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Summary

This report presents data from the ABARES Murray–Darling Basin Irrigation Survey from 2006–07 to 2014–15, with a focus on 2012–13 to 2014–15. ABARES provides key financial performance measures for cotton-growing farms and data on water use and irrigation technology and water trading. This report focuses on cotton farms, particularly those in the northern Murray–Darling Basin.

Around 90 per cent of Australia’s cotton is grown in the Murray–Darling Basin. Most of the cotton-growing farms are in the northern Basin. In recent years cotton production has expanded into the Lachlan and Murrumbidgee regions.


Farm financial performance

Farm cash incomes of cotton growers averaged around $300 000 a farm from 2006–07 to 2010–11. Improved seasonal conditions and therefore higher crop production resulted in a significant rise in farm cash income in 2011–12. Since then, incomes have fallen by around 30 per cent as seasonal conditions deteriorated and cotton prices fell.

The contribution of cotton sales to total cash receipts varied from around 40 per cent to more than 80 per cent, reflecting the flexibility cotton growers have in planting various crops in response to market and seasonal conditions.

Despite the decline in farm financial performance in recent years, 72 per cent of farms reported positive rates of return in 2014–15. Around 60 per cent of farms recorded rates of return greater than 10 per cent.

Water use and irrigation technology

Cotton growers in the Murray–Darling Basin use irrigation water to supplement rainfall in producing cotton and other crops. Using irrigation water provides higher and more reliable crop yields than relying solely on highly variable seasonal rainfall. Most cotton growers also grow a range of dryland crops, including wheat and sorghum.

From 2007–08 to 2013–14, the average volume of water used on cotton crops trended upwards. The increase was largely the result of an increase in average irrigated cotton area. Average application rates per hectare were comparatively constant over the survey years.

Flood/furrow systems were the most commonly used technology for applying water on cotton farms. At least 80 per cent of farms used this technology over the survey years.

Water trading

While a majority of cotton farms did not trade water, around a quarter of farms were net buyers of irrigation water in drier years. For net buyers, purchased water accounted for between 15 per cent and 50 per cent of their total water used.
Around 2 per cent to 3 per cent of cotton growers sold permanent water access entitlements in most years of the survey period.
Introduction


The MDBA is gathering information to better understand and assess the effect of Murray–Darling Basin Plan water reforms on Basin industries and communities. ABARES irrigation farm data will assist the MDBA with its assessments.

Some changes in farm businesses occur relatively quickly in response to movements in commodity prices, farm input prices, seasonal conditions, water allocations and other factors. Other changes occur slowly because of past investment decisions, the fixed nature of many farm assets and the time it takes to realise a return on a new investment.

ABARES has prepared a series of reports based on MDBIS data for the major irrigated agricultural industries (cotton, dairy, horticulture, rice and wine grapes). This report focuses on cotton-growing farms, particularly those in the northern Basin (Map 1). See Box 1 for a brief explanation of ABARES survey methodology.

ABARES provided input to an MDBA workshop held with cotton growers at Narrabri in New South Wales in March 2016, where the survey results and other issues were discussed.

Map 1 Reporting regions, Murray–Darling Basin

Note: Regions shown are based on the regions in the CSIRO Murray–Darling Basin Sustainable Yields Project (CSIRO 2007).
Source: ABARES
### Box 1 Survey methodology

The ABARES survey of irrigation farms in the Murray–Darling Basin included cotton-growing farms. Farm financial and physical information collected included land area and value, crop and livestock production and sales, irrigation water use by crop and pasture, irrigation water delivery methods, farm receipts and costs, labour use, debts and assets, and market values of farm capital.

ABARES surveys are designed and samples selected on the basis of a framework drawn from the Australian Business Register, which is maintained by the Australian Bureau of Statistics. To be eligible for this survey, farms had to have engaged in irrigated agricultural activities during the survey year, had an estimated value of agricultural operations of $40,000 or more, and been defined as broadacre, dairy or horticulture industry farms.

Farm-level estimates published by ABARES are calculated by weighting the data collected from each sample farm and then using that data to calculate population estimates. Further information on ABARES farm survey methodology and definitions can be found on the [ABARES Surveys web page](http://abares.gov.au/).
1 Cotton production in the Murray–Darling Basin

The Murray–Darling Basin accounts for around 90 per cent of Australia's total cotton farms and cotton area (ABS 2015a). From 2006–07 to 2013–14, irrigated cotton contributed an average of around 20 per cent of the total gross value of irrigated agricultural production in the Basin (ABS 2015b).

