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RIVERINA MURRAY
AGRICULTURAL INDUSTRIES

FINAL REPORT

Department of Planning and Environment

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EXECUTIVE SUMMARY

This report examines the current status and trends relevant to the main agricultural industries within the Riverina Murray region of NSW and identifies strategic implications to inform development of the Riverina Murray Regional Growth Plan.

The Riverina Murray region in central southern NSW borders the ACT in the east and Victoria in the south and covers 26 local government areas. The region includes the major centres of Wagga Wagga, Albury and Griffith. The region has a population of 266,350[1] and is projected to increase to 274,450 by 2031 (a 0.2% annual compound growth rate). The region covers an area of 115,096 square kilometres, or 14.6% of the total regional NSW land mass (Figure 2).

Agriculture is the major economic driver in the region, generating 10.5% of gross regional product. Manufacturing, including food processing is also a major economic contributor.

FIGURE 1: REGIONAL NSW[2]

Agricultural production is diverse and includes irrigated rice and cotton, winter cereals, horticulture including fruit, nuts and viticulture, as well as extensive areas of dryland cropping and livestock grazing such as beef and sheep and wool. There is also some intensive livestock production of pigs and poultry. The dairy industry is part of the larger irrigated Murray Dairy region, which extends into northern Victoria and is one of Australia's most productive dairy regions.

The strength of agriculture in Riverina Murray is leveraged through downstream supply chains in food processing and distribution. The region includes the NSW Murray and Murrumbidgee irrigation areas that support significant rice, horticulture and an emerging cotton industry.

BROADACRE CROPPING

Broadacre cropping, including cereals, legumes, oilseeds, hay and cotton is the largest industry sector in Riverina Murray. Most crops are produced from dryland farm systems while rice and cotton and some cereals and oilseeds are irrigated. While the number of broadacre farms reduced between 2001 and 2011 there has been an increase in the number of large farms and a reduction in small farms providing strong evidence of consolidation and intensification of output.

Grain is grown across the region and both the area under crop and production levels have been steadily increasing. The main crops by GVAP are cereals, generating around $1,537 million in gross value in 2011 with 68% of this from wheat. The area sown to rice is tied to annual water allocations and reached a peak in 2001 with 167,500 hectares sown. Cotton is emerging as a significant crop in the region with the area planted in southern NSW increasing from around 12,000 ha in 2003-04 to 52,700 ha or 41% of NSW plantings in 2014-15.

[1] ABS 2011 Census
[2] NSW Trade & Investment (2015) Economic Profile: Murray-Murrumbidgee

Economies of scale are the key to success in cropping and technology improvements have enabled farmers to sow larger areas. There is a clear trend towards larger cropping farms and the number of businesses with turnover greater than $1million and an increase in the number of crop-only enterprises has been observed. Improved machinery technology, irrigation water use efficiency, increasing scale, monitoring and benchmarking have been important factors in the success of broadacre cropping and are also important for managing climate and economic risk.

LIVESTOCK – MEAT AND WOOL

Livestock production for meat is the second largest agricultural sector in Riverina Murray generating a GVAP of $575 million in 2010-11 and occupies approximately two thirds of the farmed area. The main meat commodities by GVAP are beef ($252 million) and sheep ($158 million) and wool, which is the fifth largest agricultural sector, had a GVAP of $205 million.

The livestock sector is dominated by a large number of small farms (<500 hectares and <$100,000 EVAO) and there has been little evidence of consolidation. In 2011 there were around 2,305 farms identified as livestock farms and a further 1,520 mixed livestock and grain farms. While cattle numbers have remained steady there has been a 46% drop in the sheep numbers associated with drop in wool prices. Increased demand and high lamb prices have resulted in a shift in managing sheep for wool production to meat production.

Unlike the grains sector, livestock industries in terms of farm business and production management systems have remained relatively static. Livestock grazing producers need to manage a feed base that is highly seasonal which constrains production levels. The large numbers of sub-commercial producers, that are not necessarily subject to the same economic drivers as commercial businesses, may be masking productivity improvements in the commercial beef sector. Access to affordable land, conflict with an increasing number of non-agricultural neighbours, particularly in the eastern parts of the region, are becoming a significant issues for part of the industry

HORTICULTURE

The Riverina Murray region produces around 48% of NSW fruit and nuts and 42% of NSW vegetables and generated nearly $400million in GAP in 2010-11. Horticulture is focused is concentrated in areas with access to reliable irrigation supplies and suitable climate conditions including the Griffith, Tumut, Leeton, Carrathool and Wakool LGA. Economies of scale are a significant factor in the success of horticulture. Increasing scale provides opportunities for introduction of mechanisation and improved water use efficiency.

While the wine and citrus industries have undergone significant restructure, production of other fruit and vegetables has increased, in particularly nuts. Access to labour is a significant issue for the industry, however, export demand is strong for horticultural crops is strong. Crop protection, improved water use efficiency and new varieties are enabling producers to manage climate risks.

DAIRY

The Riverina Murray produces around 25% of NSW milk and the Murray section falls within the broader Murray Dairy region, which is one of the largest dairy producing regions in Australia. Riverina Murray contributes around 10% of the milk produce in the Murray Dairy region. Dairy is concentrated in the south around the Murray and Murrumbidgee Rivers, where there is access to irrigation water.

While the industry was significantly challenged by the millennium drought and a period of low milk prices, milk volumes have remained steady despite a reduction in the number of dairy farms. The future outlook for the industry remains positive.

REGIONAL TRANSPORT INFRASTRUCTURE

The agricultural industry generates significant freight flow, exporting products and importing production inputs such as fertiliser and fuel. Rail freight services move bulk commodities such as wine and grain to major ports. Road freight services move products within the region and to various destinations outside the region. Freight needs for agriculture are projected to grow at between 1 and 3% per annum until 2031. Maintaining road and

rail infrastructure and upgrading strategic road assets to accommodate larger and heavier loads will be important for efficient agricultural freight movement.

IRRIGATION

Irrigated agriculture is a significant component of the agricultural industry in Riverina Murray providing opportunities for production of high value commodities such as fruit, nuts, vegetables, milk, rice and cotton. Water for irrigation is accessed via direct diversion from rivers, privately owned irrigation companies (Murray Irrigation Limited, Murrumbidgee Irrigation Limited and Coleambally Irrigation Cooperative Limited) and groundwater pumping. There are two main irrigation areas are the NSW Central Murray and the Murrumbidgee Valley. Combined, these tow valleys account for around 60% of NSW irrigation water use and 30% of irrigation water use in the Murray Darling Basin. Investment in irrigation delivery and drainage infrastructure off farm and on-farm represents a multi-billion dollar investment by government and industry,

There has been substantial restructure in irrigated agriculture driven by changes to government water policy including the introduction of water trading, the Murray Darling Basin Plan, NSW Water Sharing Plans, ACCC Water Charge & Trading Rules and ACCC Water Price Determinations. Water trading has driven water into higher value irrigated businesses and environmental water recovery has reduced water availability in every traditional irrigation area throughout the Murray Darling Basin. This restructure has been accompanied by significant investment in water efficiency improvements on farm and in water delivery infrastructure.

Currently, it is estimated that there will a reduction of 624GL/year in the NSW Murray and 320 GL/year in the Murrumbidgee catchments to achieve the water recovery targets set out in the Basin Plan. This is likely to result in a reduced irrigation footprint and an increasing proportion of irrigation water used on high value commodities.

CLIMATE VARIABILITY AND CHANGE

Climate change has and will impact the agricultural industry within Riverina Murray. In the short to medium term producers will modify practices, production mixes and varieties to spread risk and reduce the impacts of climate change. Some strategies are already being adopted such as buying or leasing land in areas with more reliable rainfall or irrigation water security. In the longer term, some areas may see significant change in the mix of agricultural industries.

COMPETITIVE ADVANTAGE AND FUTURE OUTLOOK

The anticipated growth in demand for food and agricultural products in Asia should provide opportunities for further export of food produced in Riverina Murray. Numerous free trade agreements both agreed and currently being negotiated will facilitate flow of locally grown agricultural produce and value-added food products from Australia. Global growth in the “middle class” in Asia is leading to increased demand for quality food, including high end agricultural products such as fruit, dairy, high grade meats. This means potential opportunities for the Australian agricultural sector to grow in export significance.

The strengths of the Riverina Murray region include:

- The scale, diversity and productivity of agricultural land in the region.
- Good transport networks with most major highway and rail corridors crossing the region.
- Significant water infrastructure and irrigation capacity.
- An international reputation for food manufacturing with strong processing and supporting industries.

The competiveness of agriculture in the Riverina Murray region will be reliant on farmers being able to:

- Maintain productivity growth levels, especially in broadacre farming, in light of a flattening out of growth over recent years
- Innovate and adopt emerging technologies and improve their efficiency
- Manage high production costs, in particular labour costs
- Access an efficient supply chain – from farm to warehouse / manufacturer or bulk terminal to port
- Access secure water supplies for irrigated agriculture
- Manage natural resource pressures, especially associated with climate change

- Be highly attuned to international market developments.

Expansion in agriculture will require upgrades to freight, produce handling and transport infrastructure in some areas. Further diversification of some agricultural industries and value adding will need to attract increased capital investment. The location of the region has strategic competitive advantages for transport and logistics, however, the area is currently not well served by telecommunications and internet infrastructure. Future agricultural and processing business growth in the region will be reliant on a high speed, affordable and reliable communication network. This will be especially important for attracting manufacturing and technology based industries from Sydney.

RECOMMENDATIONS FOR RURAL AND LOCAL STRATEGIC PLANNING

Regional growth planning can support agriculture in Central West & Orana and maintain its competitive advantage by:

- Ensuring land suited agriculture is held in lot sizes suited to commercial agriculture
- Preventing uses and development not associated with primary production within areas identified for agriculture
- Maintaining separation between agriculture and urban development and other sensitive uses
- Facilitating restructure to enable economies of scale, adoption of new technology and more efficient management and land irrigation practices
- Ensuring urban development and sub-commercial agriculture are directed to areas outside irrigated areas or areas with the potential to be developed for irrigated agriculture
- Encouraging flexible and adaptable freight connectivity to the transport network
- Supporting freight and logistics precincts and intermodal hubs with the capacity to grow and adapt to changing needs
- Encouraging improved regional communications network.

1 AGRICULTURAL LAND AND INDUSTRY DEVELOPMENT STRATEGY

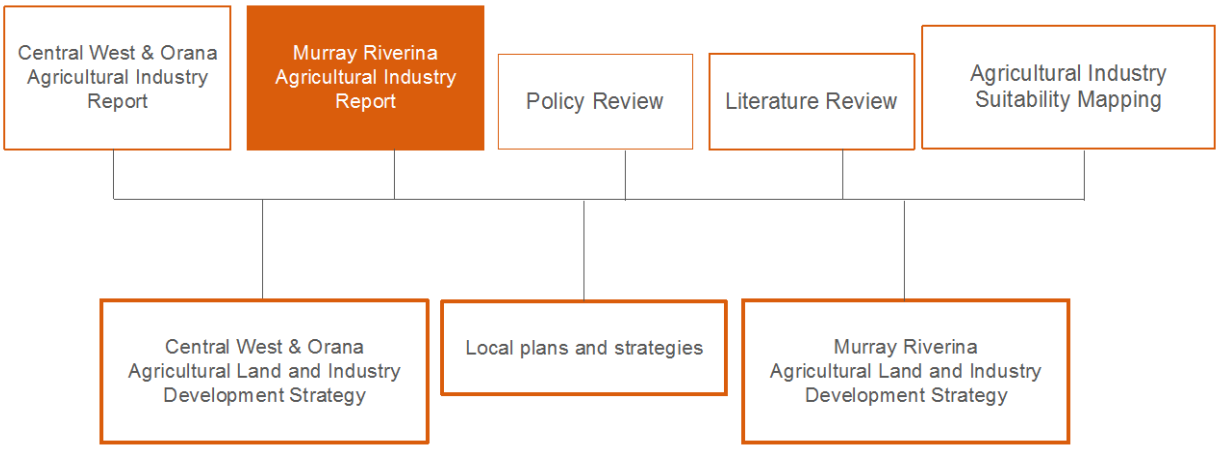
The Department of Planning and Environment (DPE) is undertaking regional strategic planning to inform growth and sustainability of the regions over the next 20 years. The Regional Plans will guide:

- The location of new settlement and infrastructure
- Protection of key industries and landscapes with appropriate planning tools
- Environmental and natural resource management across the region.

It is recognised that agriculture is an important economic driver in New South Wales (NSW) and that it is essential to maintain the industry's economic viability into the future. In order to plan for the prosperity of the regions, a solid evidence base is required to inform development of regional and local policies. DPE has commissioned the Agricultural Land and Industry Development Strategy to build an evidence base. The intention of the strategy is to:

- Provide a concise analysis of the nature of agriculture in the regions
- Identify the issues faced by industry
- Identify opportunities for growth
- Identify land use planning barriers to opportunities
- Make policy recommendations to promote and facilitate growth in the sector, and
- Provide guidance and advice as a resource to assist land use decision making at both the local and regional level.

The outcomes of the study are reported in five companion documents and will inform preparation and development of regional, including regional growth plans, and local plans and strategies:



2 INTRODUCTION

REPORT PURPOSE

This report examines the current status and trends relevant to the main agricultural industries within the Riverina Murray region of NSW. The approach taken has involved analysis of available statistical data (sourced from the Australian Bureau of Statistics) and desktop review of regional and industry reports to identify the most important issues facing producers and their industries, and the main drivers of change in these industries.

This study focuses on the main agricultural industries in Riverina Murray:

- Dryland cropping – cereals, oil seeds and legumes
- Livestock – cattle, sheep, pigs and poultry
- Perennial horticulture – orchard fruits, nuts and wine grapes
- Irrigated crops – rice and cotton
- Wool
- Annual horticulture - vegetables
- Dairy – milk

DATA SOURCES

The statistical data in this report has been sourced from the Australian Bureau of Statistics (ABS). ABS undertake an Agricultural Census of farm businesses every five years and an Agricultural Survey in the interim years reporting estimates for Statistical Local Areas (SLA's), the smallest spatial unit of the Australian Standard Geographic Classification (ASGC 2006). The 2011 Census data and 2012 and 2013 surveys were collated by Statistical Area Level 2 (SA2). SLA and SA2 boundaries do not line up exactly but for most parts of the region they are close enough to generate meaningful time series data sets. A map showing SA2 boundaries in Riverina Murray is provided in Appendix 1.

Industry sector time series data sets using the Australian and New Zealand Standard Industry Classification (ANZIC) output and number of farms by "Estimated Value of Agricultural Operation (EVAO) ranges (from 2001, 2006 and 2011) and "Area of Holding" (AOH) ranges were also analysed[3]. A farm business is considered to be 'in-scope' and part of the survey where the EVAO is greater than $5,000 per year.

Unless otherwise referenced, data in graphs and tables throughout this report have been sourced from the Australian Bureau of Statistics.

[3] Compiled by Neil Clark & Assoc. Bendigo, Victoria.

REGIONAL CONTEXT

The Riverina Murray region in central southern NSW borders the ACT in the east and Victoria in the south and covers 26 local government areas. The region includes the major centres of Wagga Wagga, Albury and Griffith. The region covers an area of 115,096 square kilometres, or 14.6% of the total regional NSW land mass (Figure 2) and comprises 26 Local Government Areas (LGA) including: Albury, Berrigan, Bland, Carrathool, Conargo, Coolamon, Cootamundra, Corowa, Deniliquin, Greater Hume, Griffith, Gundagai, Hay, Jerilderie, Junee, Leeton, Lockhart, Murray, Murrumbidgee, Narrandera, Temora, Tumbarumba, Tumut, Urana, Wagga Wagga and Wakool. The region has a population of 266,350[4] and is projected to increase to 274,450 by 2031 (a 0.2% annual compound growth rate).

Agriculture is the major economic driver in the region, generating 10.5% of gross regional product. Manufacturing, including food processing is also a major economic contributor (Table 1).

FIGURE 2: REGIONAL NSW[5]

TABLE 1: INDUSTRY GROSS REGIONAL PRODUCT AND EMPLOYMENT IN RIVERINA MURRAY[3]

TOP 5 INDUSTRIES BY CONTRIBUTION TO GROSS REGIONAL PRODUCT (2013)	TOP 5 EMPLOYERS BY INDUSTRY (2011)
1. Agriculture, Forestry and Fishing (11%)	1. Health Care and Social Assistance (11%)
2. Manufacturing (10%)	2. Retail Trade (11%)
3. Public Administration and Safety (7%)	3. Agriculture, Forestry and Fishing (11%)
4. Health Care and Social Assistance (7%)	4. Manufacturing (10%)
5. Education and Training (6%)	5. Accommodation and Food Services (8%)

[4] ABS 2011 Census
[5] NSW Trade & Investment (2015) Economic Profile: Murray-Murrumbidgee

3 REGIONAL AGRICULTURE

This section of the report provides an overview of agriculture in the Riverina Murray region including the economic contribution of key industries, land use and employment.

AGRICULTURAL PRODUCTION

In 2010-11, the Riverina Murray Gross Value of Agricultural Production (GVAP) was around $3.4 billion, the highest in NSW accounting for 30% of the State's GVAP (Figure 3) and over 11% of the regional workforce.

Agricultural production is diverse and includes irrigated rice and cotton, winter cereals, horticulture including fruit, nuts and viticulture, as well as extensive areas of dryland cropping and livestock grazing such as beef and sheep and wool. There is also some intensive livestock production of pigs and poultry. The dairy industry is part of the larger irrigated Murray Dairy region, which extends into northern Victoria and is one of Australia's most productive dairy regions.

The strength of agriculture in Riverina Murray is leveraged through downstream supply chains in food processing and distribution. The region includes the NSW Murray and Murrumbidgee irrigation areas that support significant rice, horticulture and an emerging cotton industry.

The most important agricultural industry in the region measured by GVAP was broadacre cropping contributing over 59% of GVAP followed by meat (beef, sheep, pigs and poultry), perennial horticulture (fruit, nuts and wine grapes), irrigated rice and cotton and wool (Table 2). Combined, these five industries comprise 90% (approximately $3 billion) regional GVAP. Broadacre cropping, livestock meat and wool, perennial and annual horticulture, milk and egg production are all significant at the State level, generating 35%, 19%, 28%, 48%, 42%, 24% and 24% of NSW GVAP of these sectors respectively (Table 2).

Irrigated horticulture and cropping contributes around $650million or 20% of total GVAP and comprises fruit, nuts, vegetables, rice and cotton. A comparison of GVAP per hectare of the major commodity groups highlights the importance of irrigation to regional agriculture (Figure 4). (It should be noted that GVAP/ha is subject to seasonal conditions and commodity prices. The magnitude difference between commodity groups will however be relatively steady). While horticulture, rice and cotton occupy a relatively small land area they generate significant GVAP.

The egg and nursery industries are also represented in the region. Ten commodities comprise 78% of the region's GVAP (Table 3). In descending order they are wheat, beef, wool, barley, canola, rice, sheep meat, dairy, pigs and wine grapes.

The LGA contributing the most to regional GVAP are Bland (cropping and livestock), Griffith (horticulture) and Carrathool (cropping and horticulture) followed by Greater Hume (mixed farming), Berrigan (mixed farming and dairy), Narrandera (mixed farming), Wakool (mixed farming and dairy), Corowa (mixed farming), Wagga Wagga (mixed farming and dairy), Temora (mixed farming), Coolamon (mixed farming) and Lockhart (mixed farming) (Figure 5, Figure 6).

In the decade between 2000-01 and 2010-01, total Riverina Murray GVAP increased by 25% from $2.7billion. This growth is exceptional as the region experienced the millennium drought and a period of zero allocations in many irrigation areas.

