research Organisation (CSIRO) and ABARES collaborative project that estimates soil moisture and other components of water balance at high resolution across Australia.

Upper layer soil moisture responds quickly to seasonal conditions and will often show a pattern that reflects rainfall and temperature events of the same month. 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.

Relative upper layer soil moisture during August 2014 (Map 3) was predominantly below average throughout most cropping regions in New South Wales, Victoria, South Australia and Western Australia and parts of Queensland. Relative upper layer soil moisture during August 2014 was average to above average in some northern cropping regions in New South Wales and northern and south-western cropping regions in Queensland.

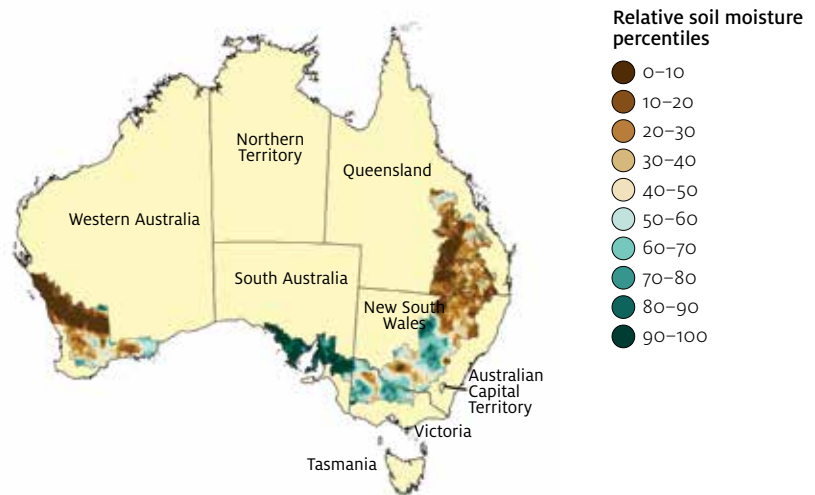
MAP 3 Upper layer soil moisture, August average 2014



Note: Relative upper layer soil moisture displayed for cropping regions only.
Sources: ABARES; Bureau of Meteorology (Australian Water Availability Project); CSIRO

Relative soil moisture in the lower layer during August 2014 (Map 4) was average to above average in many areas of the cropping zone in the eastern states (including South Australia). However, relative soil moisture in large areas of the cropping zone in southern and northern New South Wales, western Victoria, Queensland and Western Australia was below average.

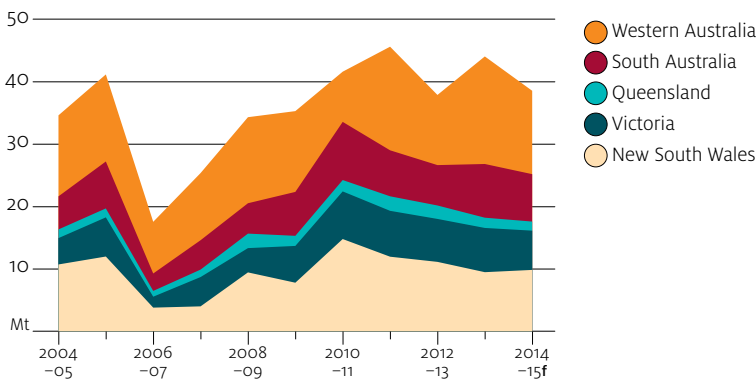
MAP 4 Lower layer soil moisture, August average 2014



Note: Relative lower layer soil moisture displayed for cropping regions only.
Sources: ABARES; Bureau of Meteorology (Australian Water Availability Project); CSIRO

Crop conditions and production forecasts by state

FIGURE 1 Australian winter crop production



f ABARES forecast.

New South Wales

Seasonal conditions varied considerably across New South Wales over late autumn and winter.