Cotton is mostly grown in northern areas of the Murray–Darling Basin, particularly the Condamine–Balonne, Border Rivers and Namoi regions (Map 2). Some cotton is grown in the Macquarie–Castlereagh, Lachlan and Murrumbidgee regions in the central and southern Basin. Regionally important cotton-growing centres in the northern Basin include Dalby, Goondiwindi, Moree and Narrabri.


Source: ABARES
Cotton is generally higher value and more profitable than alternative crops such as sorghum, wheat and oilseeds. As a consequence, cotton producers tend to base their cotton planting decisions on water availability and are less responsive to changes in cotton prices and water prices. The widespread use of futures markets and hedging by cotton growers also reduces the responsiveness of cotton plantings to changes in spot prices. However, when prices fall sharply, as they did in 2011–12, the profitability of cotton relative to other crops becomes increasingly important to crop selection decisions.

Total cotton production (irrigated and dryland) in Australia has fluctuated widely in response to changing seasonal and market conditions (Figure 1). During the drought-affected period from 2006–07 to 2009–10, cotton production fell to a level last recorded in the early 1980s. With improved seasonal conditions in 2010–11 and 2011–12 and higher world cotton prices relative to prices for other commodities, production increased to more than 1 200 kilotonnes in 2011–12. A return to drier seasonal conditions, reduced water availability and falling cotton prices resulted in declines in cotton production from 2012–13 to 2014–15.

Figure 1 Cotton production and price, Australia, 1990–91 to 2014–15

Sources: ABARES 2015, 2014
The number of farms growing irrigated cotton also fluctuated from year to year, largely depending on the availability of water (from either irrigation or rainfall) and the profitability of growing cotton relative to other crops. Broadly, the number of farms growing irrigated cotton follows a similar trend to irrigated cotton area (Figure 2).

**Figure 2** Irrigated cotton areas and irrigated farm numbers, Murray–Darling Basin, 2006–07 to 2013–14

![Irrigated cotton areas and irrigated farm numbers, Murray–Darling Basin, 2006–07 to 2013–14](source: ABS 2015a)
2 Farm financial performance

Farm financial performance is a key driver of change in the structure of the cotton-growing industry. The two main measures of farm financial performance used in this report are farm cash income and rate of return.

Farm cash income is defined as total cash receipts minus total cash costs. It is a short-term measure of the cash surplus available to a farm business for reinvestment or drawing family income after costs have been taken into account.

Total cash receipts are the cash revenues received by a farm business. In most cases, sales of cotton and other broadacre crops are the largest receipt items. Other (usually minor) items include allocation water sales, contracting and government assistance payments.

Total cash costs are payments made for materials and services and for administration, crop-related expenses, interest, and permanent and casual labour. Capital and household expenses are not included in total cash costs.

Average farm cash incomes of cotton growers were relatively stable from 2006–07 to 2010–11, mainly because of reduced total farm production during the drought (Figure 3). Although a larger cotton crop was planted in 2010–11, much of the income from that crop was received in 2011–12. Higher total cash receipts as a result of higher crop production led to a significant rise in farm incomes in 2011–12. Cotton farm cash incomes fell after 2011–12 in response to falling cotton prices, higher costs and reduced crop production because of drier seasonal conditions.

Figure 3 Farm cash income, cotton farms, Murray–Darling Basin, 2006–07 to 2014–15 average per farm

Note: Data for 2014–15 are provisional estimates. Source: ABARES Murray–Darling Basin Irrigation Survey

Receipts from cotton sales as a proportion of total cash receipts varied over the survey period, reflecting the flexibility cotton growers have in planting different crops. For example, cotton (irrigated and dryland) accounted for just over 40 per cent of total receipts in 2006–07 compared with just over 70 per cent in 2011–12 (Figure 4). The other major crops grown on cotton farms are usually wheat and sorghum.
Farm cash incomes of cotton growers were also affected by changes in total cash costs. Many cotton farm costs are directly related to cropping activities and therefore tend to change in proportion to changes in cropping areas. When averaged over all survey years, four of these types of costs (fuel, chemicals, fertiliser and contracts) were in the top five cash costs incurred on cotton farms (Figure 5).