FIGURE 3: REGIONAL GVAP AS A PROPORTION OF NSW GVAP, 2010-11

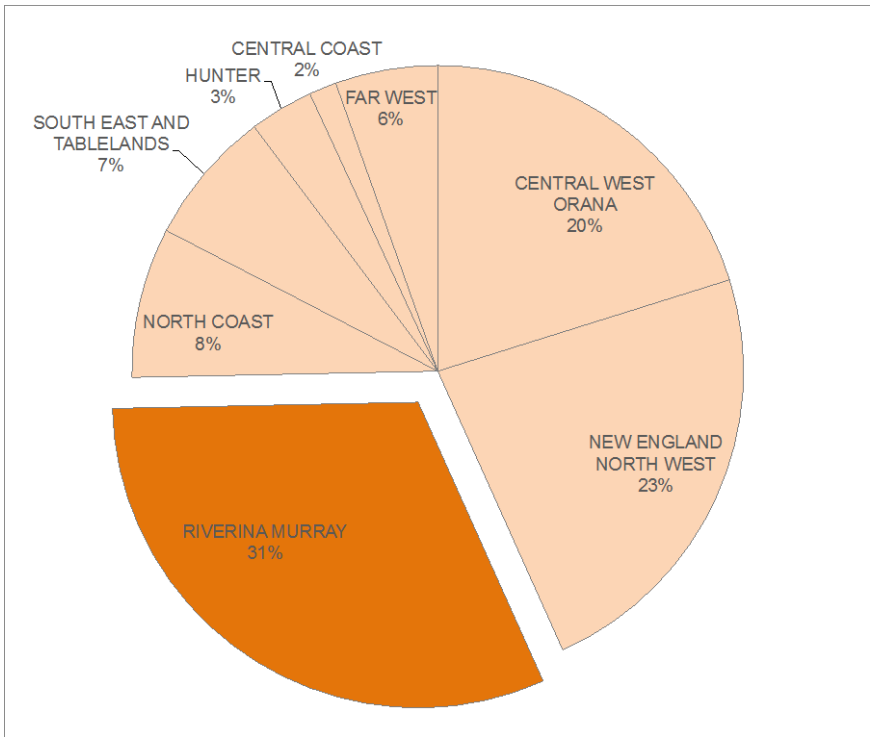


TABLE 2: GVAP BY INDUSTRY SECTOR[6], RIVERINA MURRAY 2010-11

	INDUSTRY SECTOR	GVAP $MILLION	PROPORTION OF TOTAL MM GVAP	PROPORTION OF NSW INDUSTRY SECTOR GVAP
1	Broadacre cropping	$1,993	59%	36%
2	Livestock (beef, sheep, pigs & poultry)	$575	17%	19%
3	Perennial hort. (fruit, nuts & wine grapes)	$256	8%	48%
4	Wool	$238	7%	28%
5	Annual horticulture (vegetables)	$141	4%	42%
6	Dairy	$123	4%	24%
7	Eggs	$46	1%	24%
8	Nurseries (incl. cut flowers & turf)	$15	0.4%	5%
TOTAL		**$3,387**	**100%**	

TABLE 3: TOP AGRICULTURAL COMMODITIES BY GVAP, RIVERINA MURRAY 2010-11

	MAIN AGRICULTURAL COMMODITIES	GVAP $MILLION	PROPORTION OF TOTAL MM GVAP
1	Wheat	$1,045	31%
2	Beef	$252	7%
3	Wool	$238	7%
4	Barley	$232	7%
5	Canola	$226	7%
6	Rice	$169	5%
7	Sheep meat	$158	5%
8	Dairy	$123	4%
9	Pigs	$110	3%

[6] ABS 2010-11 (NSW ag database – % value of NSW sheet)

10	Wine grapes	$81	2%
TOTAL		**$2,634**	**78%**

FIGURE 4: GVAP PER HECTARE MAJOR COMMODITY GROUP, RIVERINA MURRAY 2010-11

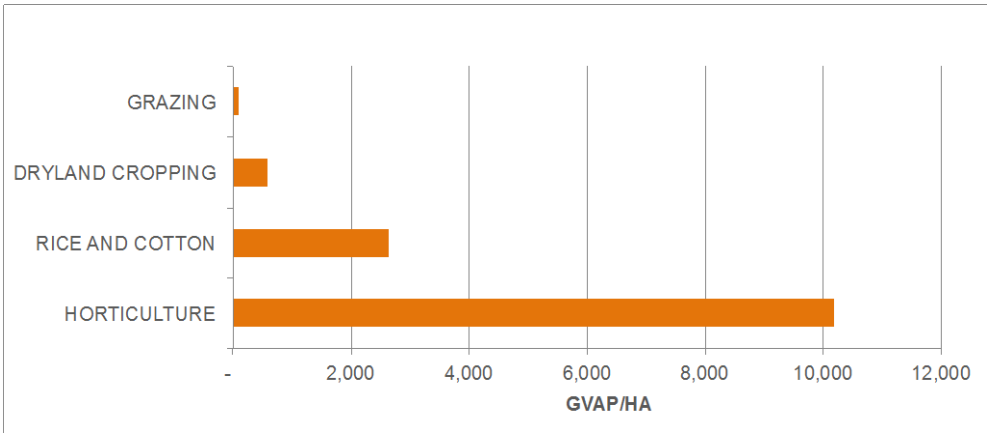


FIGURE 5: REGIONAL DISTRIBUTION OF GVAP, RIVERINA MURRAY 2010-11

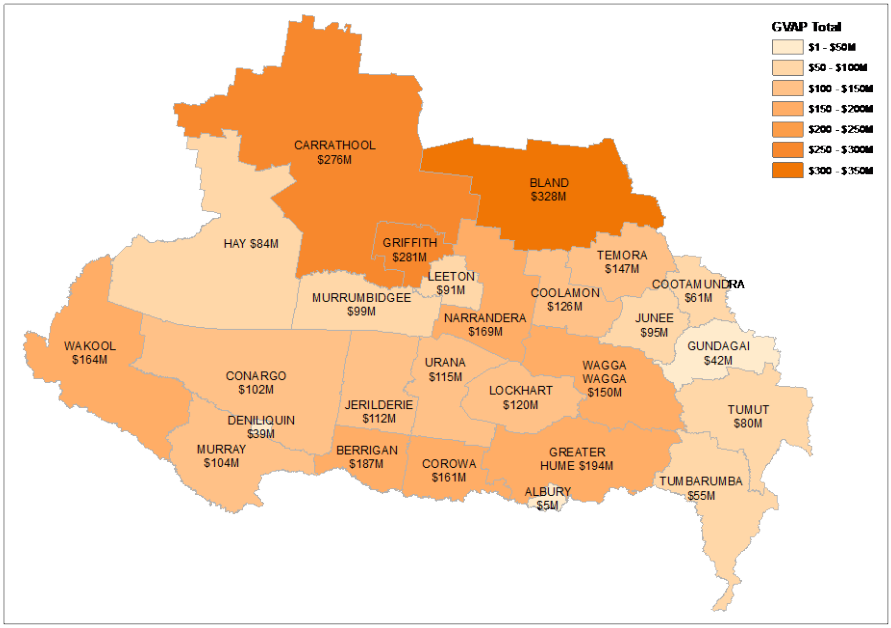
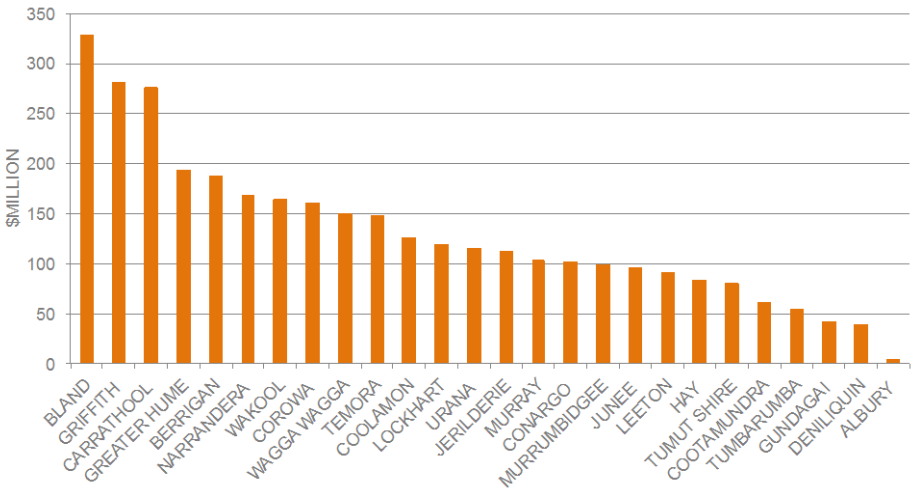


FIGURE 6: GVAP BY LGA, RIVERINA MURRAY, 2010-2011



AGRICULTURAL LAND USE

Around 96,000 square kilometres (km^2) is held in private ownership in Riverina Murray, of which over 91,000 km^2 is used for productive agriculture (Table 4). Areas set aside for conservation and non-agricultural production occupy 5,000 km^2, or 5% of private land.

The most common land use by area is grazing, which occupies approximately 66% of productive agricultural land with around 35% of this improved pastures and 65% unimproved or native pastures. Broadacre cropping and horticulture occupy the remaining 34% of productive agricultural land.

Of the 31,000 km^2 of cropped land in 2011, wheat was the main crop grown, representing approximately 45% of the cropped area. Barley accounted for approximately 12% of the cropped area and canola 8%. Combined, rice and cotton accounted for approximately 3% of the cropped area. Horticulture occupied a relatively small area, estimated at around 39,000 hectares in 2010-11.

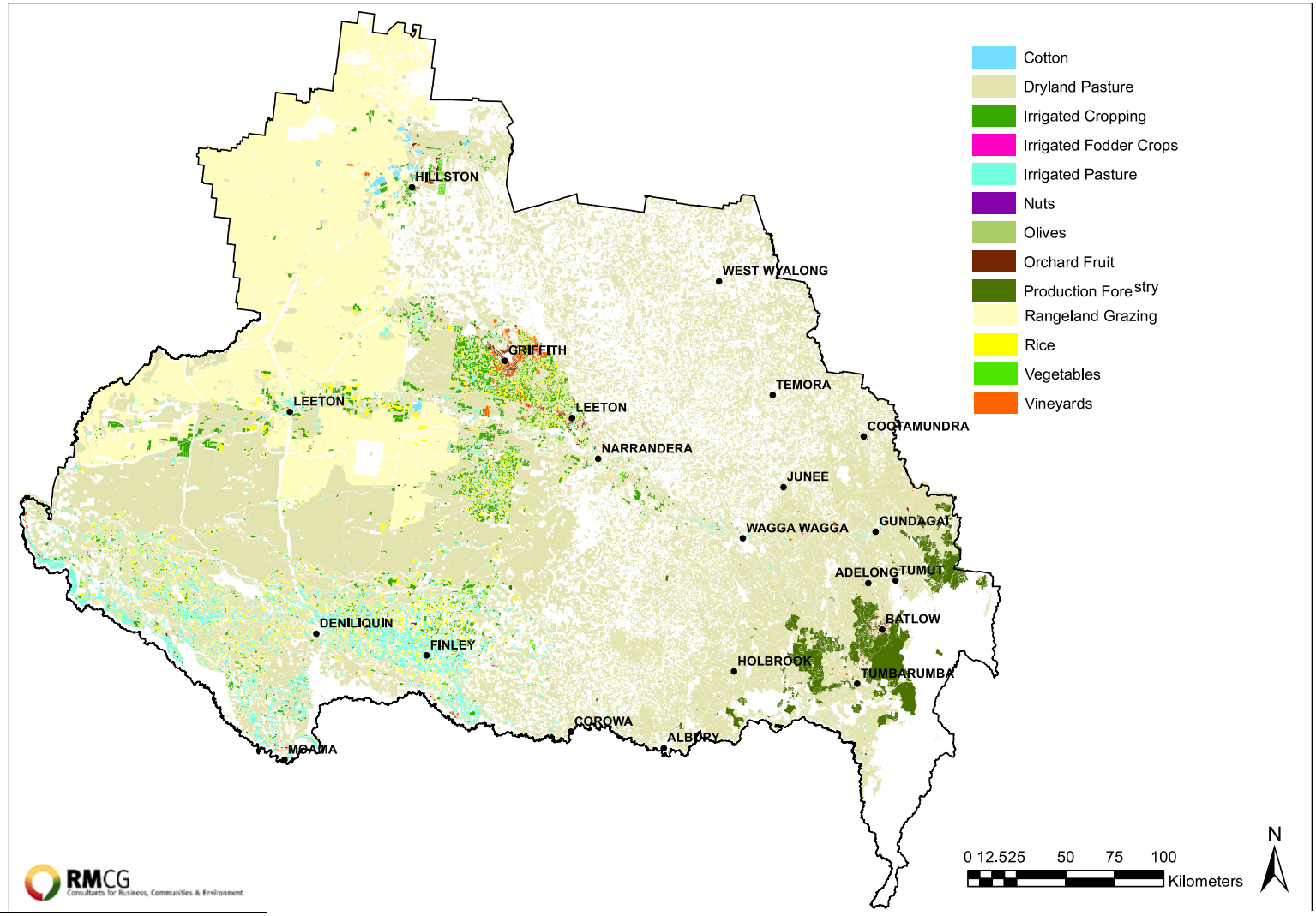
TABLE 4: USE OF PRIVATE LAND IN RIVERINA MURRAY 2010-11[7]

LAND HOLDING DESCRIPTION	SQUARE KM
Area of private land	96,000
Area used for productive agriculture	91,000
(Area of crops)	(31,000)
(Area of grazing)	(60,000)
Land set aside for conservation	3,000
Other areas not used for agricultural production	2,000
Area of forestry plantations & other	100

Productive agricultural land occupies approximately 91,000 square kilometres (km^2), or 78% of the region. The most common land use by area is grazing which occupies approximately 60,000 km^2 or 66% of the productive land Figure 7.

[7] ABS 2010-11 (NSW ag database – Area Comp spreadsheet)

FIGURE 7: AGRICULTURAL LAND USE RIVERINA MURRAY (2006)[8]



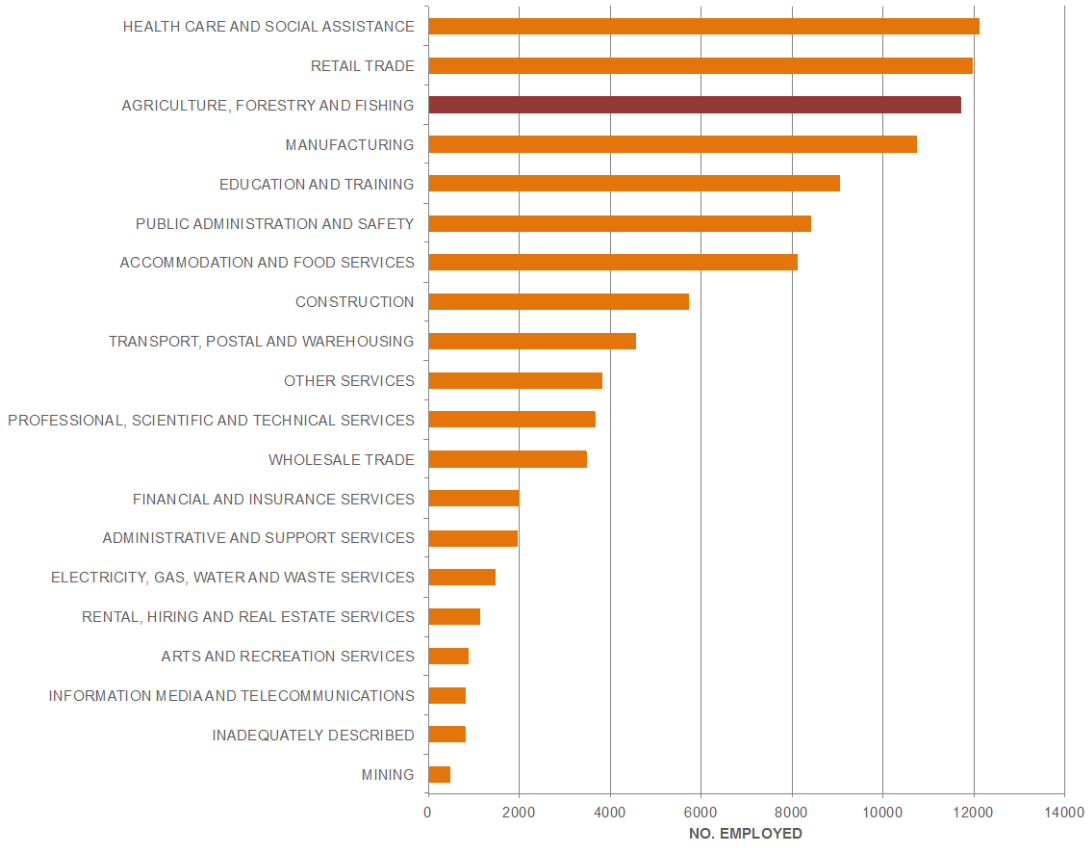
[8] Land use data from Australian Bureau of Statistics provided by Department of Primary Industry

EMPLOYMENT IN AGRICULTURE

In 2010-11, 102,946 people were employed in the Riverina Murray region[9], equating to 3% of total employment in New South Wales. Agriculture, forestry and fishing was the third largest employment sector in the region, employing approximately 11,700 people or 11% of the region's workforce (Figure 8) and 17% of all people employed in the New South Wales agriculture, forestry and fisheries sector.

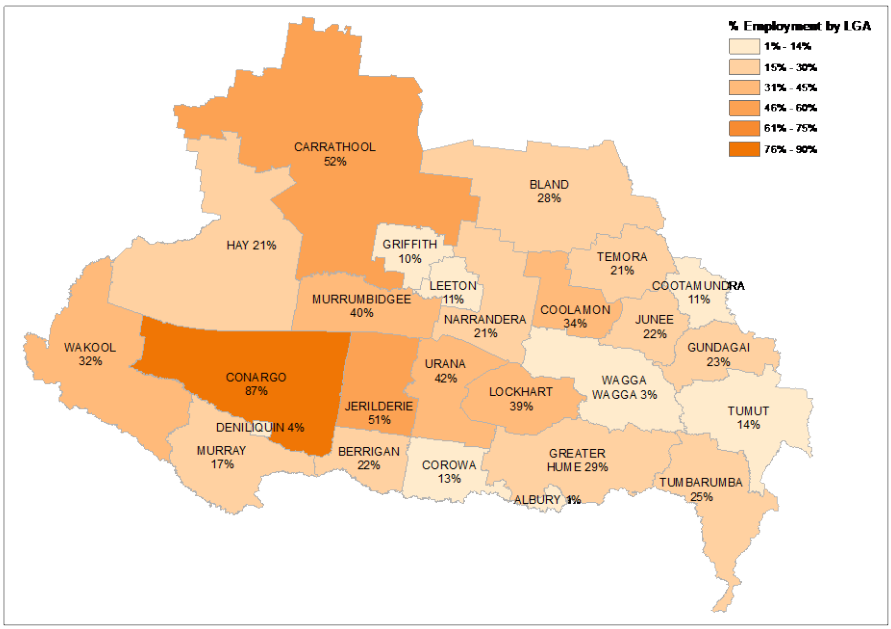
Figure 9 shows the distribution of employment in the agricultural sector across the Riverina Murray region. The LGAs with the highest proportion of employment in agriculture are Conargo (87%), Carrathool (52%), Jerilderie (51%), Urana (42%) and Murrumbidgee (40%).

FIGURE 8: EMPLOYMENT BY SECTOR, RIVERINA MURRAY, 2011



[9] ABS 2010-11 (NSW ag database – RGP employment spreadsheet)

FIGURE 9: EMPLOYMENT IN AGRICULTURE AS A PERCENTAGE OF TOTAL LGA EMPLOYMENT, RIVERINA MURRAY 2010-11



VALUE CHAIN

Primary production in Riverina Murray also supports a significant value chain including food processing and manufacturing, transport and logistics, professional services and farm supplies. Turnover of manufacturing and wholesale businesses alone was estimated to value over $3.5billion in 2011 and employed over 5,500 people (Figure 10). The value chain is concentrated in the regional centres of Wagga, Griffith and Leeton, but is local significant in other smaller population centres (Figure 11).

FIGURE 10: BUSINESS TURNOVER AGRICULTURAL MANUFACTURING AND WHOLESALEING, RIVERINA MURRAY 2010-11

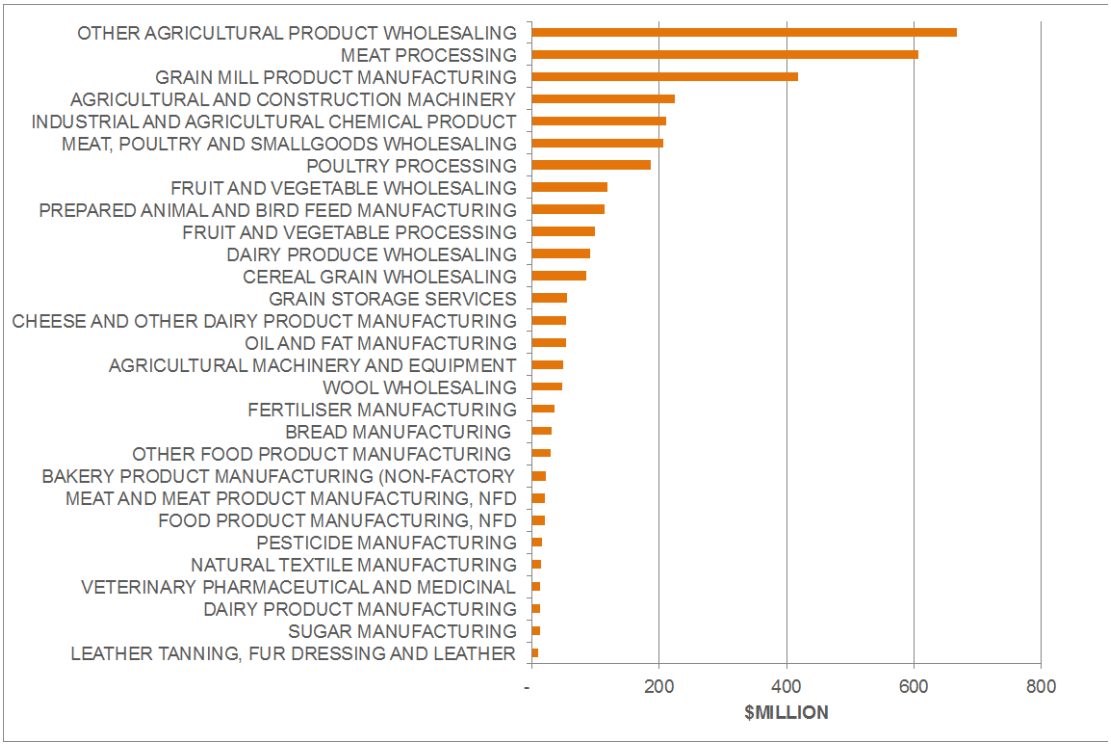
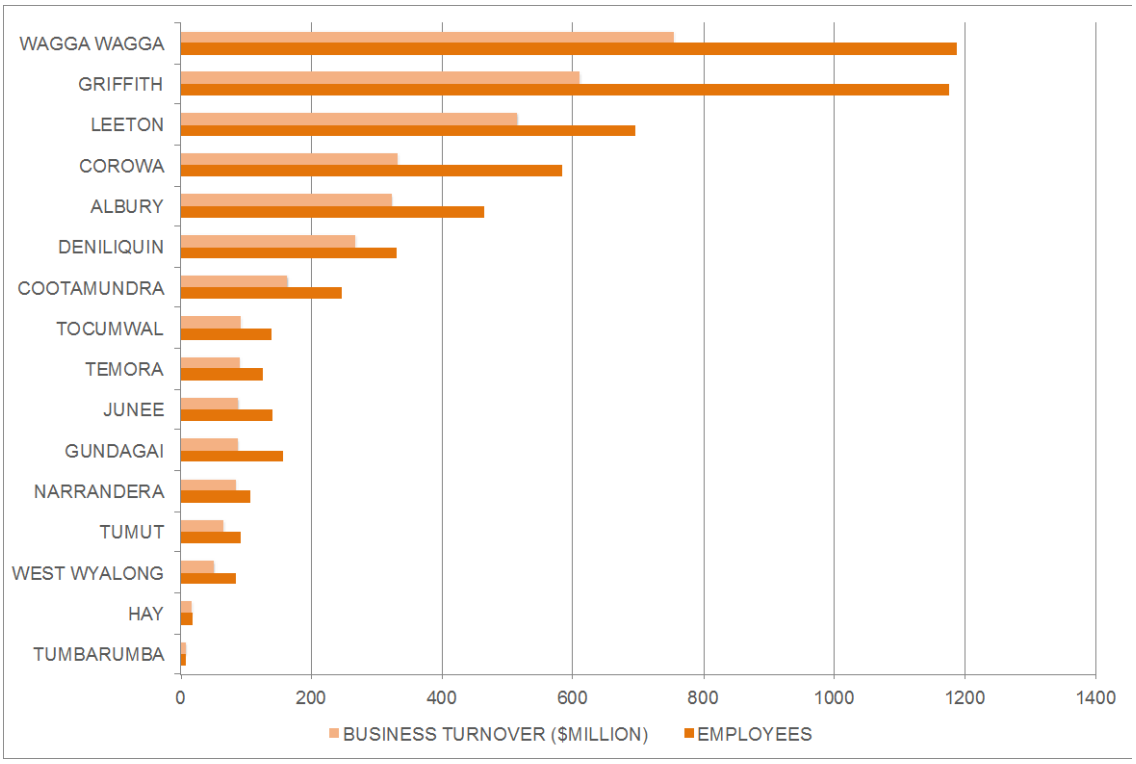


FIGURE 11: EMPLOYMENT AND BUSINESS TURNOVER AGRICULUTRAL MANUFACTURING AND WHOLESALEING BY NCSA2, RIVERINA MURRAY 2010-11



MAJOR TRENDS

The GVAP of wheat increased six-fold over the past 20 years from $158 million in 1992 up to $878 million in 2013. Canola has recently emerged as a major commodity with a significant increase in GVAP from $63 million in 2010 to an all time high of $460 million in 2013. Rice fluctuates in response to irrigation water allocations. The GVAP from rice reached an all time low in 2008 associated with the millennium drought but has since increased to pre-2000 production levels (Figure 12).