In the central and southern cropping areas, rainfall was generally average between May and July. Rainfall in August was average to below average in the central cropping zone but was largely below average to very much below average in the southern cropping region. Frost events also occurred in many parts of the southern region during August. Nevertheless, wheat and barley yields are expected to be higher in these regions than the well below average yields achieved in 2013–14.

In the northern cropping region, rainfall between May and July was mostly below average. August rainfall was mainly above average but was largely too late to benefit winter crops. Yields in this region are expected to be lower than in 2013–14. August rainfall in the northern region replenished upper layer soil moisture levels but further rainfall will be needed to facilitate the planting of summer crops and aid crop development.

Total winter crop production in New South Wales is forecast to increase by 4 per cent in 2014–15 to 9.8 million tonnes, largely reflecting the expected increase in yields in the southern and central regions. The total area planted to winter crops is estimated to be largely unchanged at around 5.8 million hectares.

Wheat production is forecast to increase by 6 per cent in 2014–15 to 7 million tonnes. The area planted to wheat is estimated to have increased by 3 per cent to 3.9 million hectares and the average yield is forecast to rise by around 3 per cent on the previous season.

Barley production is forecast to fall by 3 per cent in 2014–15 to 1.1 million tonnes, driven by a 4 per cent decline in the area planted to 640 000 hectares. The average yield is forecast to increase marginally.

Canola production is forecast to remain largely unchanged in 2014–15 at around 904 000 tonnes. The area planted to canola is estimated to have increased by 4 per cent to 650 000 hectares. This is expected to be largely offset by a forecast fall in the average yield, largely reflecting frost damage in the southern cropping region.

The total area planted to summer crops in New South Wales is forecast to increase by 3 per cent in 2014–15 to 554 000 hectares. The area planted to grain sorghum is forecast to increase by 43 per cent in 2014–15 to 200 000 hectares. However, following dry seasonal conditions in September, adequate and timely rainfall during the summer crop planting window will be needed for the forecast planted area for grain sorghum to be realised.

Queensland

Seasonal conditions were generally unfavourable during winter across the cropping regions in Queensland and have reduced the prospects for winter crops. Following broadly average rainfall in June, rainfall in July was generally well below to very much below average. Although August rainfall was average to above average, very little rainfall fell in the first two weeks. Widespread and heavy rainfall in mid-August is expected to have benefited crops sown in the Darling Downs but came too late to benefit winter crops in central Queensland.

Winter crop production in Queensland is forecast to fall by 11 per cent in 2014–15 to around 1.5 million tonnes, largely because of the generally unfavourable seasonal conditions over winter. The total area planted to winter crops in Queensland is estimated to have decreased by around 1 per cent to around 1.1 million hectares, 8 per cent below the five-year average to 2012–13.

Wheat production is forecast to fall by 8 per cent in 2014–15 to around 1.1 million tonnes. A forecast 13 per cent fall in average yield is expected to more than offset an estimated 5 per cent increase in planted area.

Barley production is forecast to fall by 8 per cent in 2014–15 to 127 000 tonnes, reflecting an expected 8 per cent decline in average yield. The area planted to barley is estimated to have remained largely unchanged in 2014–15.

The total area planted to summer crops in Queensland is forecast to increase to 621 000 hectares in 2014–15, around 8 per cent higher than the below average area planted in 2013–14. This is driven by a forecast rise in the area planted to grain sorghum, which reflects favourable grain sorghum prices and the availability of fallow land. The area planted to grain sorghum is forecast to rise by 20 per cent in 2014–15 to 420 000 hectares. However, timely rainfall during the summer crop planting window will be needed for the forecast planted area for grain sorghum to be realised.

Victoria

Seasonal conditions in Victoria were generally favourable for planting and early crop development but dry during winter. Additionally, frost during August adversely affected prospects, especially for canola, pulses, legumes and early-sown cereals in the Mallee region.