Figure 6 shows the average annual rate of return to capital (excluding capital appreciation) for cotton farms. Rate of return is a measure of the annual profit generated by a business, expressed as a percentage of the value of the capital used to generate that profit. Because it is expressed as a ratio, the rate of return for cotton farms can be compared with the rate of return for other farm types or other potential investments. For example, the average rate of return for broadacre farms in both 2013–14 and 2014–15 was 1.4 per cent (Martin 2016).
The estimated average rate of return (excluding capital appreciation) for cotton growers was 5.7 per cent in 2013–14 and 4.9 per cent in 2014–15, compared with an average of 6.8 per cent in 2012–13 (Figure 6). The average rate of return over the entire period of the survey—from 2006–07 to 2014–15—for cotton-growing farms was around 4.9 per cent.

Despite the declines in farm financial performance from 2011–12 to 2014–15, the proportion of farms with positive rates of return was 72 per cent. Around 60 per cent of cotton growers recorded rates of return higher than 10 per cent in 2014–15.

**Figure 6 Rate of return, cotton farms, Murray–Darling Basin, 2006–07 to 2014–15**

Note: Data for 2014–15 are provisional estimates. Rate of return excludes capital appreciation.

Source: ABARES Murray–Darling Basin Irrigation Survey
3 Water use and irrigation technology

Cotton growers in the Murray–Darling Basin use irrigation water to supplement rainfall in producing cotton and other crops. Using irrigation water provides higher and more reliable crop yields than relying solely on highly variable seasonal rainfall. Most cotton growers also grow a range of dryland crops, including wheat and sorghum.

Figure 7 shows estimated average volumes of water, both total and per hectare, applied to irrigated cotton crops from 2006–07 to 2014–15. Both water use variables are expressed as indexes with 2006–07 as the base year.

The average volume of irrigation water used on cotton trended upwards from 2007–08 to 2013–14. This was generally consistent with the trend for average irrigated cotton area (Figure 2) and reflected increased water availability over the period 2009–10 to 2013–14.

Figure 7 Index of water use on cotton crops, cotton farms, Murray–Darling Basin, 2006–07 to 2014–15

Note: Data for 2014–15 are provisional estimates.
Source: ABARES Murray–Darling Basin Irrigation Survey
Across the Murray–Darling Basin, flood/furrow systems were the most common irrigation technology used on cotton farms (Figure 8). The survey data indicate that some farms may be moving away from flood/furrow systems towards travelling irrigator systems.

Figure 8 Main irrigation technologies, cotton farms, Murray–Darling Basin, 2006–07 to 2014–15

Note: Data for 2014–15 are provisional estimates.
Source: ABARES Murray–Darling Basin Irrigation Survey
4 Water trading

Water trading provides cotton-growing farmers with a tool for managing their farm businesses. Overall there is less water trading (of both seasonal allocations and permanent entitlements) in the northern regions than in the southern regions of the Murray–Darling Basin because of the limited connectivity of the northern river systems. However, water trading has assisted the expansion of cotton growing into the Lachlan and Murrumbidgee regions in recent years.

In the years for which water trading data are available from the survey, most cotton farms did not trade water (Figure 9). In some drier years, particularly 2006–07 and 2013–14, just over 25 per cent of farms purchased allocation water, and those purchases accounted for around 25 per cent of total water used on average (Figure 10). In 2010–11, when water was more plentiful, allocation water purchases accounted for almost 50 per cent of total water used.

Figure 9 Proportion of cotton farms by allocation water trade group, Murray–Darling Basin, 2006–07 to 2013–14

Note: Net buyers/sellers are farms that bought/sold more water than they sold/bought. Water trading data are not available for 2011–12 and 2012–13.
Source: ABARES Murray–Darling Basin Irrigation Survey

The market for permanent water access entitlements has also provided irrigators with a tool for managing their farm businesses. Around 2 per cent to 3 per cent of cotton growers sold entitlements in most years.
Figure 10 Allocation water purchases by net buyers, cotton farms, Murray–Darling Basin, 2006–07 to 2013–14

Note: Water trading data are not available for 2011–12 and 2012–13.
Source: ABARES Murray–Darling Basin Irrigation Survey
References

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