The availability of cool climate varieties, buoyant prices and higher reliability of irrigation water supplies in southern NSW have resulted in a rapid expansion of cotton production. Around 400,000 bales of cotton, or 17% of national production were harvested in southern NSW in 2013-14 and this is expected to increase to 600,000 bales in the 2014-15 season[10].

The gross value of sheep meat increased five-fold over the past 20 years from $26 million in 1992 to $124 million in 2013. There has been a small increasing trend in the gross value of beef over the past two decades, increasing from $150 million in 1992 to $241 million in 2013. Wool has fluctuated around $250 million in gross value showing neither an increasing or decreasing trend. This represents a loss in value in real terms (Figure 13).

Wine grapes emerged as a major commodity during the mid to late 1990's and continued to grow for around a decade peaking at $173 million in 2008. Global over-supply and drop in prices has resulted in a drop in GVAP of wine grapes Overall there has been a four-fold increase in the gross value of wine from $27 million in 1992 to $105 million in 2013. Similarly, the gross value of citrus grew into the early 2000's however, has since decreased with a drop in citrus prices. Both industries were significantly impacted by reduced water allocations during the millennium drought (Figure 14).

[10] http://www.cottongrower.com.au/images/articles/cd8b3adb26fb3c49e77b0c669be067ef.pdf

FIGURE 12: TREND IN GVAP OF BROADACRE CROPS, RIVERINA MURRAY

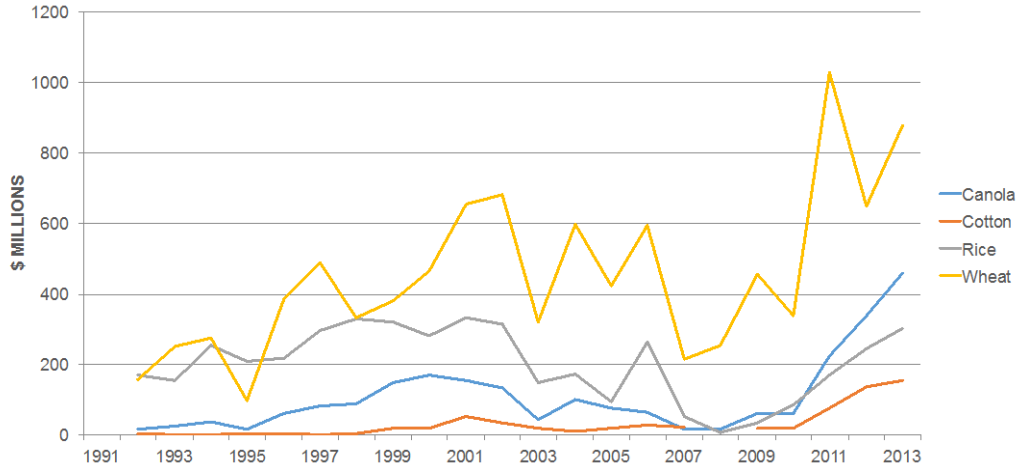


FIGURE 13: TREND IN GVAP OF LIVESTOCK PRODUCTS, RIVERINA MURRAY

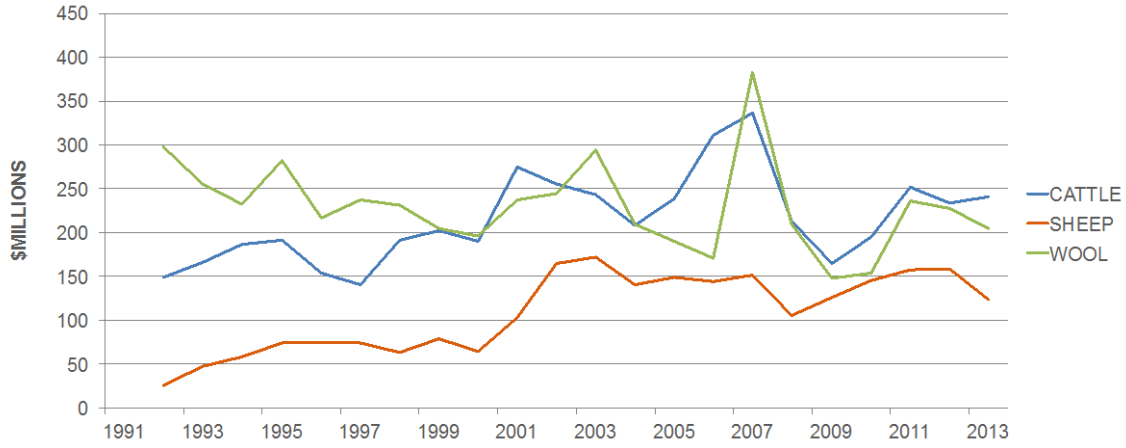
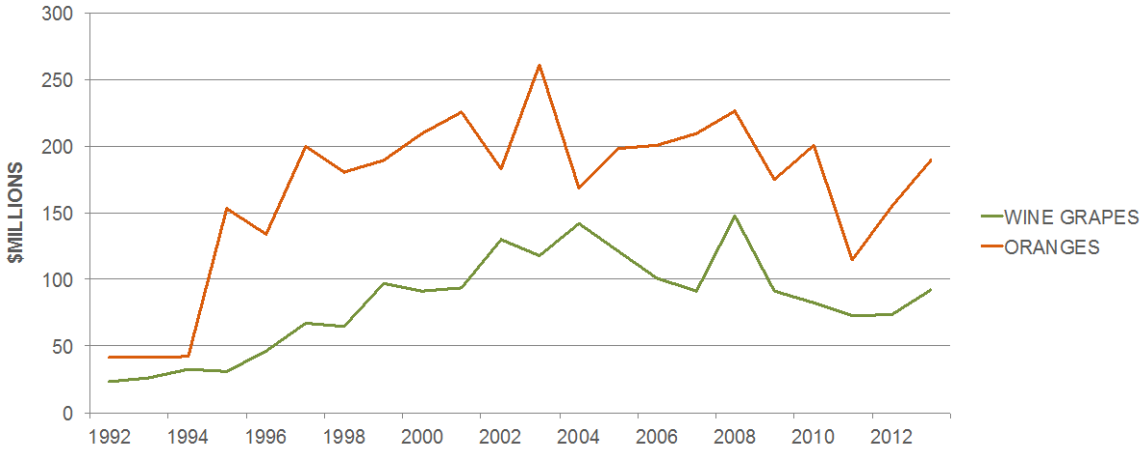


FIGURE 14: TREND IN GVAP OF WINE GRAPES AND ORANGES, RIVERINA MURRAY



STRATEGIC IMPLICATIONS

Agriculture and the value chain are significant sectors of the economy of Riverina Murray. Agriculture is the region's most widespread land use and is diverse, ranging from irrigated horticulture and cropping in the Murray, Macquarie and Lachlan Valleys to large scale dryland cropping and grazing. Agriculture and the value

chain provide significant employment and exports from the region. The main regional agricultural commodities have shown sustained growth in terms of value of production. The continued success of agriculture will be vital to the prosperity and growth prospects of the region. Planning should facilitate ongoing agricultural productivity and encourage investment in the value chain.

4 MAJOR AGRICULTURAL INDUSTRY SECTORS

This study focuses on seven main agricultural industries in the Riverina Murray region:

- Cropping – cereals, oil seeds and legumes, rice and cotton
- Livestock – cattle, sheep
- Perennial horticulture – orchard fruits, nuts and wine grapes
- Wool
- Annual horticulture - vegetables
- Dairy

The following sections provide a detailed analysis of these industries.

5 CROPPING

MAIN FINDINGS

- Broadacre cropping, including cereals, legumes, oilseeds, hay and cotton is the largest industry sector in Riverina Murray
- Most crops are produced from dryland farm systems while rice and cotton and some cereals and oilseeds are irrigated
- There were approximately 3,500 broadacre farms in 2011 including (grains-only, and mixed farms) a reduction of 31% since 2001. At the same time there was an increase in the number of large farms (>2,500hectare and >$1million EVAO) and a reduction in smaller farms providing strong evidence of consolidation and intensification of output.

GRAINS

- Grain is grown across the region and both the area under crop and production levels have been steadily increasing.
- The main crops by GVAP are cereals, generating around $1,537 million in gross value in 2011 with 68% of this from wheat.
- Over the past 20 years the GVAP from wheat has increased five-fold increase and the area sown has doubled and the GVAP from canola increased 25 fold and the area sown ten fold.
- The area sown to rice is tied to annual water allocations and reached a peak in 2001 with 167,500 hectares sown. In 2008 and 2009, when water allocations were minimal, the area sown to rice reached its lowest levels in the last 20 years.

COTTON

- Cotton is emerging as a significant crop in the region.
- The area of cotton grown in southern NSW from around 12,000 ha in 2003-04 to 52,700 ha or 41% of NSW plantings in 2014-15

CURRENT SITUATION

Broadacre cropping is the largest industry sector in Riverina Murray contributing 59% ($1,993 million) of total regional GVAP in 2010-11. Cereals (including rice) contribute over 77% ($1,537 million), oilseeds 12% ($226 million), legumes 2% ($45 million) hay 5% ($96 million) and cotton 4% ($76 million) (Figure 15). Riverina Murray cropping is also significant at a state level contributing 36% of NSW's production in 2010-11.

Wheat generates the most gross value ($1,045 million) accounting for 68% of cereals and 52% of total cropping output in 2010-11 (Figure 16). The main wheat producing LGA were Bland, Carrathool, Narrandera and Temora (Figure 19). Barley and oats are the next highest by value at $232 million and $40 million respectively while production of irrigated summer cereals such as sorghum and maize is relatively minor. Bland, Narrandera and Carrathool were the main barley growing LGA (Figure 22).

Canola accounts for $226million of GVAP and 99% of the gross value of oilseed crops in the region. Canola was mostly grown in Greater Hume, Lockhart and Temora (Figure 21.

Hay production (mostly comprising cereal and pasture hay types) generated $96 million in 2010-11 (Figure 17). Legume crops generated $45 million, comprising mostly lupins ($38 million) and field peas ($5 million) (Figure 18).

Irrigated broadacre cropping comprising rice and cotton in Riverina Murray had a combined GVAP of $245 million or 13% of the total cropping GVAP for the region in 2010-11.The main rice producing LGA in 2010-11 were Griffith, Wakool, Murrumbidgee and Jerilderie (Figure 22) and Carrathool and Hay are the main cotton growing LGA (Figure 23).

FIGURE 15: GVAP OF GRAIN AND COTTON AS A PERCENTAGE OF TOTAL BROADACRE CROPPING GVAP, RIVERINA MURRAY 2010-11

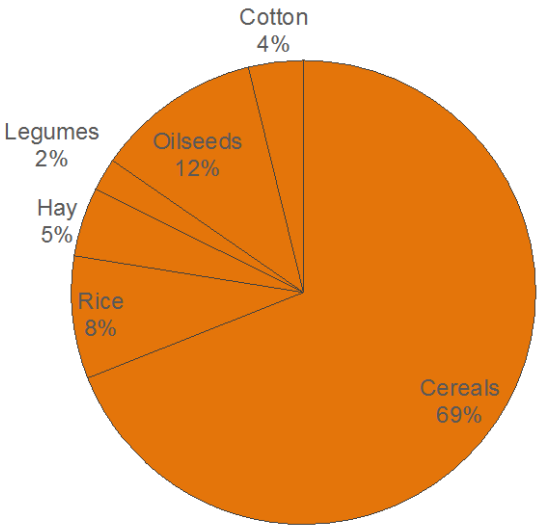


FIGURE 16: GVAP OF CEREALS, RIVERINA MURRAY 2010-11

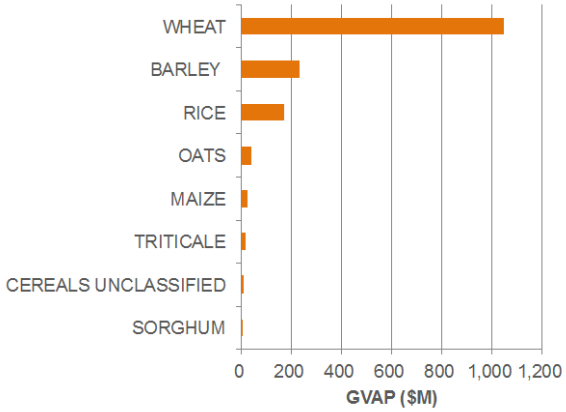


FIGURE 17: GVAP OF HAY, RIVERINA MURRAY 2010-11

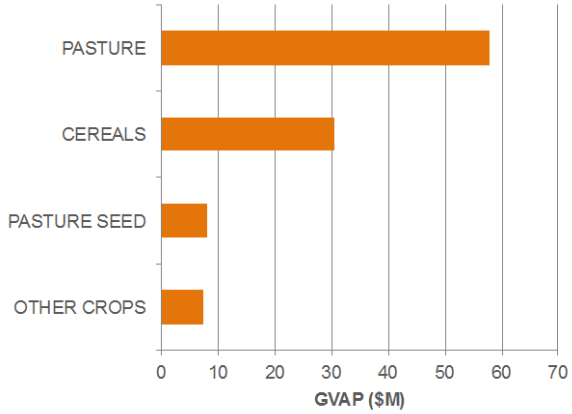


FIGURE 18: GVAP OF LEGUMES, RIVERINA MURRAY 2010-11

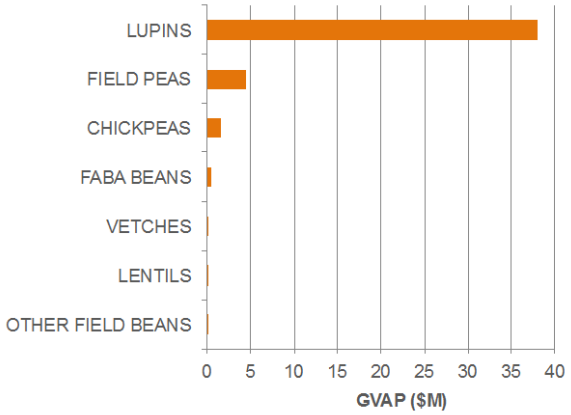


FIGURE 19: DISTRIBUTION OF WHEAT GVAP, RIVERINA MURRAY 2010-11

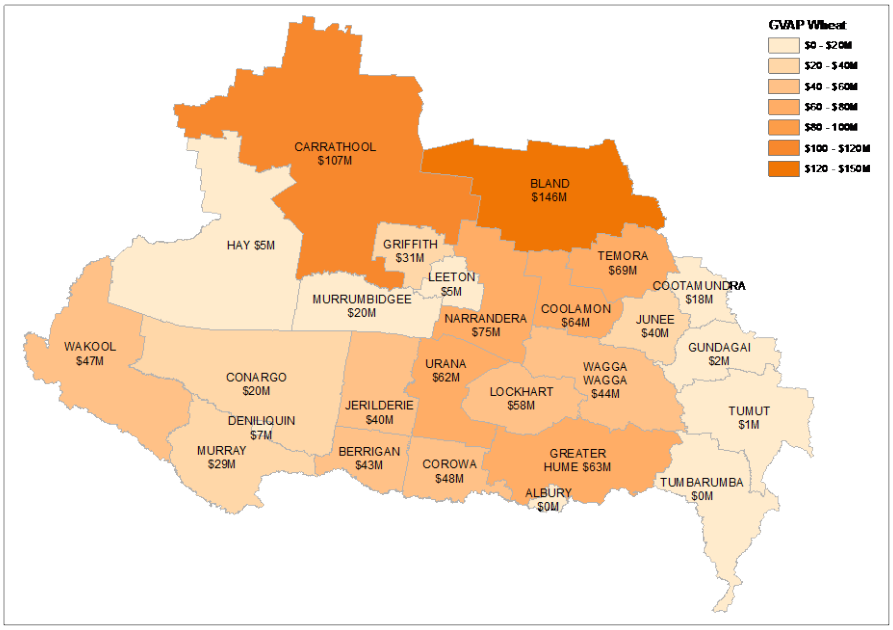


FIGURE 20: DISTRIBUTIONOF OF BARLEY GVAP, RIVERINA MURRAY 2010-11

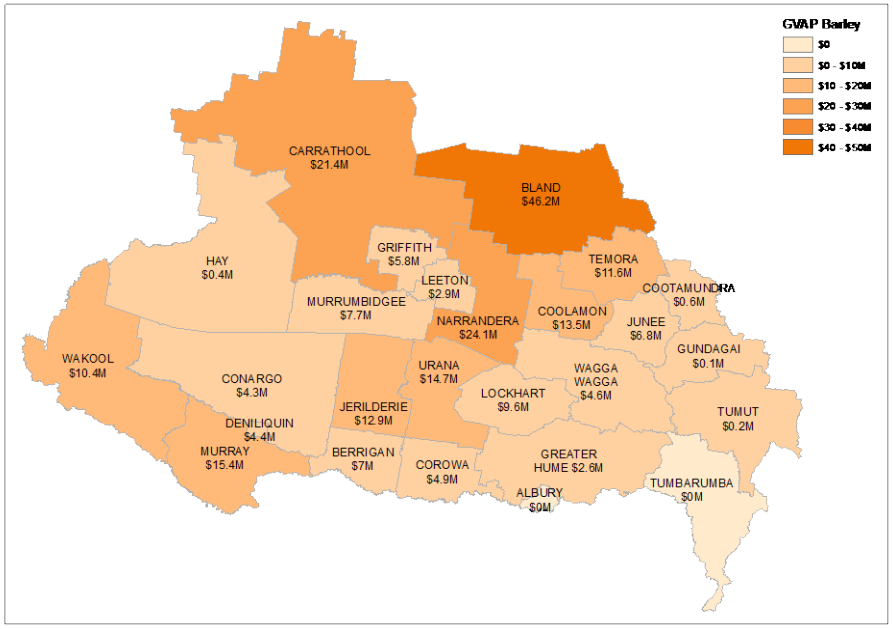


FIGURE 21: DISTRIBUTION OF CANOLA GAVP, RIVERINA MURRAY 2010-11

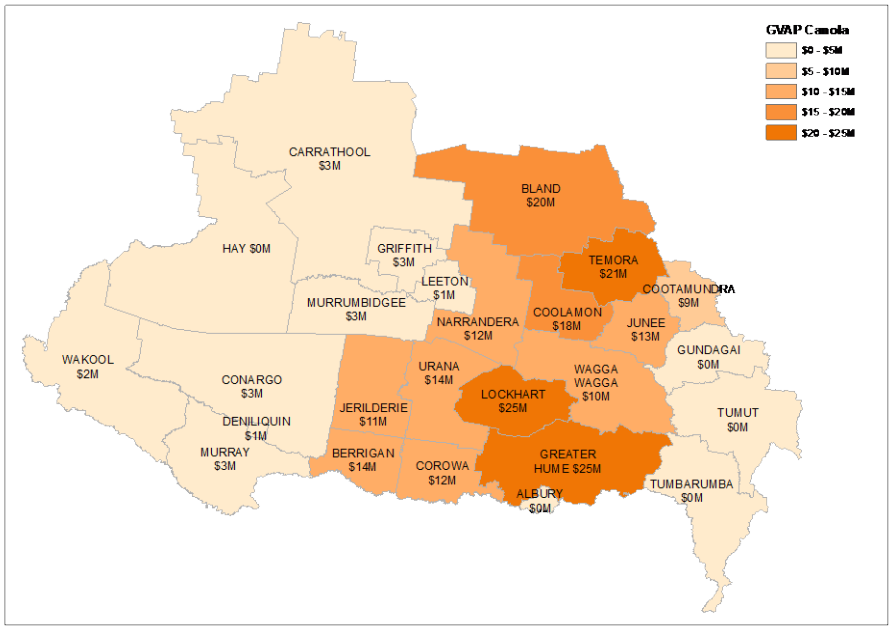


FIGURE 22: DISTRIBUTION OF RICE GVAP, RIVERINA MURRAY 2010-11

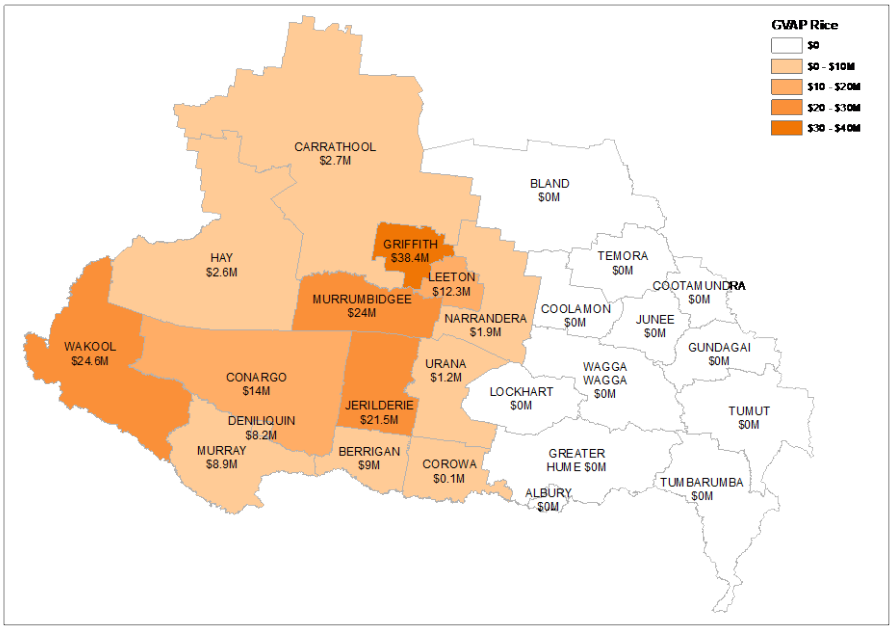
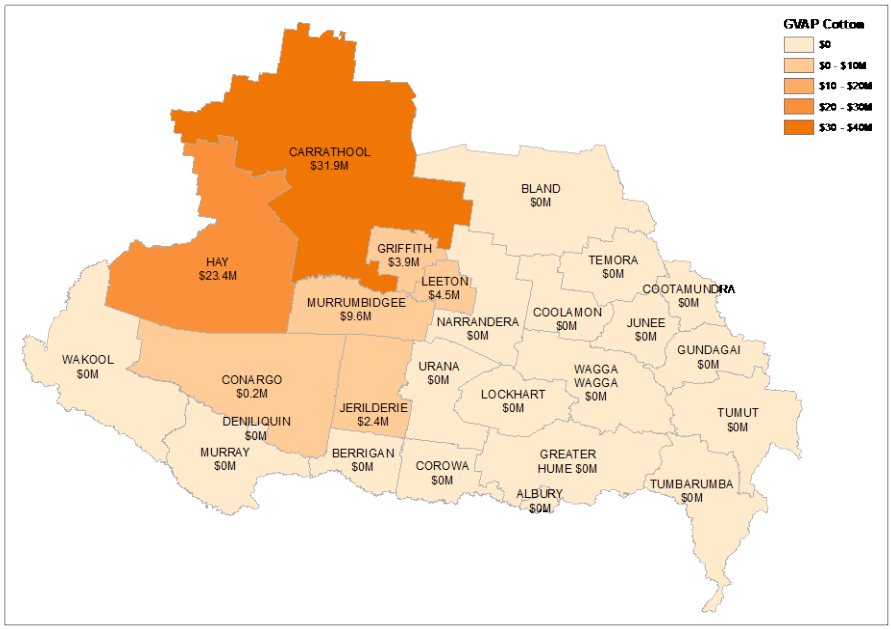


FIGURE 23: DISTRIBUTION OF COTTON GVAP, RIVERINA MURRAY 2010-11



INDUSTRY TRENDS

Around 3,500 farms are identified as grain growing farms in the region with around 40% of these including a livestock enterprise. Since 2001, the number of broadacre mixed and cropping farms has decreased by around 24% from around 4,700 farms while at the same time there has been an increase in the area and production of grain.