Winter crop production in Victoria is forecast to decline by 11 per cent in 2014–15 to around 6.3 million tonnes, largely reflecting expected falls in yields from those achieved in 2013–14. The area planted to winter crops in Victoria is estimated to have increased by 1 per cent.

Wheat production is forecast to decrease by 11 per cent in 2014–15 to around 3.1 million tonnes, driven by an expected 13 per cent fall in average yield. Area planted to wheat is estimated to have increased by 2 per cent in 2014–15, largely at the expense of barley.

Barley production is forecast to decline by 15 per cent in 2014–15 to around 1.9 million tonnes, with the average yield forecast to fall by 14 per cent. Additionally, area planted to barley is estimated to have fallen by 1 per cent.

Canola production is forecast to decrease by 8 per cent in 2014–15 to 569 000 tonnes, with an increase in planted area expected to be more than offset by a forecast 12 per cent decline in average yield.

South Australia

Growing conditions have been largely favourable in the major cropping regions of South Australia. Above average rainfall in autumn followed by generally average rainfall in winter has resulted in favourable levels of lower layer soil moisture across most of the major cropping regions. This means crops in South Australia were well placed to withstand drier than average conditions during spring. Temperatures during winter were average to above average, which has facilitated crop development.

Total winter crop production in South Australia is forecast to fall by 12 per cent in 2014–15 to 7.6 million tonnes, reflecting an expected decline in average yields. However, yields are still expected to be above average as a result of the generally favourable seasonal conditions. Area planted to winter crops is estimated to have increased by 1 per cent to almost 4 million hectares, the highest since 2007–08.

Wheat production is forecast to fall by 12 per cent in 2014–15 to around 4.5 million tonnes, reflecting an expected 14 per cent decline in average yield. The area planted to wheat is estimated to have increased by around 3 per cent to around 2.4 million hectares.

Barley production is forecast to fall by 15 per cent in 2014–15 to 1.9 million tonnes, largely because of a forecast 13 per cent decline in average yield from the near record yields of last season. Area planted to barley is forecast to be 2 per cent lower at 870 000 hectares.

Canola production is forecast to fall by 10 per cent in 2014–15 to 396 000 tonnes, reflecting an expected 6 per cent decline in average yield. Area planted to canola is estimated to have declined by 4 per cent to 285 000 hectares.

Western Australia

After a generally favourable opening to the cropping season, winter growing conditions across the Western Australian grains belt were mixed. Winter rainfall was generally below average to very much below average, but timely rainfall in southern and western regions has benefited crops. Temperatures were well above average over winter and especially so during August.

Soil moisture in many regions of the grains belt was low at the end of winter, increasing the importance of sufficient and timely spring rainfall to achieve the forecast level of production.

Total winter crop production in Western Australia is forecast to be 13.4 million tonnes in 2014–15, a 22 per cent decrease from the record level of production in 2013–14. Favourable levels of soil moisture are expected to assist development of crops in the southern regions of the grains belt over spring. Yields in these regions are expected to be above average. In contrast, soil moisture levels in the northern and eastern regions were much lower at the start of spring and crop yields are expected to be below average.

Wheat production is forecast to decrease by 20 per cent in 2014–15 to 8.4 million tonnes. Area planted to wheat is estimated to have risen by 2 per cent to 5.1 million hectares. The forecast average yield of 1.65 tonnes a hectare is around the 10-year average to 2012–13.

Barley production is forecast to decrease by 34 per cent in 2014–15 to around 2.5 million tonnes, largely reflecting a forecast 29 per cent fall in average yield from the record achieved in 2013–14.

Canola production is forecast to fall by 16 per cent in 2014–15 to around 1.5 million tonnes, reflecting a 17 per cent decline in average yield. Area planted to canola is estimated to have risen by 2 per cent to a record 1.3 million hectares.