WHEAT

The area of wheat grown has more than doubled over the last 20 years from around half a million hectares in 1992 to around 1.25 million hectares in 2013. The GVAP of the regional wheat crop increased from $158 million in 1992 to $878 million in 2013 and reached a peak of $1,026 million in 2011. In irrigated areas, wheat is an important part of the rotation with production of rice and cotton.

While wheat production has increased in accordance with the area sown, annual wheat production is extremely variable and fluctuates dramatically in response to growing season rainfall. Wheat production plummeted in the extreme drought years of 1995, 2003, 2007 and 2008 for example (Figure 24).

The trend in area sown to wheat is repeated across the main wheat growing areas of Bland, Carrathool, Narrandera, Lockhart, Coolamon, Greater Hume, Wagga Wagga and Temora. The area sown to wheat peaked in 2009 in Carrathool and in several other of the other main wheat producing areas (Figure 25).

Patterns in wheat yields are also similar between the main wheat growing LGA (Figure 26). Wheat yields fluctuate with rainfall and tend to be within the range of 1 to 3 tonnes/hectares, averaging around 2.4 tonnes/hectare over the past 20 years. Yields were as low as 0.5 tonnes/hectares in the extreme drought years. Advances in wheat yields have slowed and the reasons for this are uncertain but are likely to include reduced growing season rainfall.

FIGURE 24: TREND IN AREA SOWN AND PRODUCTION OF WHEAT, RIVERINA MURRAY

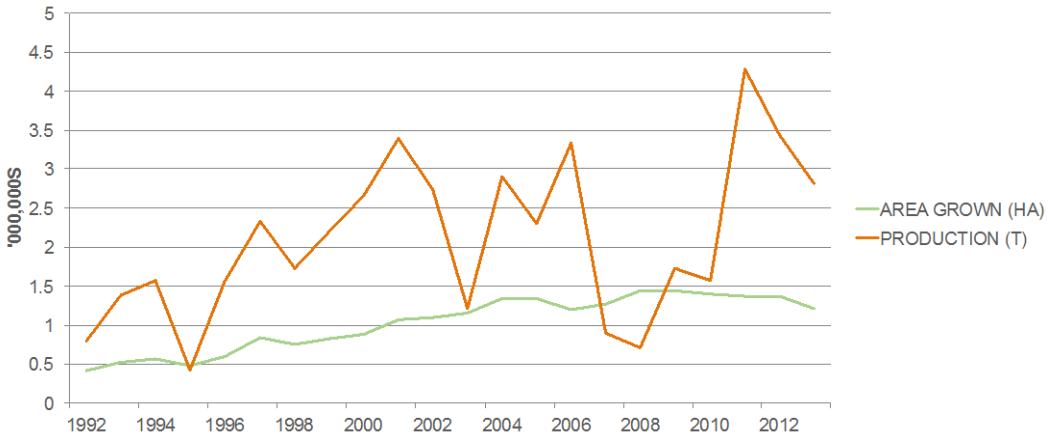


FIGURE 25: TREND IN AREA SOWN TO WHEAT IN MAIN WHEAT GROWING LGA, RIVERINA MURRAY

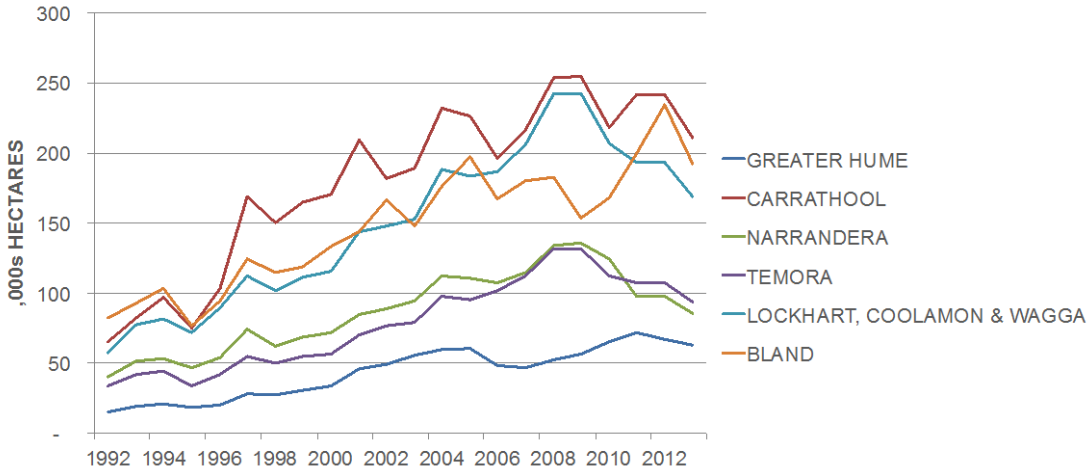
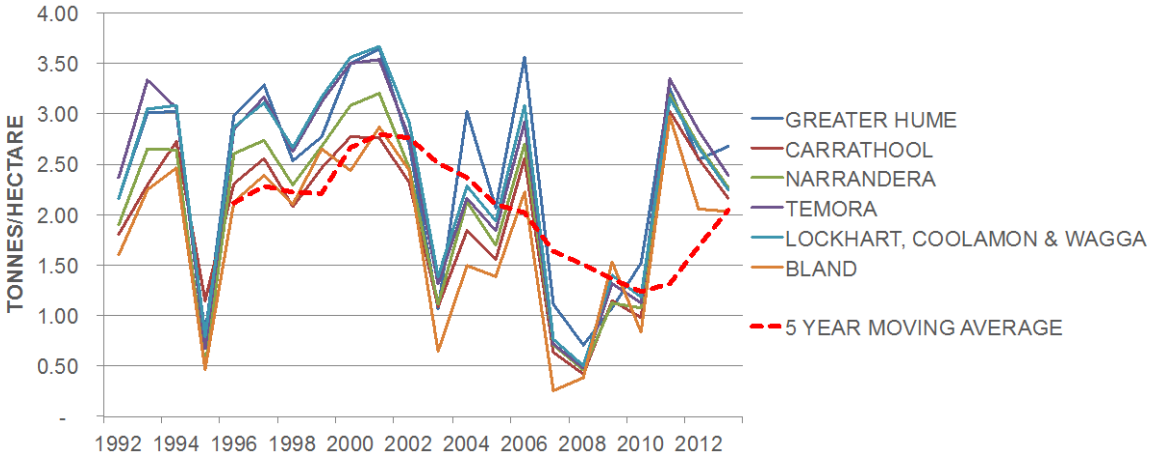


FIGURE 26: TREND IN YIELD OF WHEAT IN MAIN WHEAT GROWING LGA, RIVERINA MURRAY



BARLEY

The area sown to barley doubled between 1992 and 2010, however, the area grown and production has dropped in the last two years. The GVAP of the regional barley crop increased from $58 million in 1992 to

reach a high of $236 million in 2011. The trends in area sown are repeated across the main barley growing LGA of Carrathool and Bland. The area sown to barley peaked in Carrathool and in several of the other main barley growing areas in 2005 (Figure 27, Figure 28).

Barley yields fluctuate with rainfall and tend to be within a range of 1 to 2.5 tonnes/hectare, averaging 1.9 tonnes/hectare over the last 20 years. Yields were as low as 0.5 tonnes/hectare during the extreme drought years. Patterns in barley yields are similar between the main barley grown LGA (Figure 29). Similar to wheat, advances in barley yields have slowed and may be due in part to reduced growing season rainfall.

FIGURE 27: TREND IN AREA SOWN AND PRODUCTION OF BARLEY, RIVERINA MURRAY

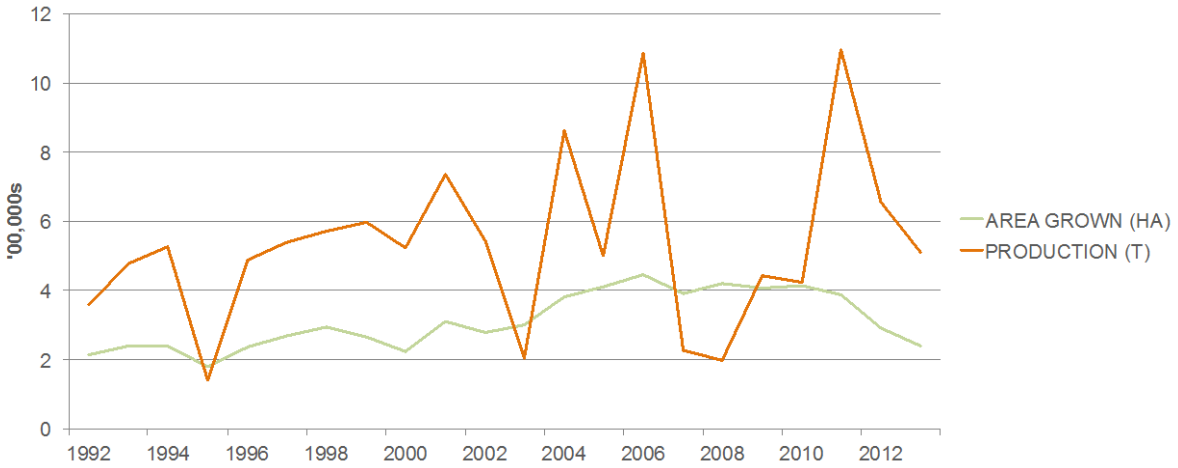


FIGURE 28: TREND IN AREA SOWN TO BARLEY IN MAIN BARLEY GROWING LGA, RIVERINA MURRAY

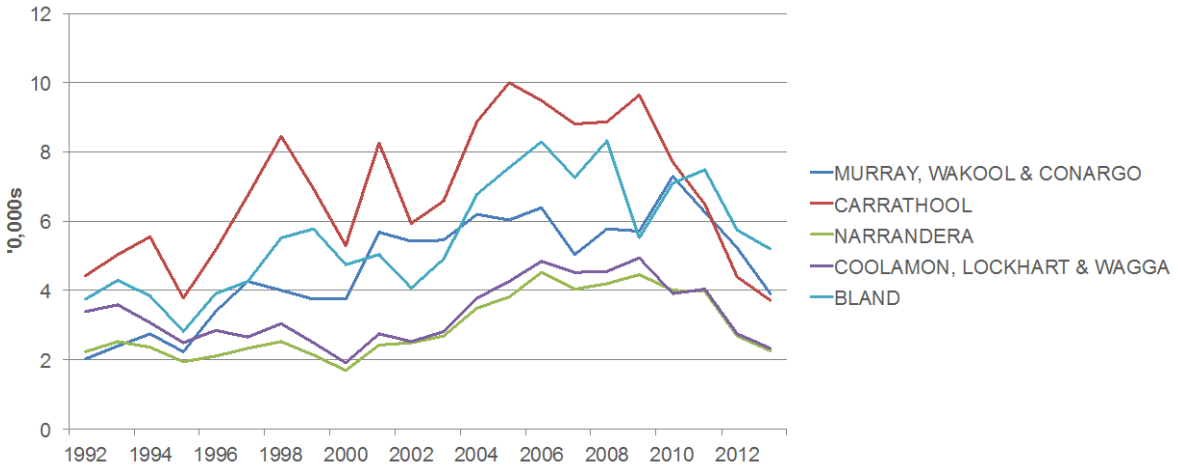
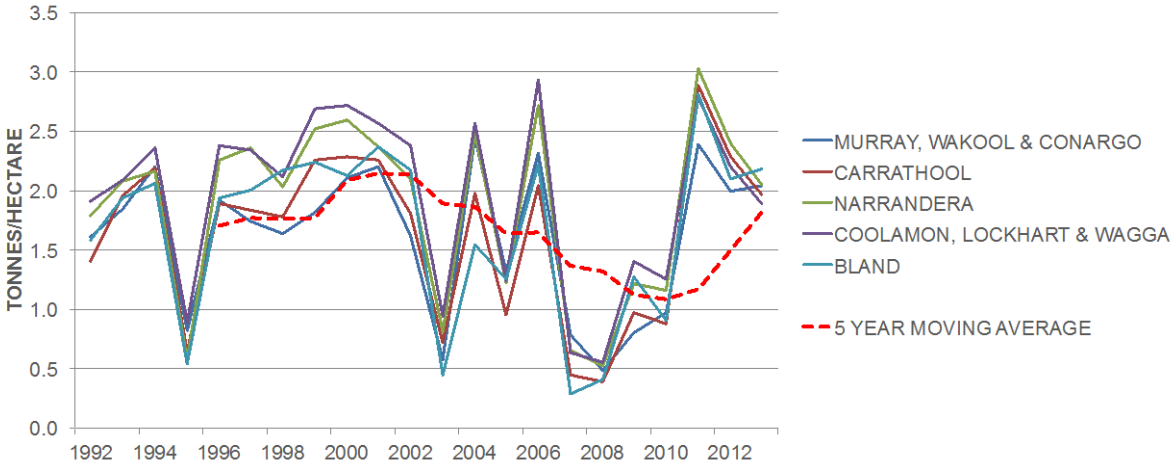


FIGURE 29: TREND IN YIELD OF BARLEY IN MAIN BARLEY GROWING LGA, RIVERINA MURRAY



CANOLA

Canola has emerged as a significant crop in the region generating $460 million in 2013 up from only $18 million in 1992. Over the same period farm numbers growing canola increased from 560 to nearly 2,000 and the area sown increased from 54,000 hectares up to 571,000 hectares (Figure 30). These trends are replicated in the main canola growing areas of the region (Figure 31). Canola yields trended downwards during the millennium drought and have been recovering since. On average canola has yielded 1.4 tonnes/hectare over the past 20 years fluctuating around a high of 1.89 tonnes/hectare in 1993 and a low of 0.14 tonnes/hectare in 2008 (Figure 32).

FIGURE 30: TREND IN AREA SOWN AND PRODUCTION OF CANOLA, RIVERINA MURRAY

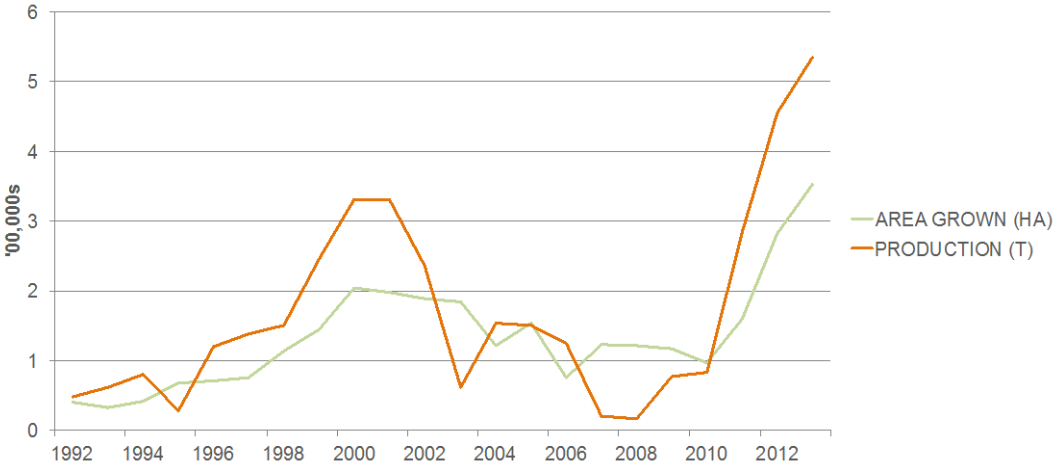


FIGURE 31: TREND IN AREA SOWN TO CANOLA IN MAIN CANOLA GROWING LGA, RIVERINA MURRAY

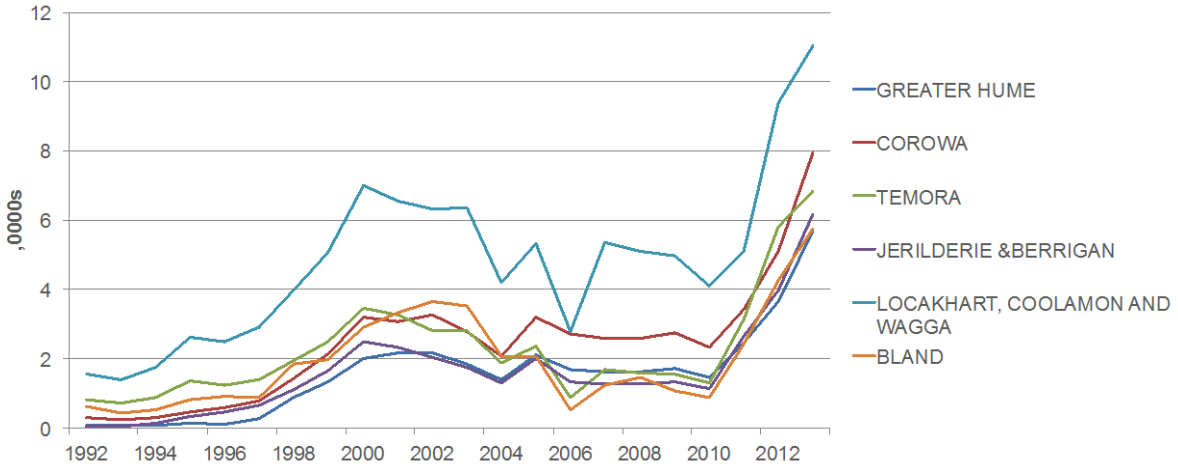
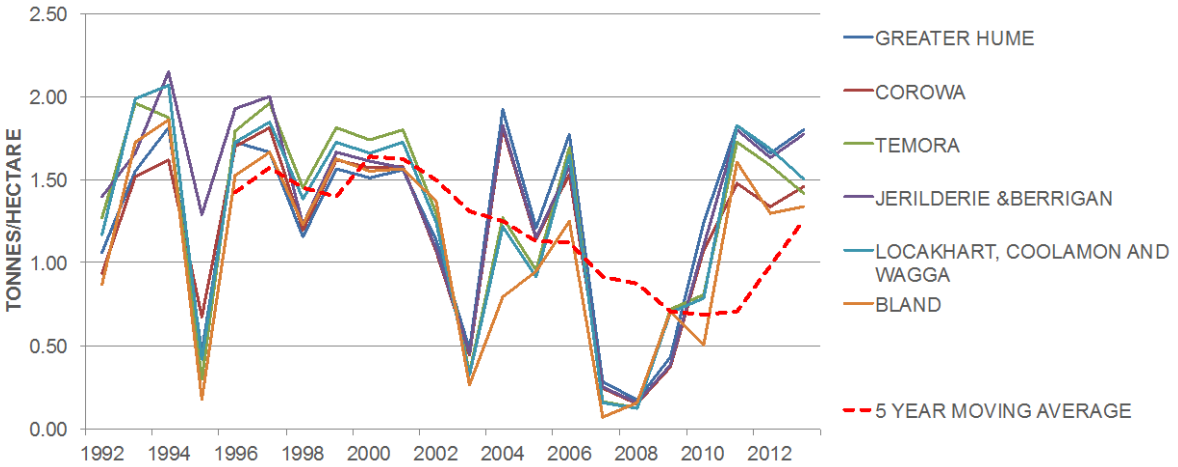


FIGURE 32: TREND IN YIELD OF CANOLA IN MAIN CANOLA GROWING LGA, RIVERINA MURRAY



RICE

Rice makes up the majority of irrigated cropping and in 2010-11 the value of rice production was $169 million grown over 73,697 hectares. Rice production is highly sensitive to seasonal irrigation allocations (Figure 34) and is usually grown as part of a mixed farming system that includes cereals such as wheat, using a rotation cycle across the farm over four to five years. Over the last 20 years, the area of rice has reached up to 150,000 hectares in non-drought years while in 2007-08 the area under production fell to 2,200 hectares[11] associated with extremely low allocations. The area sown to rice in Hay, Jerilderie and Berrigan has not returned to pre-drought levels (Figure 34, Figure 35) and the reasons for this are unclear. Rice yields are similar across the main rice growing LGA (Figure 36).

[11] Marsden Jaoobs and Associates (2010) Economic and social profiles and impact assessment in the Murray Darling Basin

FIGURE 33: TREND IN RICE PRODUCTION, ANNUAL IRRIGATION ALLOCATION AND ANNUAL RAINFALL, MURRAY IRRIGATION AREA

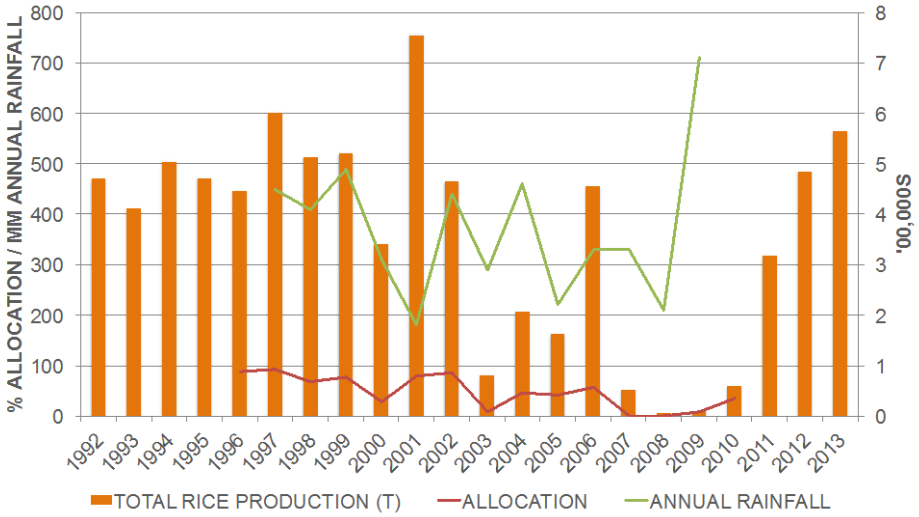


FIGURE 34: TREND IN AREA SOWN AND PRODUCTION OF RICE, RIVERINA MURRAY

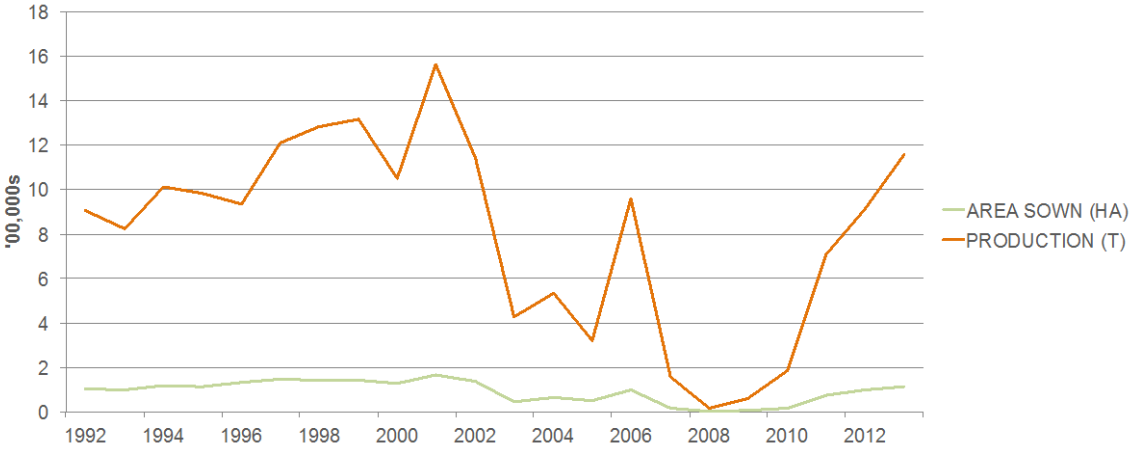


FIGURE 35: TREND IN AREA SOWN TO RICE IN MAIN RICE GROWING LGA, RIVERINA MURRAY

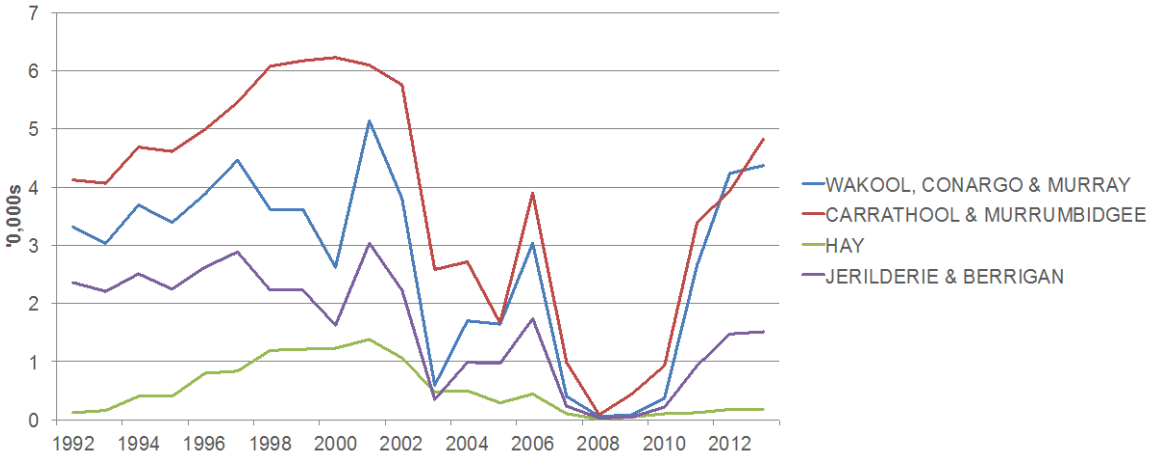
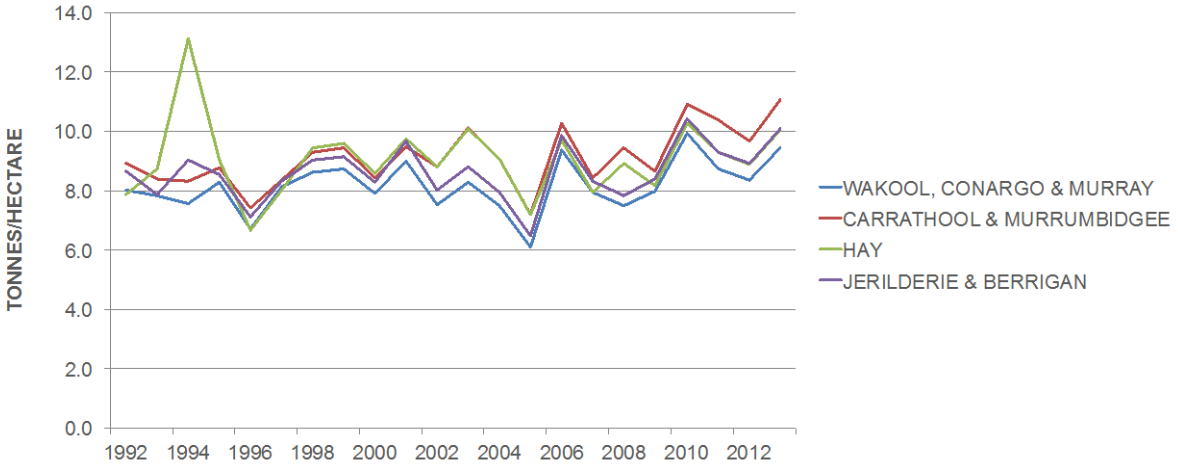


FIGURE 36: TREND IN YIELD OF RICE IN MAIN CANOLA GROWING LGA, RIVERINA MURRAY



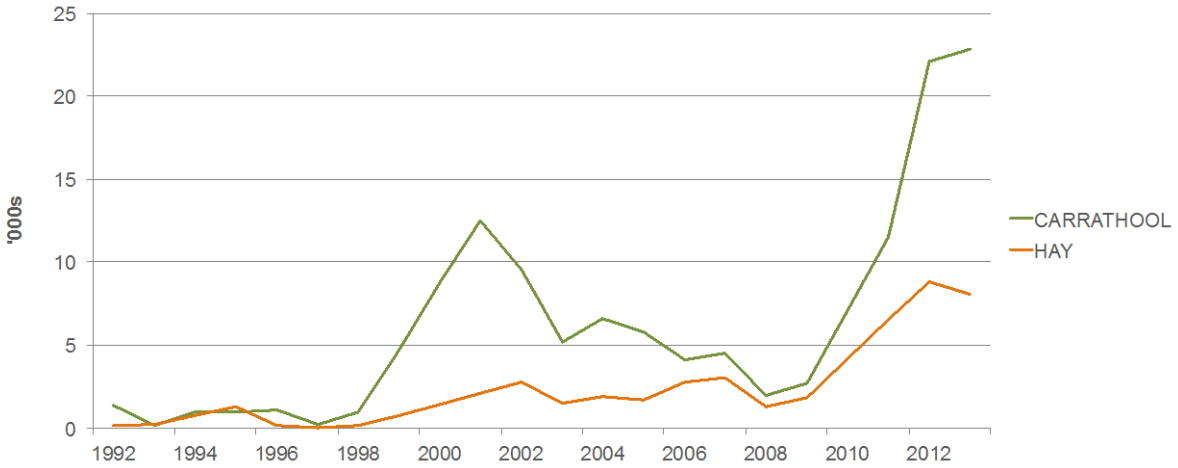
COTTON

Cotton is an opportunistic annual crop that is also highly dependent on seasonal irrigation allocations and is emerging as a significant crop in the Riverina Murray with production focused in the Carrathool and Hay LGA (Figure 37). Cotton has traditionally been grown for lint used in the manufacture of fabrics. More recently cottonseed, previously a low-value by-product, is increasingly sought after as a high oil and protein content stockfeed. Cotton is usually grown as part of a mixed cropping enterprise where cotton is the most profitable crop in a rotation that also includes winter cereals such as wheat.

The availability of cool climate varieties, buoyant prices, new markets for cotton seed and higher reliability of irrigation water supplies in southern NSW have seen a rapid expansion of cotton production (Figure 38). Around 47,000 hectares of cotton was sown in 2013-14 up from 3,300 hectares in 2009/10. Over 400,000 bales of cotton harvested in southern NSW in 2013-14 and this was expected to increase to 600,000 bales in the 2014-15 season[12].

The trend in yield of cotton is similar in the two main cotton growing LGA (Figure 39.

FIGURE 37: TREND IN AREA SOWN TO COTTON IN MAIN COTTON GROWING LGA, RIVERINA MURRAY



[12] http://www.cottongrower.com.au/images/articles/cd8b3adb26fb3c49e77b0c669be067ef.pdf

FIGURE 38: AREA SOWN AND PRODUCTION OF COTTON, RIVERINA MURRAY

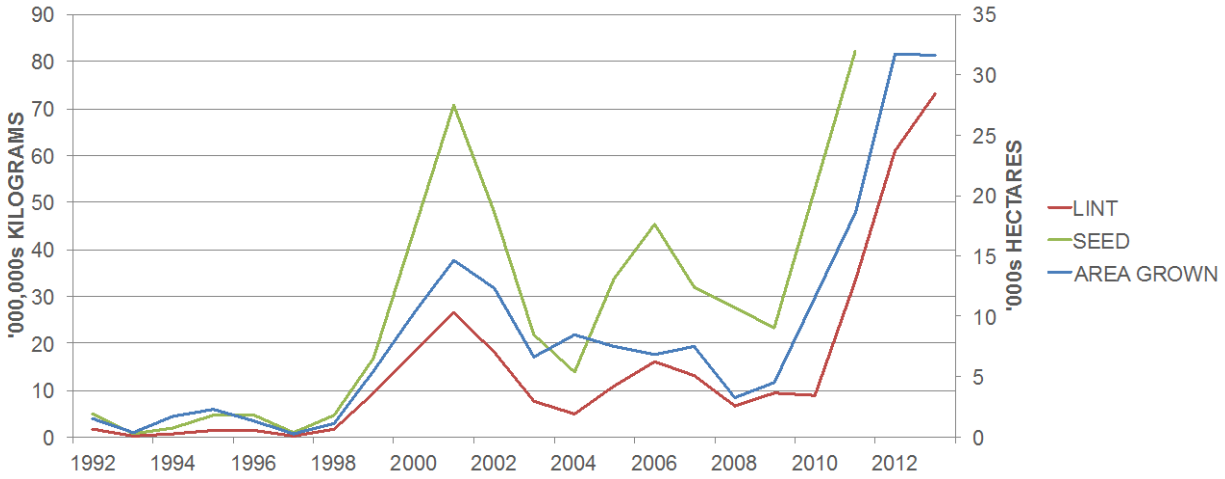


FIGURE 39: TREND IN YIELD OF COTTON IN MAIN COTTON GROWING LGA, RIVERINA MURRAY

ECONOMIC CONDITIONS AND PRODUCTIVITY

The broadacre cropping sector has gone through a period of relatively rapid adoption of new machinery technologies notably no-till seeding and GPS assisted navigation. Farmers are sowing larger areas using large precision seeding and spray equipment (covering up to 100/ha/hr). This technology has enabled farmers to plant larger areas of crops and management of larger farms achieved through farm consolidation. There has been a trend away from sheep in mixed farming systems towards more intensive cropping. On-farm storage of grain has substantially increased and farmers are using a range of tools to price and direct sell their products.

Chemical resistance is a growing issue of concern and poses some risk to no-till system. Some farmers are now using a winter fallow period and / or summer crops to manage disease and weed issues. Projected increases in average temperatures and reduced annual and seasonal rainfall, will impact on crop yields over the medium to long term that may result in some contraction of the cropping zone eastwards.

Increasing productivity by increasing enterprise scale is the main avenue for cropping enterprises to address declining terms of trade (output prices relative to input prices) and inevitable periods of low commodity prices. This requires access to suitable land in large parcels. Increasingly, cropping enterprises will be attracted to areas of more reliable rainfall.

While there is a continuing growth trend in wheat production in Riverina Murray and Australia wide, there is a plateau in wheat yield. Commencing in the 1990's, advances in yield growth have slowed and appear to be stagnant, as indicated in Figure 40. As noted previously, wheat yields in Riverina Murray while fluctuating with

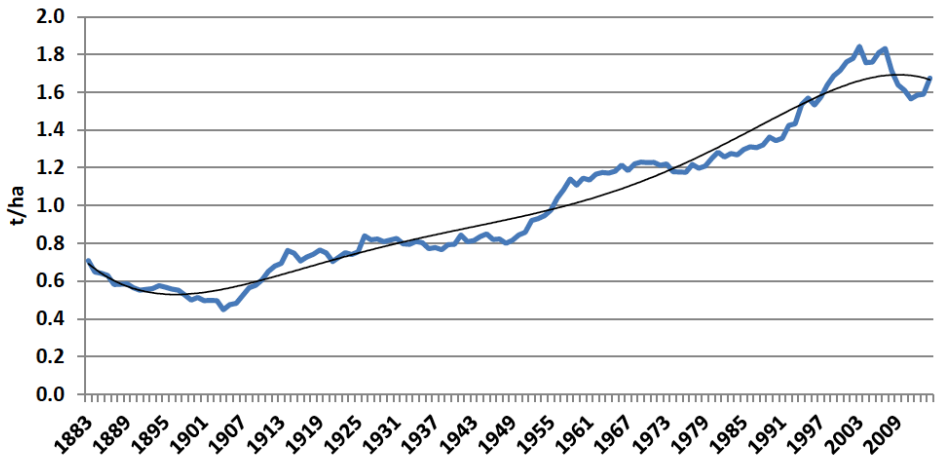
rainfall, have maintained an average of just over 1.5 tonnes/hectare over the past 20 years. It will be difficult for farmers to find productivity increases under these conditions. This will further drive business to increase scale unless the industry develops improved varieties to overcome inertia in yield improvements as well as look for alternative crops.

Broadacre farms have been able to maintain profitability in the face of declining terms of trade through productivity growth. Productivity growth amongst broadacre cropping farmers averaged 1.5% per year between 1997 and 2011 driven mostly by innovation and farmers adopting more efficient technologies and management practices. Changes in industry structure where less efficient farmers are exiting and larger more efficient businesses are entering is leading to more efficient resource use across farms. This has been an important source of productivity growth. There is however some evidence that this growth is beginning to slow[13].

Australia wide cropping (broadacre grains) showed an increase in productivity growth from 1977-78 to 2010-11 with an average annual growth of 1.5% recorded in Total Factor Productivity (TFP). Mixed cropping-livestock industries by comparison had an average annual growth in Total Factor Productivity of 0.9% for the same period.

The cotton industry has achieved a 40% increase in water-use productivity over the past decade from better irrigation techniques and more efficient delivery systems. While the profitability/hectare of cotton is similar to that of rice, it uses 25% less water enabling growers to grow more cotton than rice with the same volume of water. It is therefore likely that there will be further expansion of cotton at the expense of rice in southern NSW. The expansion in cotton has prompted investment in cotton gins at Whitton and Carrathool.

FIGURE 40: TREND IN AUSTRALIAN WHEAT YIELD – 1883 TO 2013-14 (T/HA) 10 YEAR MOVING AVERAGE (JCS SOLUTIONS 2014)



BUSINESS SCALE TRENDS

The trend towards larger grain farms is reflected in Riverina Murray where there has been an increase in the average farm size, both in terms of physical size (hectares) and business size as measured by Estimated Value of Agricultural Operations (EVAO) (Figure 41). With the exception of an unusually large farm size in 2001, the same trend is observed in mixed grain-livestock properties (Figure 42). This exception may be due to the rapid decline in the number of properties engaged in mixed grain-livestock enterprises.

An analysis of grains only farms found that business size has increased over the last decade (Figure 43) with the number of farms generating over $1million increasing by 54% while the number of smaller enterprises decreased by between 31% and 42%. The share of EVAO produced by farms over $1million increased from around 58% to 72% of EVAO between 2001 and 2011 (Figure 44). This is indicative of the trend toward increased concentration of output observed in other Australia agricultural industries[14] where the largest 30% of grain businesses are producing more than 60% of the total gross value of grains.

[13] ABARES (2014) Australian agricultural productivity growth. Australian Bureau of Agricultural and Resource Economics and Sciences. Commonwealth of Australia
[14] Productivity Commission (2005) Trends in Australian Agriculture. Productivity Commission Research Paper, Commonwealth of Australia, ACT.

The number of high turnover (greater than $1million/year) mixed grain-livestock farms also increased by around 10%. At the same time the total number of mixed grain-livestock farms in the region reduced by 48% from around 2,250 to 1,500 farms. This suggests that there has been consolidation of mixed farms as well as grains only farms and mixed farms shifting to grains only enterprises.

The number of properties between 100 and 500 ha in size has decreased compared with an increase in the number of properties between 500 and 25,000 ha (Figure 45). This has coincided with an increase in the number of high turnover grains businesses and suggests that there has been some restructuring and amalgamation of properties over the last decade. The number of farms under 500 ha is reducing.

CHANGE IN AVERAGE AREA OF HOLDING AND ESTIMATED VALUE OF AGRICULTURAL OPERATION

FIGURE 41: RIVERINA MURRAY GRAIN FARMS

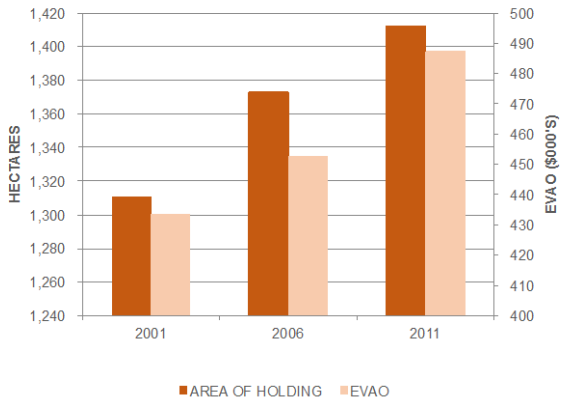


FIGURE 42: RIVERINA MURRAY MIXED GRAIN-LIVESTOCK FARMS,

FIGURE 43: CHANGE IN BUSINESS SIZE (EVAO) OF GRAIN FARMS, RIVERINA MURRAY (INCLUDING PERCENTAGE CHANGE WITHIN EACH CATEGORY BETWEEN 2001 AND 2006)

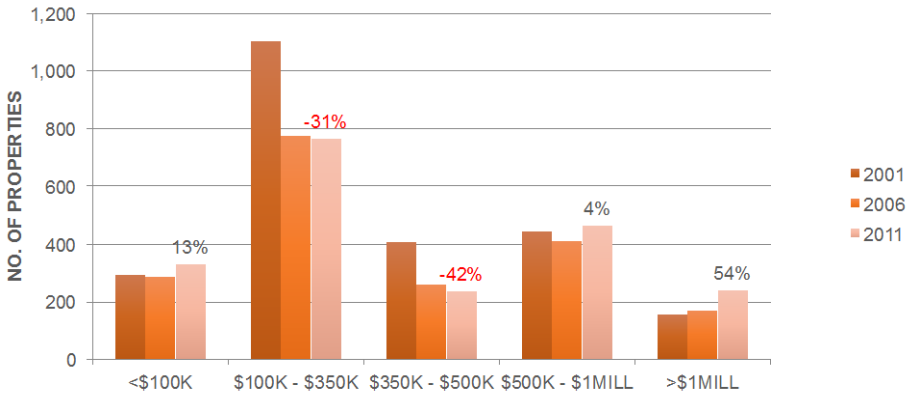


FIGURE 44: CHANGE IN TOTAL EVAO BY BUSINESS SIZE CATEGORY, RIVERINA MURRAY (INCLUDING PROPORTION OF 2011 CATEGORY CONTRIBUTION TO TOTAL 2011 EVAO)

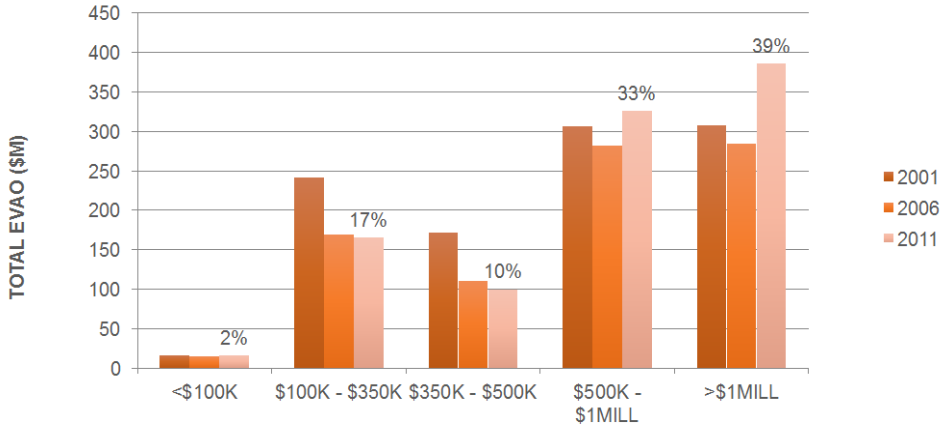


FIGURE 45: CHANGE IN GRAIN FARM SIZE, RIVERINA MURRAY

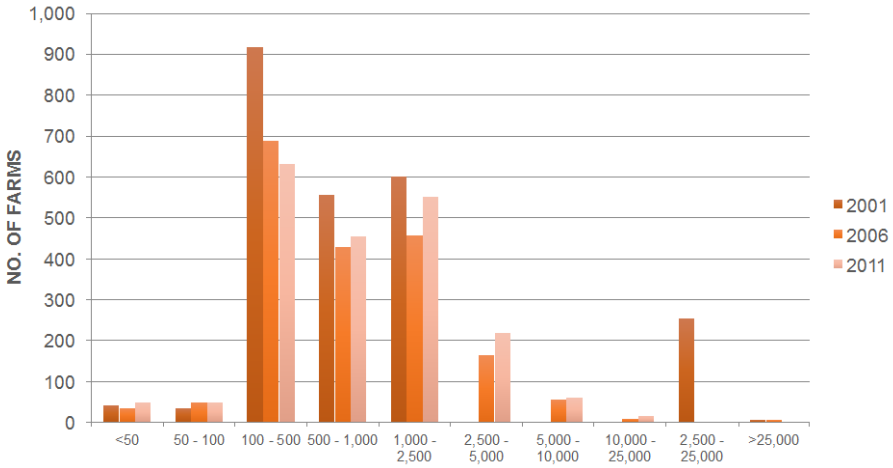


TABLE 5: LGA WITH THE MOST LARGE MIXED AND CROPPING ONLY FARMS, RIVERINA MURRAY 2010-211

		FARMS >2,500 HA		
	LGA	**MIXED FARMS**	**GRAINS ONLY FARMS**	**TOTAL**
1	CARRATHOOL	28	83	111
2	BLAND	29	58	87
3	WAKOOL CONARGO AND MURRAY	19	39	58
4	JERILDERIE AND BERRIGAN	9	24	33
5	COROWA AND URANA	14	22	36

COTTON

In 2011, around 20 farms were identified as cotton growing farms in the region, roughly double that identified in 2001. Despite the small sample size, there is a clear trend towards larger business in terms of farm size (Figure 46) and business size (Figure 47).