TABLE 2 Australian crop production

Crop	Area planted				Yield				Production			
	Average a '000 ha	2012-13 '000 ha	2013-14s '000 ha	2014-15f '000 ha	Average a t/ha	2012-13 t/ha	2013-14s t/ha	2014-15f t/ha	Average a kt	2012-13 kt	2013-14s kt	2014-15f kt
Winter crops												
Wheat	13 555	12 979	13 512	13 837	1.90	1.76	2.00	1.75	25 804	22 856	27 013	24 234
Barley	3 877	3 644	3 920	3 778	2.13	2.05	2.43	2.00	8 219	7 472	9 545	7 547
Canola	2 432	3 272	2 655	2 714	1.27	1.27	1.42	1.25	3 119	4 142	3 760	3 388
Chickpeas	524	574	507	339	1.21	1.42	1.24	1.39	623	813	629	470
Faba beans	160	203	152	168	1.89	1.86	2.15	2.00	303	377	328	337
Field peas	275	281	245	231	1.28	1.14	1.40	1.31	351	320	342	302
Lentils	166	165	169	174	1.48	1.12	1.50	1.86	250	185	254	324
Lupins	595	450	387	437	1.26	1.02	1.62	1.32	739	459	625	576
Oats	776	729	744	739	1.56	1.54	1.78	1.58	1 200	1 121	1 326	1 165
Triticale	187	99	152	152	1.78	1.73	1.77	1.65	325	171	268	251
Summer crops												
Grain sorghum	586	648	493	623	3.03	3.44	2.25	2.96	1 804	2 230	1 107	1 844
Cottonseed	446	442	392	282	2.83	3.26	3.21	2.91	1 249	1 439	1 259	820
Cotton lint	446	442	392	282	2.01	2.30	2.27	2.06	889	1 018	890	580
Rice (paddy)	77	114	76	91	10.01	10.22	11.01	9.88	766	1 161	833	894
Corn (maize)	65	79	58	67	6.00	6.44	5.78	5.75	395	507	335	383
Sunflower	32	30	27	37	1.30	1.46	1.18	1.18	41	44	32	44

a Five-year average to 2013-14. b Area harvested for grain. c Cotton area is estimated harvested area. f ABARES forecast. s ABARES estimate.

Note: The crop year refers to crops planted during the 12 months to 31 March. Slight discrepancies may appear between tables as a result of including the Australian Capital Territory and Northern Territory in the Australian totals. Rice, cottonseed and cotton lint include northern dry and wet season crops.

Sources: ABARES; Australian Bureau of Statistics; Pulse Australia

Grains industry productivity update—2015

Productivity growth is a key mechanism for agricultural industries to remain competitive and for farmers to maintain profitability. Productivity growth reflects improvements in the efficiency with which farmers combine market inputs to produce outputs.

Total factor productivity (TFP) is the key indicator ABARES uses to measure productivity. TFP is defined as the ratio of total market outputs produced (such as crops, livestock or wool) to total market inputs used (land, labour, capital, materials and services). It is better for evaluating overall productivity performance of agricultural industries than single input or partial factor productivity (PFP) measures (such as labour productivity or crop yield per hectare). PFP measures attribute the combined effects of changes in all aspects of farm production systems solely to one input, which may result in a misleading assessment of the drivers of productivity growth.

In the long run, productivity growth is the key mechanism by which farmers maintain profitability. In particular, with some important profit drivers such as seasonal conditions and market prices largely beyond farmers' control, profitability is largely determined by their choice of enterprise and use of farm inputs. Furthermore, farmers can reduce their unit costs of production and input use over time through continuously adopting new technologies (such as improved inputs) and management practices.