FIGURE 46: CHANGE IN COTTON FARM SIZE, RIVERINA MURRAY

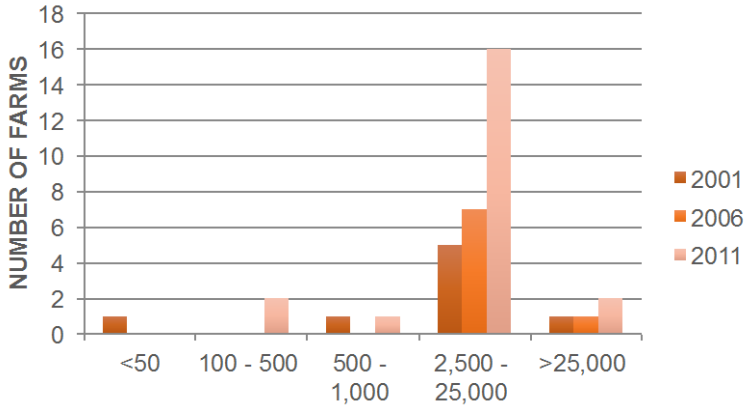
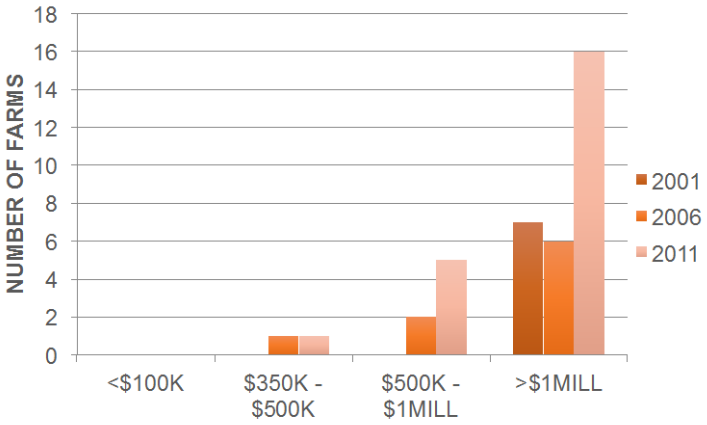


FIGURE 47: CHANGE IN COTTON BUSINESS SIZE, RIVERINA MURRAY



STRATEGIC IMPLICATIONS

Broadacre cropping generates the most GVAP in Riverina Murray and occupies a significant land area. Crops are grown in rotations that include cereals, oilseeds, legumes, rice and cotton, mostly in dryland systems but also under irrigation. Irrigation increases production significantly.

Economies of scale are the key to success in cropping and technology improvements have enabled farmers to sow larger areas. There is a clear trend towards larger cropping farms and the number of businesses with turnover greater than $1million and an increase in the number of crop-only enterprises has been observed. This has resulted in increased concentration of output with the top 15% of businesses producing over 50% of grain EVAO.

6 LIVESTOCK – MEAT

MAIN FINDINGS

MEAT

- Livestock production for meat is the second largest agricultural sector in Murray –Murrumbidgee generating a GVAP of $575 million in 2010-11 and occupies approximately two thirds of the farmed area.
- The main meat commodities by GVAP are beef ($252 million) and sheep ($158 million).
- In 2011 there were around 2,305 farms identified as sheep, beef cattle or sheep and beef farms in the Murray–Murrumbidgee region. There was a further 1,520 mixed livestock and grain farms.
- The livestock sector is dominated by a large number of small farms (<500 hectares and <$100,000 EVAO) and there has been little evidence of consolidation.
- Cattle numbers have been relatively static over the past 20 years, hovering around 900,000.
- There was a small increase in the GVAP of beef from $150 million in 1992 to $241 million in 2013.
- Most beef produced in 2010-11 came from the Greater Hume, Wagga Wagga, Tumbarumba and Tumut LGA
- There was a 46% decline in sheep numbers between 1992 and 2013; however the GVAP of sheep meat increased nearly five-fold from $26 million in 1992 to $124 million in 2013.
- Sheep meat was mostly produced in Greater Hume, Bland, Hay, Wagga Wagga and Carrathool local government areas during 2011.

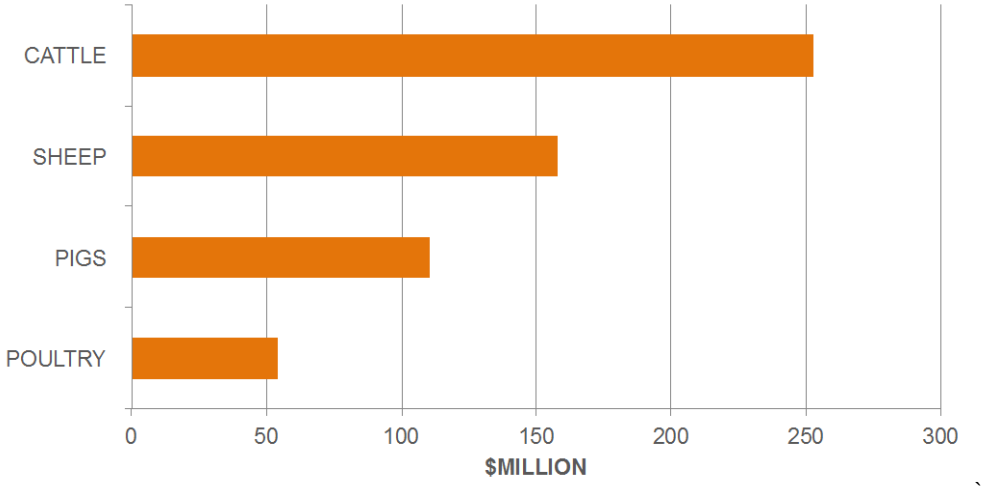
WOOL

- Wool is the fifth largest agricultural sector in the Murray – Murrumbidgee region with a GVAP of $205 million in 2010-11.
- Wool production has decreased in line with the reduction in sheep numbers. There was nearly 60% less wool produced in the region in 2010 (28,000 tonnes) compared with 1992 (67,000 tonnes).
- Even though there has been a decrease in wool production, the GVAP of wool has fluctuated around $230 million showing neither an increasing or decreasing trend indicating significant productivity gains.
- The local government areas that contributed the most to wool production were Greater Hume, Bland, Wagga Wagga, Carrathool, Hay, Conargo and Junee.

CURRENT STATISTICS - MEAT

Livestock production for meat in Riverina Murray includes beef cattle, sheep, pigs and poultry. Combined these commodities contributed $575 million to the region's GVAP in 2010-11. Beef cattle were the main commodity, generating $252 million or 44% of the total livestock GVAP for the region. Sheep ($158 million) was the next most important commodity accounting for 27% of the total livestock GVAP, followed by pigs ($110 million) and poultry ($54 million) (Figure 48).

FIGURE 48: GVAP OF LIVESTOCK COMMODITIES, RIVERINA MURRAY 2010-11



Beef and sheep production occur across the region, however it is more concentrated in certain LGAs. Greater Hume, Wagga Wagga, Tumbarumba and Tumut were the largest beef producing LGAs in the region during 2010-11 (Figure 49).

Sheep production occurred mostly in Greater Hume, Bland, Hay, Wagga Wagga and Carrathool (Figure 50).

Pig and poultry production are less widespread. Pig meat production was largely centred in Corowa that generated 44% of the regional GVAP for pig meat during 2010-11 followed by Temora, Wakool and Narrandera. The majority of poultry production occurred in Griffith and Bland, which combined generated 94% of the regional GVAP for poultry production.

FIGURE 49: REGIONAL DISTRIBUTION OF BEEF GVAP, RIVERINA MURRAY 2010-11

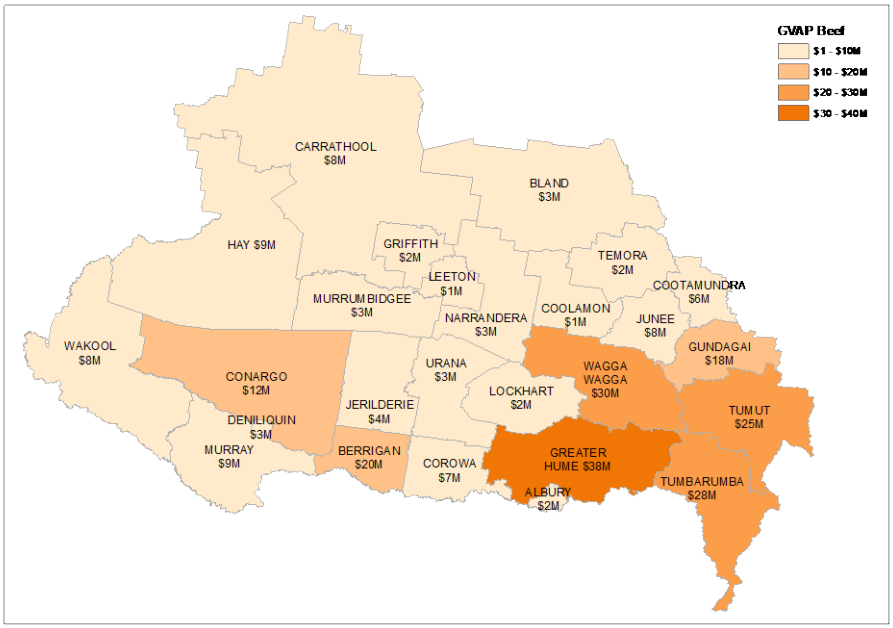
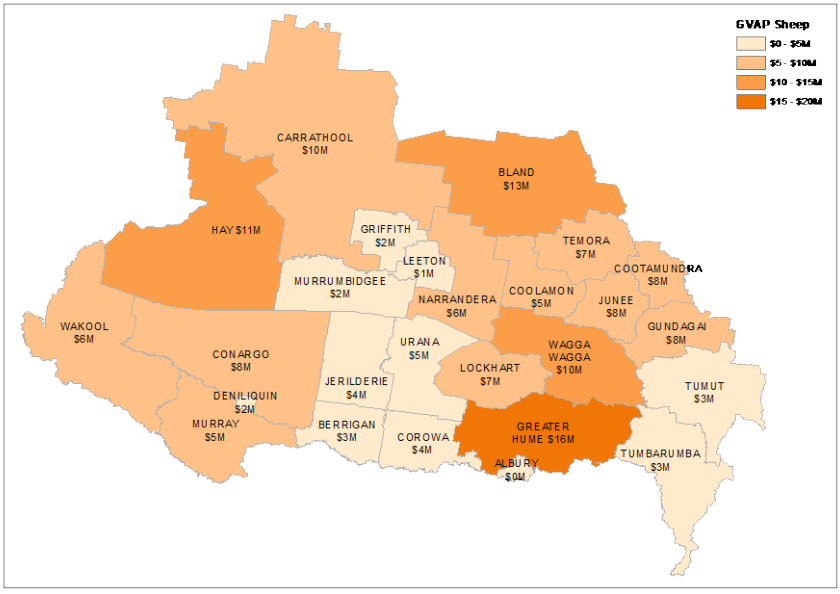


FIGURE 50: REGIONAL DISTRIBUTION OF SHEEP GVAP, RIVERINA MURRAY 2010-11



There were around 1,208 livestock producers with beef cattle (and without sheep) in 2011. The majority of these farms (around 860 or 71%) derive less than $100,000 gross turnover, while around 270 (or 22%) of farms generate between $100,000 and $350,000. Twelve properties generated more than $1 million (Figure 51)

Figure 52 shows the distribution of property size range of beef and sheep only enterprises in 2011. The majority of properties were 500 hectares or less (71%) and of these, 34% were less than 100 hectares. The LGAs with the largest number of producers with small beef holdings (less than 100 hectares) are Tumut, Greater Hume, Wagga Wagga and Tumbarumba.

There were around 660 sheep only properties in Riverina Murray in 2011. The turnover derived from the sheep only properties is similar to that of beef farms, with the majority (around 412 farms or 63%) turning over less than $100,000 gross and 29% (around 189 farms) generating between $100,000 and $350,000. Ten properties generated more than $1 million.

Sheep only properties tend to be slightly larger. In 2011, 46% of sheep only properties were greater than 500 hectares (compared with 29% of beef only enterprises).

FIGURE 51: EVAO OF LIVESTOCK ENTERPRISES, RIVERINA MURRAY 2011

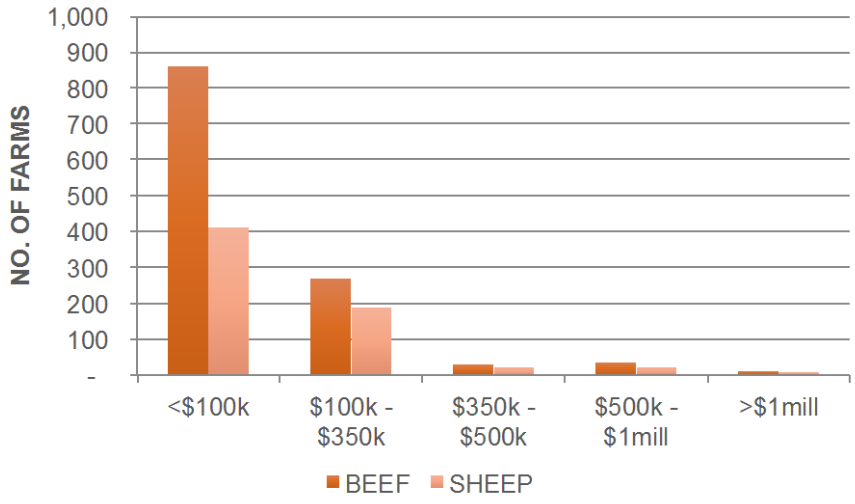
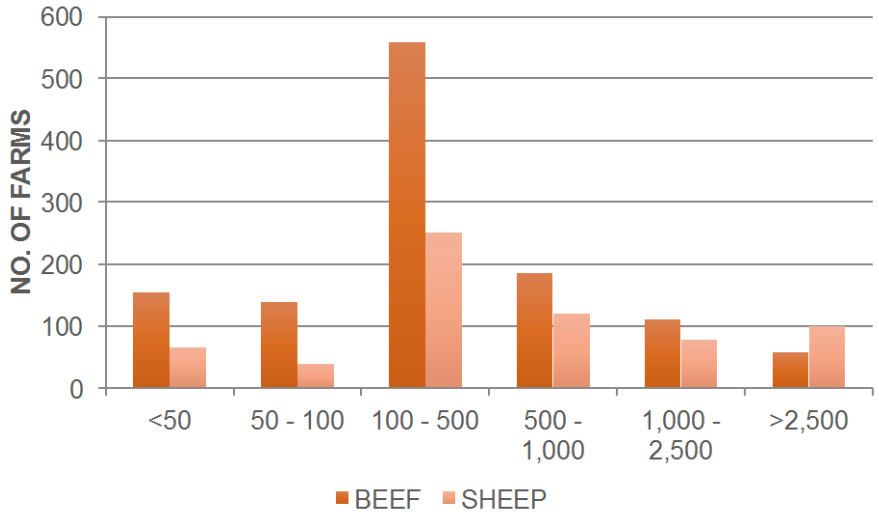


FIGURE 52: LIVESTOCK ENTERPRISE HOLDING SIZE, RIVERINA MURRAY 2011



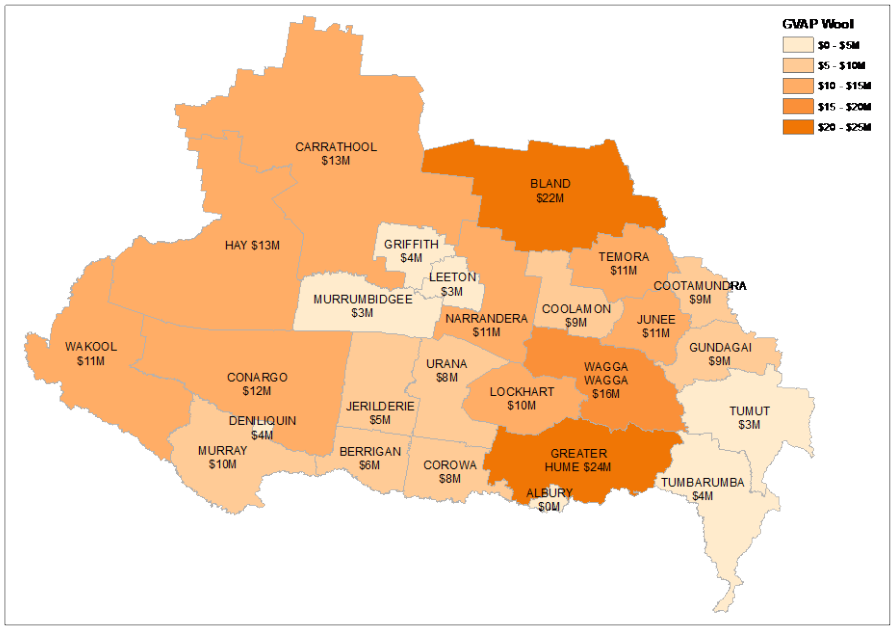
CURRENT STATISTICS – WOOL

CURRENT STATISTICS

In 2010-11 around 28,000 tonnes of wool was produced in the Riverina Murray region, with a GVAP of $205 million. Wool is produced widely across the region (Figure 53). Greater Hume ($24 million) and Bland ($22

million) local government areas contributed the most to regional wool production followed by Wagga Wagga ($16 million), Carrathool ($13 million), Hay ($13 million), Conargo ($12 million) and Junee ($11 million).

FIGURE 53: REGIONAL DISTRIBUTION OF WOOL GVAP, RIVERINA MURRAY 2010-11



INDUSTRY TRENDS

There has been some fluctuation in the number of livestock farms. Between 2001 and 2011 numbers peaked in 2006 at around 2,700 farms, representing a 28% increase on the number of farms in 2001. Farm numbers then reduced to around 2,300 farms in 2011. There has also been a steady decline in the number of mixed farming enterprises over the same period, with the number of farms falling 32% since 2001.

The gross value of sheep meat has experienced a near five-fold increase over the past 20 years from $26 million in 1992 to $124 million in 2013. There has been a small increasing trend in the gross value of beef over the past two decades, increasing from $150 million in 1992 to $241 million in 2013.

BEEF

Cattle numbers fluctuate to some extent with seasonal conditions, however the total cattle numbers have remained relatively static over the past 20 years, with the total number of head hovering around 900,000. Across the region cattle numbers declined in 2003 and dropped sharply in 2009 associated with the millennium drought. These trends are mirrored in the main beef producing LGA (Figure 54).

There has been a decline in cattle numbers in 2013 in three of the four main beef producing LGA. This is representative of the regional trend. Of the main beef producing LGA, only Greater Hume experienced a recent increased in cattle numbers. Grass fed beef producers are managing a feed base that is highly seasonal and need to be relatively conservative with their production systems and stocking rates. It is possible that the increase in cattle numbers in Greater Hume is coming from feedlots that are not as reliant on local seasonal conditions to maintain their feed base.

SHEEP

There has been a steady decline in total sheep numbers across the region over the past 20 years from 13 million to 6 million between 1992 and 2009. Since 2009, numbers have stabilised and are beginning to build reflecting improved lamb prices. This regional trend is reflected in the main sheep producing areas of Bland, Carrathool, Greater Hume, Hay and Wagga Wagga (Figure 55).

A reduction in the GVAP from wool occurred concurrently with the increase in GVAP of sheep meat. The proportion has changed from 92% wool / 8% sheep meat in 1992 to 62% wool / 38% sheep meat in 2013 (Figure 56).

WOOL

Over the period 1992 to 2009 the Riverina Murray region experienced a 46% decline in sheep numbers. Since 2009, sheep numbers have stabilised and this trend was reflected in each of the main sheep producing areas of Greater Hume, Bland, Hay, Wagga Wagga and Carrathool (Figure 55).

Wool production has declined concurrently with the decrease in sheep numbers. There was nearly 60% less wool produced in the region in 2010 (28,000 tonnes) than in 1992 (67,000 tonnes). This regional trend is reflected in the main wool producing local government areas of Greater Hume, Bland, Wagga Wagga, Carrathool, Hay, Conargo and Junee (Figure 57).

Even though there has been a decline in wool production in the region, the GVAP of wool has tended to fluctuate around $230 million showing neither an upward or downward trend. While this represents a loss in value of total wool production for the region in real terms, the value per kg of wool has substantially increased.

FIGURE 54: TREND IN CATTLE NUMBERS IN THE MAIN BEEF PRODUCING LGA, RIVERINA MURRAY

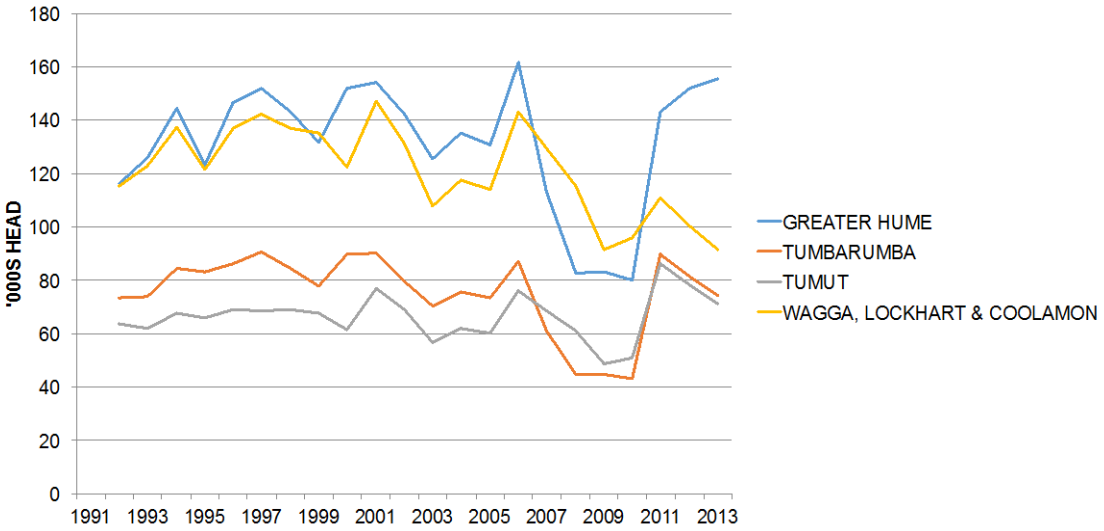


FIGURE 55: TREND IN SHEEP NUMBERS IN THE MAIN SHEEP PRODUCING LGA, RIVERINA MURRAY

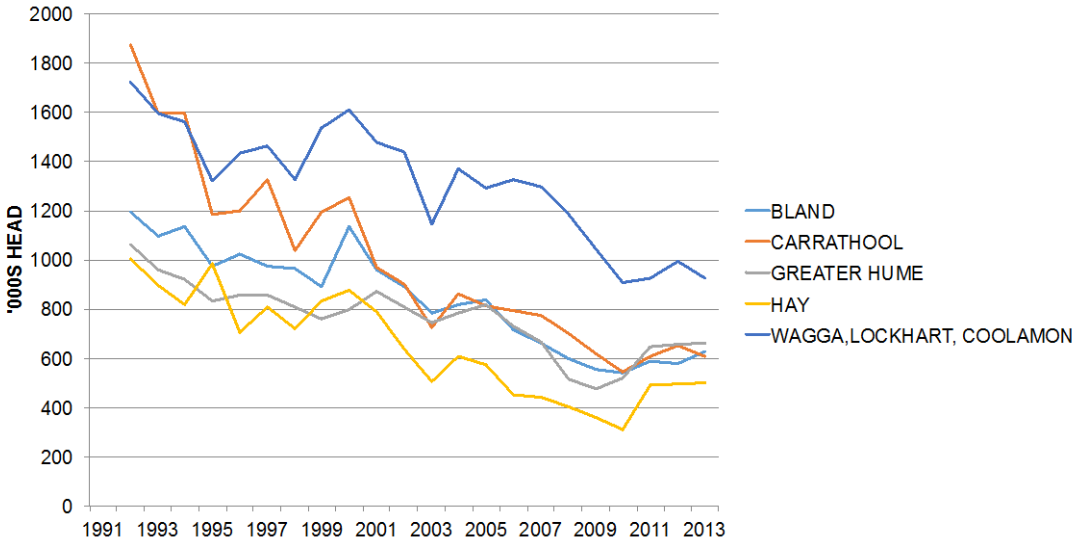


FIGURE 56: TREND IN GVAP OF WOOL AND SHEEP MEAT, RIVERINA MURRAY

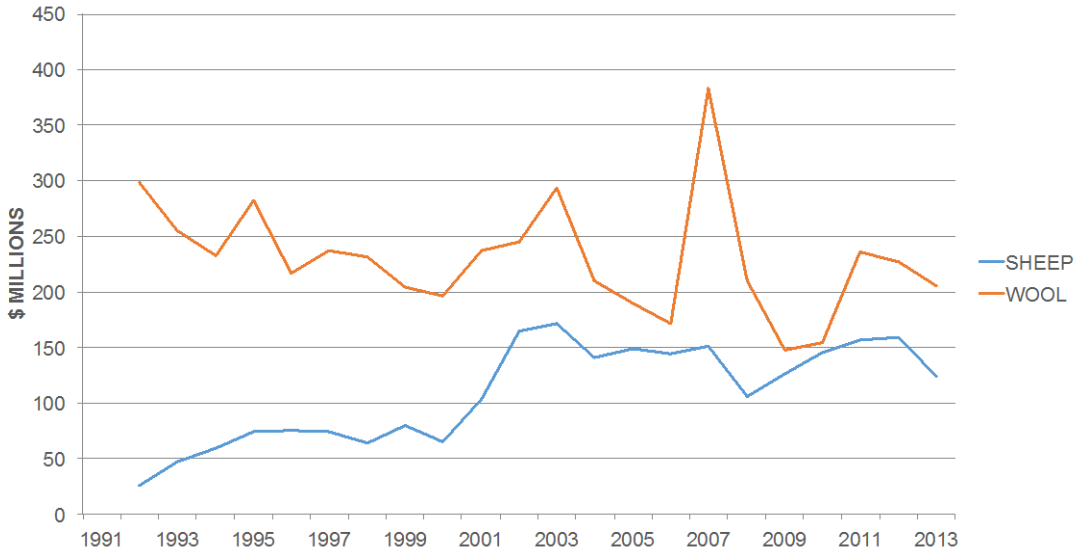
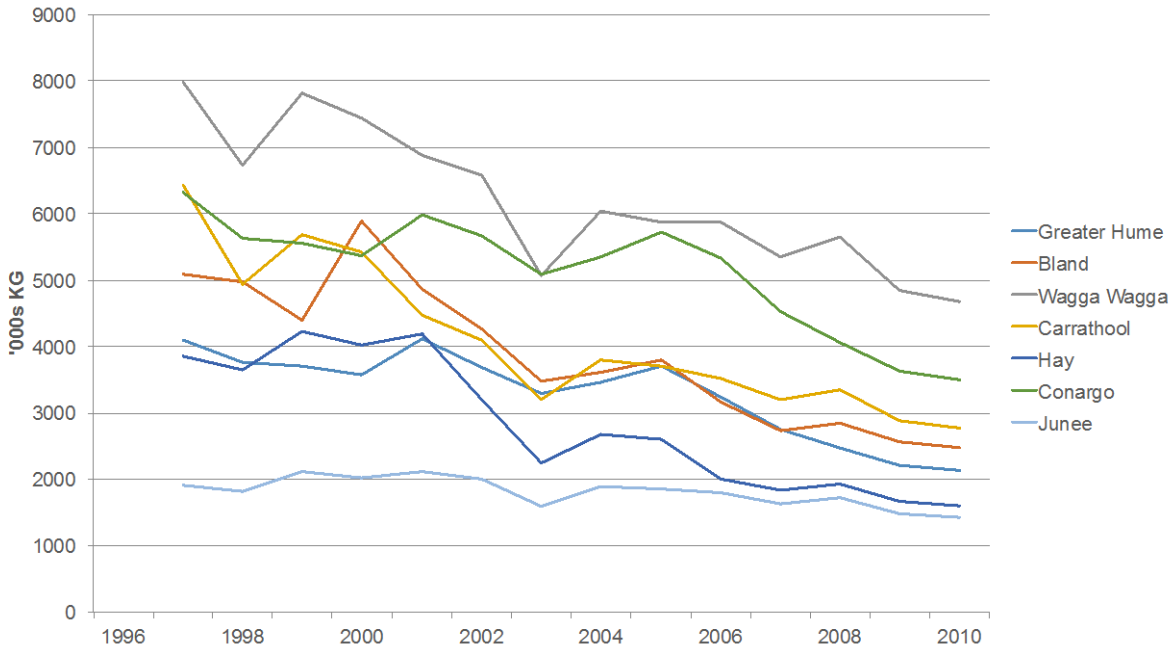


FIGURE 57: TREND IN WOOL PRODUCTION IN THE MAIN WOOL PRODUCING LGA, RIVERINA MURRAY



Note: Data not available for years 1995 and 1996, therefore data prior to 1997 has not been included. Conargo includes Murray and Wakool LGAs.

ECONOMIC CONDITIONS AND PRODUCTIVITY

Unlike the grains sector, livestock industries in terms of farm business and production management systems have remained relatively static. Livestock producers are managing a feed base that is highly seasonal which constrains production levels. Beef production more often than not is component of farm income, rather than the principal source of farm income. The large numbers of sub-commercial producers, who are not necessarily subject to the same economic drivers as commercial businesses, may be masking productivity improvements in the commercial beef sector.

Sheep enterprises in rainfall zones greater than 500 mm have achieved greater average profitability compared to beef and dryland cropping over the past few years (2008 to 2012). Those farm businesses that have increased their production level per dry sheep equivalent (DSE) whilst controlling costs are doing the best with

sheep enterprises[15]. Sheep meat production in the region has been doing well and increasing its share of gross income, compared to wool, on the back of demand and increase in lamb prices.

The scale of most beef enterprises and long term beef prices have meant the vast majority of beef operations in Australia are non-commercial however profits from beef in the last 12 months have been high in relative terms. The biophysical constraints on beef production in grazing systems make it difficult for these enterprises to restructure, scale up their operations and stay competitive.

While wool production has halved over the past two decades, the gross value has been at least maintained. The 1980s was a period of negative productivity in the sheep industry when there was strong global demand for wool and rising wool prices. However, since the dismantling of the wool reserve price scheme, productivity growth has increased at an average rate of 1.4 per cent per year. Beef industry productivity growth has been at a lower 0.9 per cent per year over this period[16].

There has been little consolidation of livestock farms (in terms of physical size or EVAO) in the Riverina Murray region. Small farms (in terms of gross value) continue to dominate farm numbers in the region in all sectors but most intensely in the livestock sector, mainly beef. Australia wide, the smallest farms are estimated to account for only 10% of gross farm output, whereas 10% of farm businesses now produce over 50% of output[17] (Figure 58, Figure 59).

FIGURE 58: CHANGE IN TOTAL EVAO BY BEEF BUSINESS SIZE CATEGORY, RIVERINA MURRAY

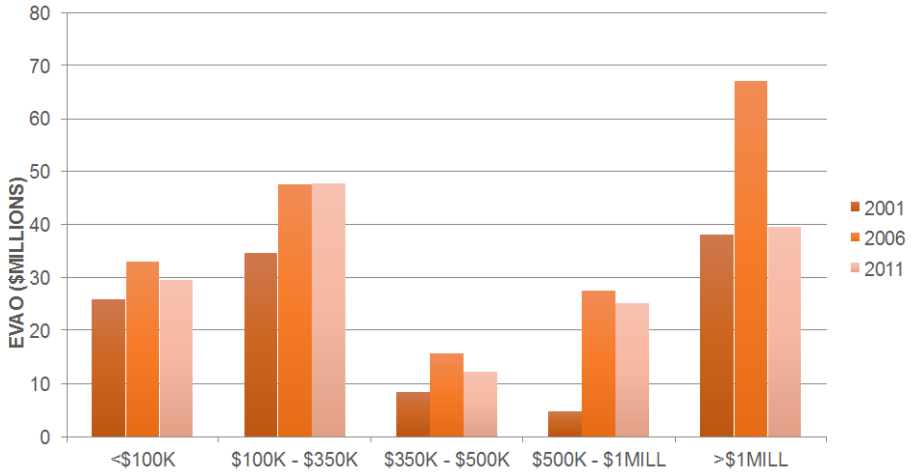
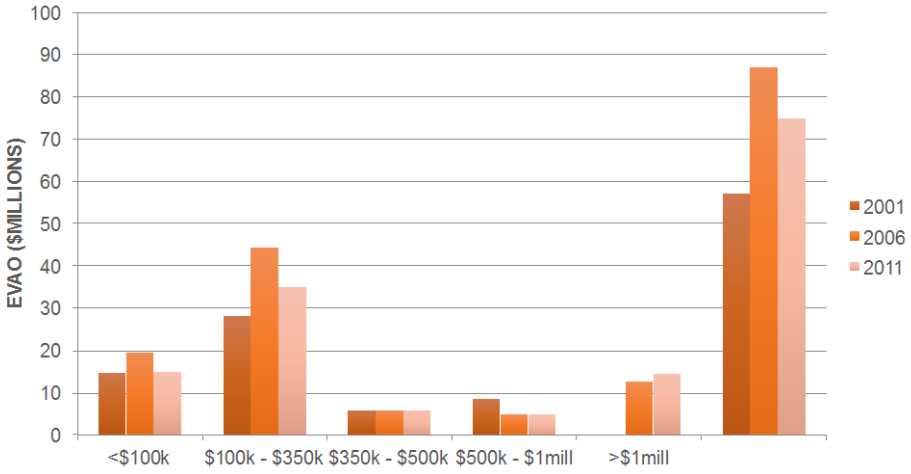


FIGURE 59: CHANGE IN TOTAL EVAO BY SHEEP BUSINESS SIZE CATEGORY, RIVERINA MURRAY



[15] MLA (2014) Prime lamb situation analysis. Report prepared for Meat and Livestock Australia by Holmes and Sackett.
[16] ABARES (2014) Australian agricultural productivity growth. Australian Bureau of Agricultural and Resource Economics and Sciences. Commonwealth of Australia.
[17] Productivity Commission (2005) Trends in Australian Agriculture. Productivity Commission Research Paper. Commonwealth of Australia, ACT.

BUSINES SCALE TRENDS

There has been little consolidation of livestock farms (in terms of physical size or EVAO) in the Riverina Murray region (Figure 59 and Figure 60).

The range of grazing only farms (beef or sheep grazing, or both) by business size and area of holding changed little between 2001 and 2011 in the main livestock production LGA.

Small farms (in terms of gross value) continue to dominate farm numbers in the livestock sector, mostly beef. Australia wide, the smallest farms are estimated to account for only 10% of gross farm output, whereas 10% of farm businesses now produce over 50% of output[18].

In the Riverina Murray region the number of higher turnover (greater than $500,000/year) beef farms has remained static relatively to the total number of farms over the past decade (Figure 60). There is also no trend towards larger beef farms in terms of physical area over this period (Figure 61). The data indicates that farm numbers have increased in all area of holding size ranges from 2001 to 2011.

FIGURE 60: CHANGE IN BEEF BUSINESS SIZE (EVAO), RIVERINA MURRAY

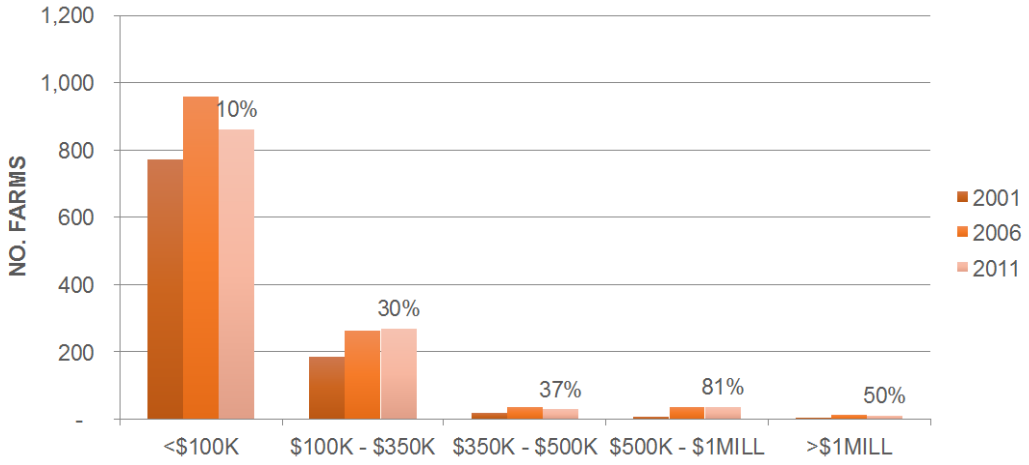
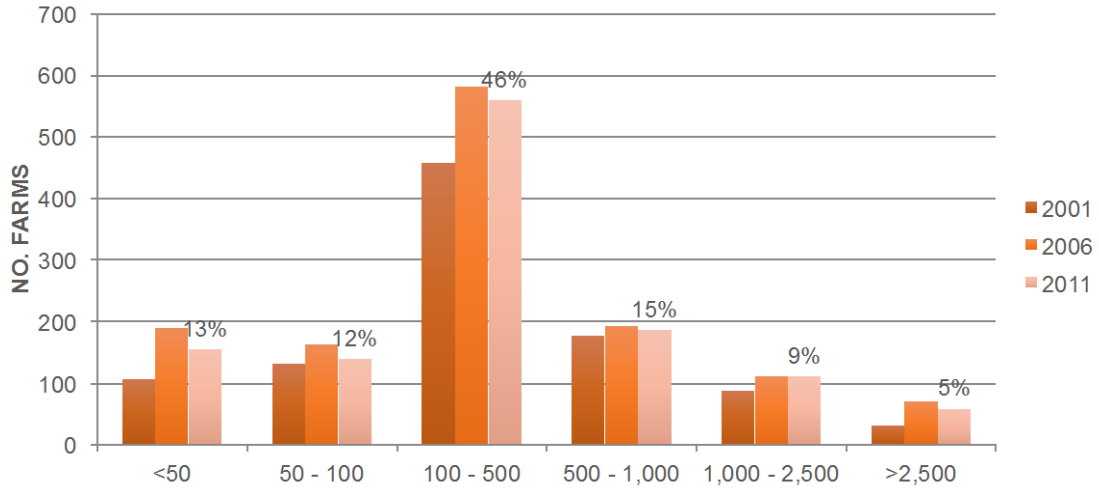


FIGURE 61: CHANGE IN BEEF FARM SIZE OF HOLDING, RIVERINA MURRAY



STRATEGIC IMPLICATIONS

Livestock production for meat is the second largest agricultural sector measured by GVAP in Riverina Murray and accounted for 19% of NSW meat GVAP and occupies two-thirds of land used for agriculture in the region. Beef production is focused in the south-eastern parts of the region and sheep is spread across the region. Livestock production is undertaken as part of a mixed cropping – livestock enterprise or livestock only. The

[18] Productivity Commission (2005) Trends in Australian Agriculture. Productivity Commission Research Paper. Commonwealth of Australia, ACT.

livestock sector is dominated by a large number of small farms (<500 hectares and <$100,000 EVAO) and there has been little evidence of consolidation. There is evidence of a shift of managing sheep for wool production to meat production to capitalise on demand and high lamb prices.

7 PERENNIAL HORTICULTURE

MAIN FINDINGS

- Perennial horticulture in the Murray-Murrumbidgee is comprised of orchard fruits (mostly oranges and apples), wine grapes, nuts, and nurseries, cut flowers and cultivated turf.
- The perennial horticultural industry had a GVAP in 2011 of around $271 million, which is 8% of the total GVAP in the region.
- Perennial horticulture is concentrated in the Griffith LGA with significant output also occurring from Tumut, Leeton, Carrathool and Wakool.
- Oranges and apples are the two biggest fruit crops contributing 26% ($69.2 million) and 16% ($44.5 million) respectively to the region's perennial horticulture GVAP.
- Over the last 20 years there has been an increase in the production of grapes, citrus apples and pears while production of stone fruit has decreased.
- The wine grape and citrus industries in particular, have been impacted by global over-supply and price slumps.
- The production and value of walnut production in the Murray and Murrumbidgee is expected to increase significantly as close to 80% of trees currently planted mature and begin to bear harvestable fruit.
- Perennial horticulture is highly dependent on access to a secure water supply and is concentrated in areas with access to High Security water entitlements and groundwater.

CURRENT SITUATION

In 2010-11 perennial horticulture contributed $271 million to GVAP in the Riverina Murray (8% of total GVAP). The main perennial horticulture commodities grown in this region are orchard fruits primarily oranges, apples, pears, stone fruit and wine grapes.

TABLE 6: GVAP PERENNIAL HORTICULTURE RIVERINA MURRAY

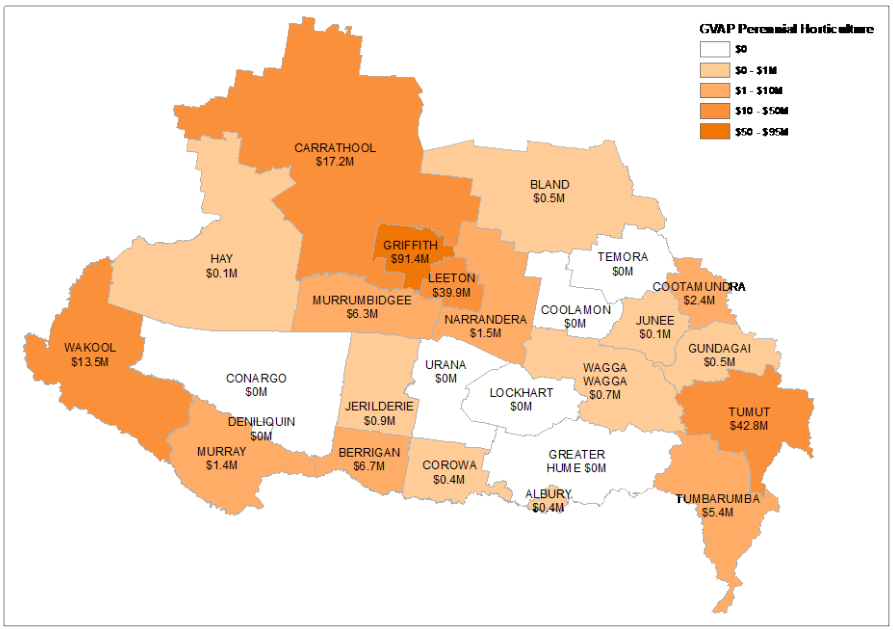
COMMODITY	GVAP	SHARE OF PERENNIAL HORTICULTURE GVAP
Orchard fruits (excluding wine grapes)	$151 million	56%
Wine grapes	$81 million	30%
Nuts	$24 million	9%
Nurseries, cut flowers and cultivated turf	$15 million	5%

The total area of perennial horticulture is small relative to the broadacre industries due to its intensive nature. In 2010-11 approximately 7,500 ha was utilised for apple, pear and stone fruit production on 76 farms. Around 31,000 ha were utilised for wine grape production, 188 ha (on 41 properties) for nursery production, cut flowers and cultivated turf and there were 968,210 nut trees planted on 39 properties. Perennial horticulture is highly dependent on access to secure water and is concentrated in areas that have access to high security water entitlements or ground water.