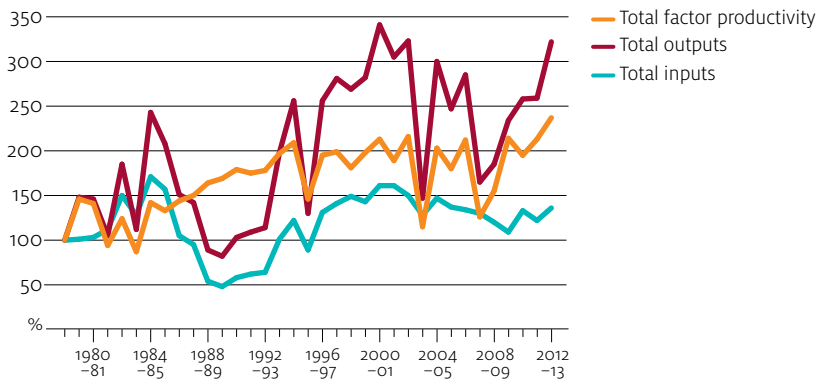
Technological progress allows farmers to substitute more advanced inputs for relatively costly ones. This allows farmers to lower their costs by using more efficient combinations of inputs. For example, farmers have reduced their use of inputs associated with mechanical cultivation by adopting improved capital technologies and agricultural chemicals. Similarly, where farmers have adopted improved management practices, they have reduced a range of inputs. Such cost-saving technological improvements constitute productivity growth.

Increasing productivity is not the only pathway to higher profit. Improvements in the terms of trade (the ratio of prices received for outputs to prices paid for inputs) may induce farmers to choose a less efficient (productivity decreasing) output mix or scale of operations. For example, farmers may expand cropping into relatively marginal land to take advantage of fortuitous market conditions. However, periods of high commodity prices tend to be temporary. In the longer term, productivity growth remains the main means of sustaining farm profitability.

Cropping industry productivity

Cropping industry TFP increased at an average annual rate of 1.6 per cent from 1977–78 to 2011–12. Despite periods of extreme volatility, total output from specialist cropping farms grew on average at around 2.6 per cent a year over this period as a result of increasing input use (1.0 per cent a year) and productivity growth (Figure 2).

FIGURE 2 Trends in cropping specialists' total factor productivity, total inputs and total outputs, 1977–78 to 2011–12



Source: ABARES

Technical change, through growers' adoption of new technologies and management practices, has been the main driver of long-term productivity growth of cropping specialists (Hughes et al. 2011). In workshops on grains industry productivity held across Australia in 1999 and 2009 (Jackson 2010; Knopke, O'Donnell & Shepherd 2000), growers and other industry stakeholders identified the new technologies and knowledge that had driven higher productivity. They included:

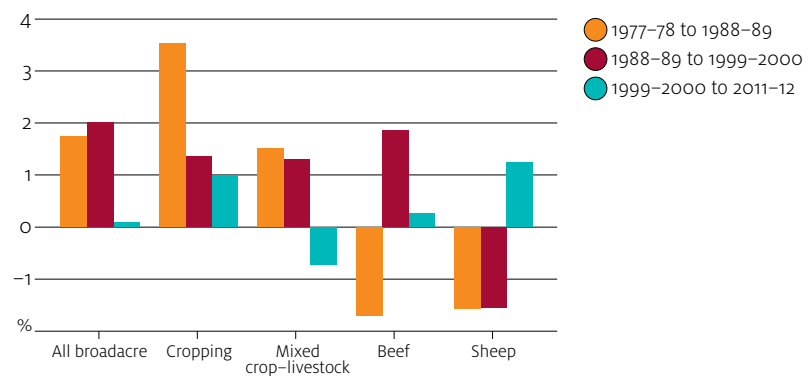
- greater understanding of cropping systems, such as plant physiology and determinants of soil fertility
- improved crop rotations that provided better pest and weed control
- larger and more sophisticated machinery
- improved crop varieties, such as those with better disease resistance.

These advances in technology individually contributed to productivity growth; they also facilitated the development and use of more efficient farming systems such as conservation farming. These systems allowed farmers to substitute capital and intermediate inputs (crop chemicals and fertiliser) for labour—reflected in the strong growth in PFP measures relating to crop labour and capital—and to substantially increase material inputs use (Table 3). Conservation farming also yielded productivity benefits for some farmers through improved soil quality and structure, greater water holding capacity and greater flexibility of sowing timing.

TABLE 3 Average annual broadacre productivity growth by industry, 1977–78 to 2011–12 (%)

Category	All broadacre	Cropping	Mixed crop-livestock	Beef	Sheep
Total factor productivity					
Productivity	1.0	1.6	0.9	0.8	0.1
Outputs	0.0	2.6	-0.8	0.5	-2.6
Inputs	-1.0	1.0	-1.7	-0.3	-2.6
Partial factor productivity					
Land	1.0	1.4	0.4	0.9	-0.2
Labour	2.2	3.3	2.0	1.3	0.8
Capital	1.6	2.8	2.0	0.4	1.3
Materials	-1.8	-1.5	-1.6	-1.8	-2.0
Services	0.9	1.9	0.9	0.4	0.2
Input use					
Land	-0.9	1.2	-1.3	-0.3	-2.4
Labour	-2.1	-0.7	-2.8	-0.8	-3.3
Capital	-1.5	-0.2	-2.8	0.2	-3.8
Materials	1.9	4.1	0.8	2.3	-0.6
Services	-0.9	0.8	-1.7	0.2	-2.7

However, the rate of productivity growth of cropping specialists has slowed in recent decades (Figure 3). Diminished public R&D intensity is likely to have played a role (Sheng, Mullen & Zhao 2011). However, drought conditions across Australia have also significantly affected the cropping industry. These conditions reduced the output of cropping specialists by around 13 per cent relative to before 2000 (Hughes et al. 2011).

FIGURE 3 Broadacre total factor productivity growth, by period

Productivity growth rates are converging across the three agroecological regions defined by the Grains Research and Development Corporation (GRDC 2011) (Table 4). Between 1977–78 and 2011–12 cropping specialists in the southern region achieved average annual TFP growth of 1.7 per cent, while those in the northern region achieved an average of 1.6 per cent. Cropping specialists in the western region achieved average annual TFP growth of 1.5 per cent.

TABLE 4 Average annual cropping total factor productivity growth, by region, 1977–78 to 2011–12 (%)

Category	Productivity growth	Output growth	Input growth
All cropping specialists	1.6	2.6	1.0
Southern region	1.7	3.1	1.4
Northern region	1.6	1.2	-0.5
Western region	1.5	3.7	2.2

Note: All cropping specialists also includes cropping specialists from outside the Grains Research and Development Corporation agroecological regions.

Cropping versus other broadacre farms

Across the broadacre industries, average productivity growth in the cropping industry has exceeded that of the livestock industries (Table 3). TFP growth of cropping specialists averaged 1.6 per cent a year between 1977–78 and 2011–12, higher than beef (0.8 per cent), mixed crop–livestock (0.9 per cent) and sheep (0.1 per cent) farms. This may reflect differences in the capacity of cropping and livestock farms to substitute to lower-cost input combinations. In particular, advances in machinery, agricultural chemicals and crop varieties have allowed cropping farms to substitute capital and materials (such as crop chemicals and fertiliser) for labour, such that input use has fallen relatively more than it has for livestock farms.

In recent years the gap between the productivity growth rates of the cropping and livestock industries has narrowed (Figure 3). TFP among cropping specialists and mixed crop–livestock farms has been growing more slowly and the growth rate in the livestock industries has been increasing. Among other factors, this convergence reflects the fact that while poor seasonal conditions over much of the 2000s affected all broadacre industries, significant falls in cropping industry output were not accompanied by similar declines in input use.

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The 'Biosphere' Graphic Element

The biosphere is a key part of the department's visual identity. Individual biospheres are used to visually describe the diverse nature of the work we do as a department, in Australia and internationally.



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