The most economically important LGAs in terms of total perennial horticulture output in the Riverina Murray (Figure 62) are:

- Griffith with a GVAP of $100 million – main contributors are wine grapes and oranges
- Tumut with a GVAP of $$44 million – main contributor is apples
- Leeton with a GVAP of $41 million – main contributors are oranges and wine grapes
- Carrathool with a GVAP of $28 million – main contributors are oranges, wine grapes and cherries
- Wakool with a GVAP of $19 million – main contributors are oranges, peaches, nectarines, table grapes, nuts and nurseries, cut flowers and cultivated turf

FIGURE 62: DISTRIBUTION OF PERENNIAL HORTICULTURE (INCLUDING WINE GRAPES) GVAP, RIVERINA MURRAY 2010-11



ORCHARD FRUIT

The most economically important fruit crops in 2010-11 were oranges and apples contributing 26% ($69.2 million) and 16% ($44.5 million) respectively to the region's perennial horticulture GVAP (Figure 63). The two main apple production areas are Tumut ($41.3 million) and Tumbarumba ($3.2 million). Orange production is more widespread across the region; the three main production areas are Griffith ($29.1 million), Leeton ($26.5 million) and Carrathool ($8.3 million). Minor amounts of production (less than $5 million) occur in the LGA's of Bland, Narrandera, Tumut Shire and Wakool (Figure 64).

The main stone fruit crops in 2010-11 were nectarines contributing $6.2 million (2%) and cherries $6.1 million (2%). Nectarines are produced mainly in Berrigan and Wakool ($2.8 million) with minor production (less than $0.5 million) in Albury, Corowa, Griffith and Tumut. Cherries are grown in Carrathool ($3.2 million), Cootamundra ($2.4 million) and Tumut ($0.5 million).

Olives contributed $5.4 million (2%) of the perennial horticulture output. The highest level of olive production occurs in Murrumbidgee ($3.8 million) with minor amounts of production (less than $1 million) occurring in Berrigan, Carrathool, Jerilderie and Wagga Wagga.

FIGURE 63: GVAP OF PERENNIAL HORTICULTURE, RIVERINA MURRAY 2010-11

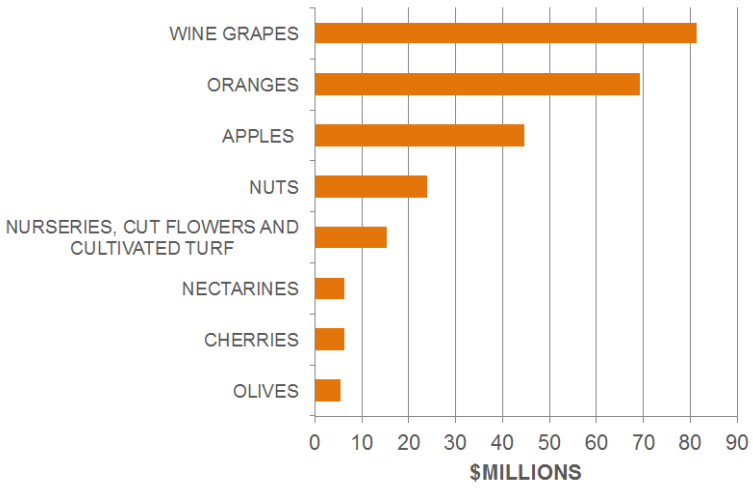
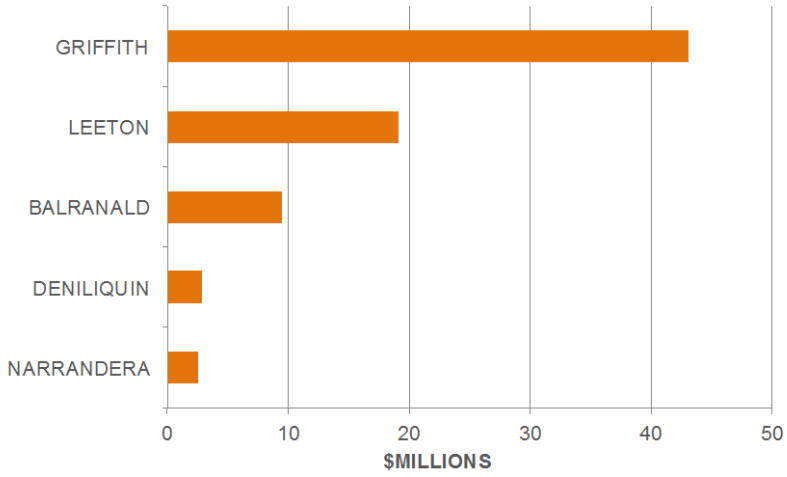


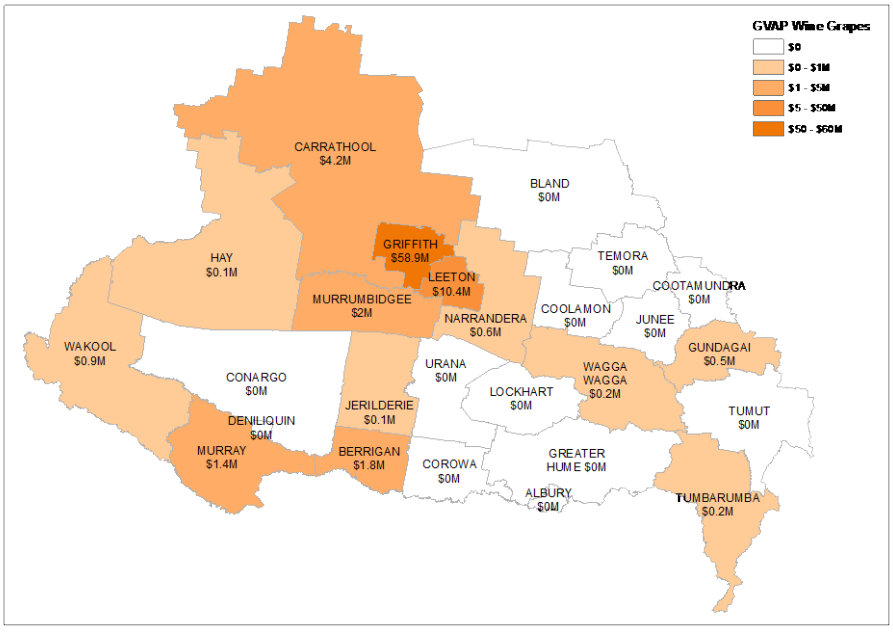
FIGURE 64: GVAP OF ORANGES IN MAIN ORANGE GROWING LGA, RIVERINA MURRAY 2010-11



WINE GRAPES

Wine grapes accounted for $81 million of the region's GVAP (30% of the perennial horticulture GVAP). Griffith was the region's largest contributor to the gross value of wine grapes in 2010-11, accounting for 72% ($58.9 million) of the total output (Figure 65). The next most important local government areas were Leeton ($10.4 million), Carrathool ($4.2 million), Berrigan ($1.8 million), Murray ($1.4 million) and Murrumbidgee ($2 million). Gundagai, Jerilderie, Narrandera, Tumbarumba, Wagga Wagga and Wakool all contributed less than $1 million to the region's wine grape value.

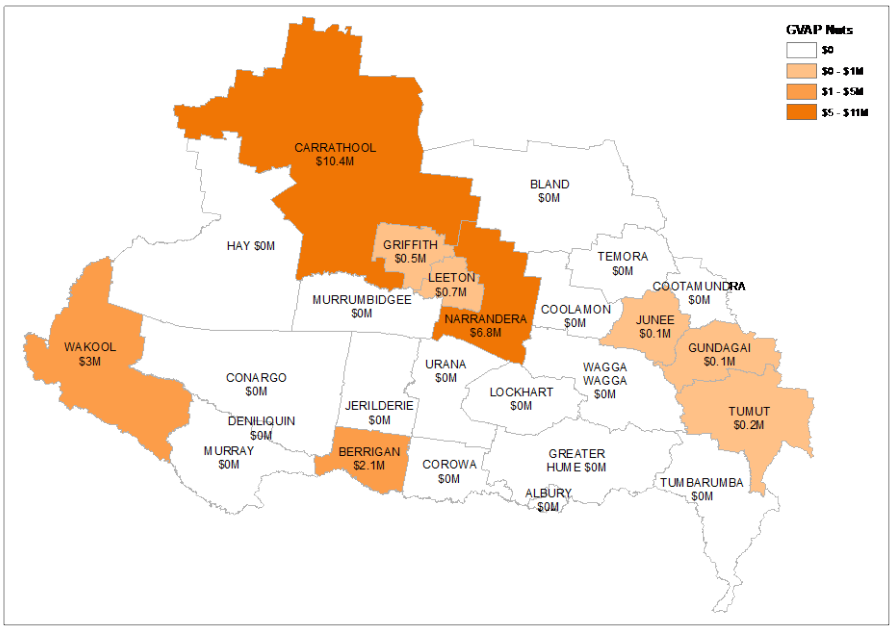
FIGURE 65: DISTRIBUTION OF WINE GRAPE GVAP, RIVERINA MURRAY 2010-11



NUTS

Nut crops grown in the area include almonds, walnuts and pistachios. In total, nut crops accounted for 9% of perennial horticulture output ($24 million). Walnuts and almonds are the two most economically important nut crops contributing $11 million and $9 million respectively. Narrandera ($7 million), Berrigan ($2 million) and Griffith ($0.5 million) are the main contributors to the regions almond GVAP (Figure 66). Carrathool is the region's main contributor to walnut GVAP accounting for $10 million. Leeton contributes $0.7 million to the walnut GVAP.

FIGURE 66: DISTRIBUTION OF NUT GVAP, RIVERINA MURRAY 2010-11

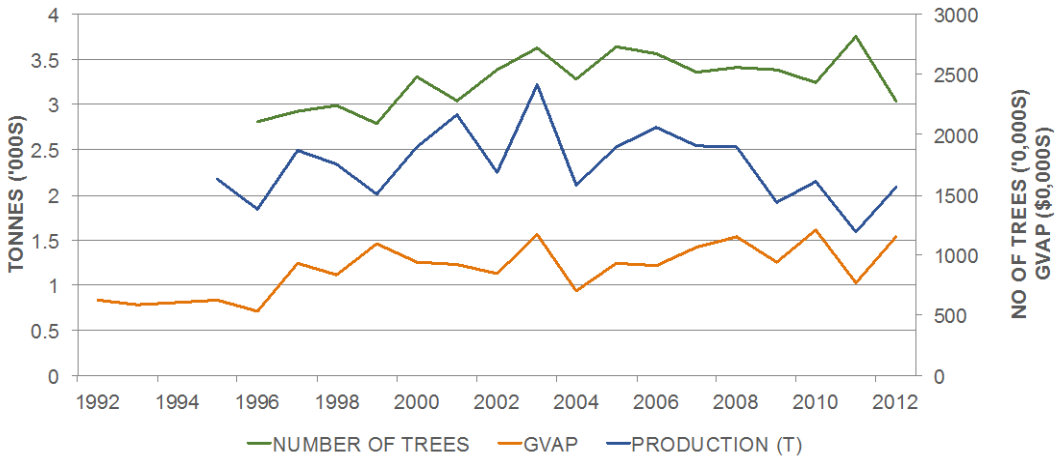


INDUSTRY TRENDS

ORANGES

Citrus production in the Riverina Murray had a minor decrease in volume from 163 million tonnes in 1995 to 156 million tonnes in 2012. During this time the number of trees increased slightly from 2.8 million to 3 million and the value of production increased from approximately $62 million in 1995 to $115 million in 2012. This indicates that although total production decreased, the prices received for oranges and/or lower operating costs enabled the gross value of production to increase (Figure 67).

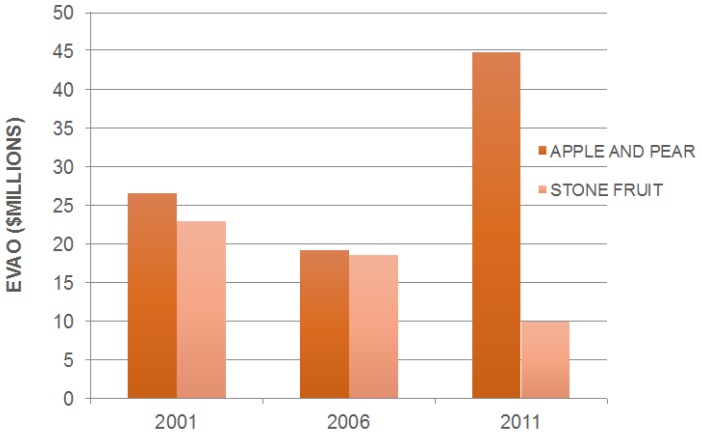
FIGURE 67: TREND IN GVAP, PRODUCTION AND NUMBER OF ORANGE TREES IN THE MAIN ORAGE GROWING LGA OF RIVERINA MURRAY



APPLES AND PEARS

The EVAO of apple and pear production increased from $27 million in 2001 to approximately $45 million in 2011. In contrast, the EVAO of stone fruit production steadily declined from $23 million in 2001 to approximately $10 million in 2011 (Figure 68)

FIGURE 68: CHANGE IN APPLE, PEAR AND STONE FRUIT EVAO, RIVERINA MURRAY



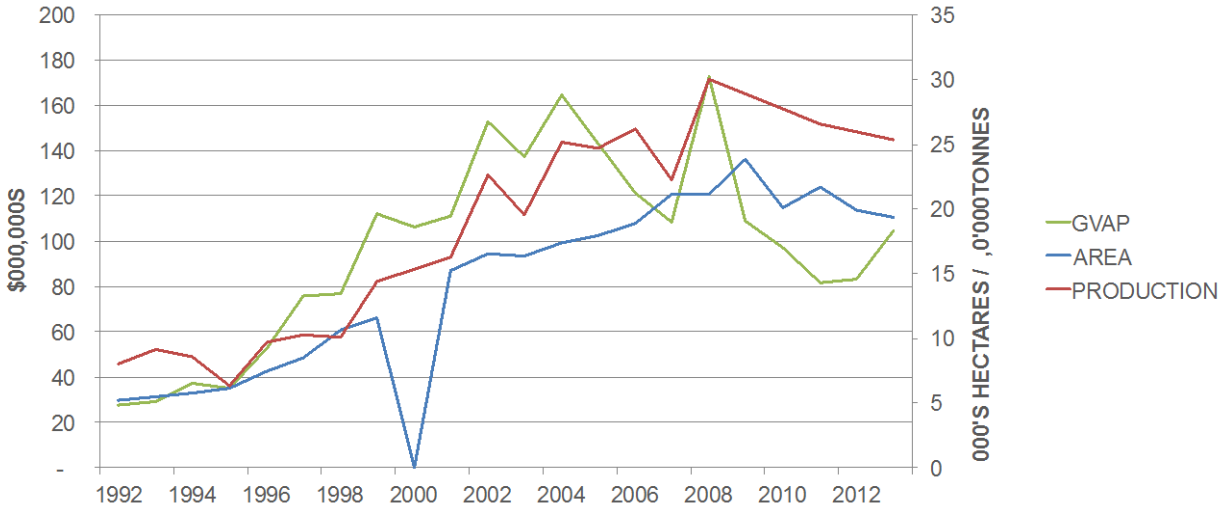
WINE GRAPES

The Australian wine industry experienced a period of considerable growth from 1992 to 2007, led by export expansion. This trend is consistent with the area and production of wine grapes in Riverina Murray Figure 69 with production increased steadily from 80,000 tonnes in 1992 up to 300,000 tonnes in 2008. The gross value of wine grapes in the region also rose steadily from $27 million in 1992 to $165 million in 2004, dipped and then peaked again at $173 million in 2008. Since 2007 the Australian wine industry has seen a significant downturn in industry profitability and variable industry output due to the global financial crisis reducing export demand for Australian wine grapes an oversupply in the domestic market and decreased prices. In the Riverina Murray wine grape production fell from 300,000 tonnes in 2008 to 273,000 tonnes in 2013 and gross value has dropped from $173 million down to $105 million.

The wine industry is highly fragmented with the largest 38 wineries accounting for 88% of production and the largest producer with less than 15% of output[19]. The fragmentation of the supply chain combined with recent grape oversupply has meant that an increasing proportion of grape production is un-contracted, and pricing signals tend to be short term and highly variable.

Grape price changes are not uniform and there is significant volatility from year to year and between grape varieties and regions. Prices paid for wine grapes have steadily declined over the decade, however average price for the 2012/13 vintage is the highest for four years, up 9% from 2011/12. Red wine grapes increased by an average of 13% to $619/t while white wine grape prices increased by 2% to $388/t.

FIGURE 69: TREND IN AREA, PRODUCTION AND VALUE OF WINE GRAPE PRODUCTION, RIVERINA MURRAY



[19] Wine Federation Australia (2014)

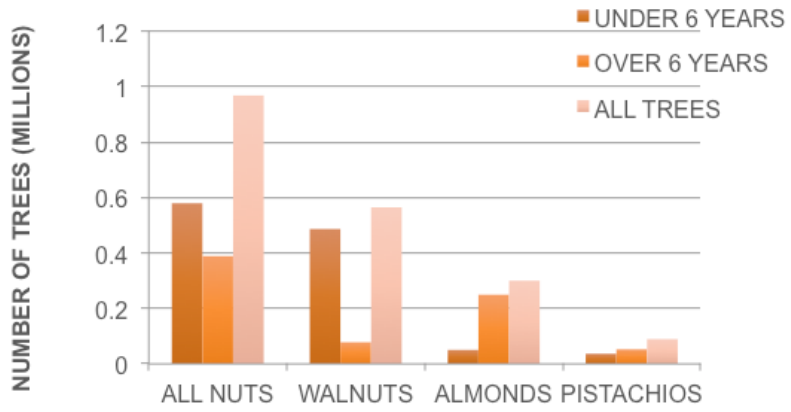
NUTS

Collection of ABS data from the nut industry in Riverina Murray began in 2006. The gross value of nuts increased more than six-fold in value from around $8million in 2006 to $49million in 2011.

The majority of almonds, walnuts and pistachios produced in NSW are grown in Riverina Murray Almonds and walnuts are the two biggest nut crops in terms of GVAP. Almonds represent a mature industry, with only a small percentage (17%) of planted trees under the age of 6 (Figure 70). Therefore current production levels will continue to increase slightly as trees mature.

Pistachio production has reached approximately 60% of its full production (with 41% of trees under 6 years). A large increase in walnut production in this area can be expected over the next 6 – 12 years as the majority of planted trees mature and begin to bear fruit. While modern varieties of walnut bear fruit within their first few years, it takes 4–6 years to produce a harvestable quantity and 10–12 years for the tree to reach full production. Currently 86% of planted walnut trees are under 6 years indicating that the current production and GVAP of walnuts in the Riverina Murray is only a fraction of its potential value to the region.

FIGURE 70: AGE RANGE OF NUT PLANTATIONS IN THE RIVERINA MURRAY 2010-11



ECONOMIC CONDITIONS AND PRODUCTIVITY

ORANGES

Citrus is one of most important horticultural industries in NSW with a production area of around 13,000 hectares. The Australian citrus industry is the largest fresh fruit exporter in Australia worth in excess of $200 million annually. NSW produces around 250,000 tonnes of citrus annually representing 40% of Australian production and 36% of citrus exports. Over 70% of NSW production of oranges comes from the Riverina Murray region.

Exports of Australian oranges in 2012-13 jumped to their highest in nearly a decade, a total of 133,373 tonnes, thanks largely to a surge in sales to Hong Kong, Japan, China and elsewhere in Asia. Industry figures for the 2012-13 financial year show that exports to Hong Kong and Japan have increased but it is the emergence of a direct export route to China that shows the most promise. In 2012-13 China bought about 3500 tonnes of Australian oranges, a 1100 per cent jump on the previous year. Exports to China also pay well. The average price per kilogram for exports to China (from April to November 2013) was $1.42. The average price per kilogram across all export markets in this period was $1.06[20].

Export markets are key to a profitable citrus industry in Australia. Without them there would be a huge over-supply in the Australian domestic market.

[20] Australian oranges exports the highest in years. Darren Gray. Sydney Morning Herald 2014

APPLES

Australia is a minor exporter of apples with only 1% of total production traded internationally. Australia produces about 0.8 per cent of the world's apples and apples account for about one-third of Australia's pome fruit exports. Australian apples are exported to the United Kingdom, Asia, New Zealand and Canada[21].

Over the long term, China could offer opportunities for Australian apple growers, though this needs to be kept in perspective given the size of local production and the current trade restrictions. More detailed research is needed to identify the real opportunities for marketable varieties in niche segments and in targeted cities rather than to view China as one large market.

WINE

The volume of wine consumed within Australia has remained roughly the same from 1997 to 2012 at approximately 25L/head/year. However reduced market share due to increasing consumer demand for wine imports (from 7% in 2007 to 16% in 2012/13) has placed greater pressure on Australian wine grape production for domestic markets.

Wine exports peaked in 2006/07 however the onset of the global financial crisis had a significant impact, given that the industry's two largest markets – the United Kingdom and the United States went into recession and remain heavily impacted by the financial and economic downturn. At the same time, the strong Australia dollar reduced the industry's international competitiveness, and impacted returns on export sales.

International price-based wine competition has also intensified, with large producers Spain and Italy significantly increasing overseas sales during the past decade, as their domestic consumption has declined – particularly post global financial crisis. Consumption remains under pressure in these regions, which are still affected by recession[22].

NUTS

Consumer demand is increasing for walnuts and almonds both domestically and internationally. In 2014, the International Nut Council described international market demand for nuts as "incessant" and prices have been rising for five years despite big crops. Growth has been attributed to publicity of results of nutritional studies proving the health benefits, versatility and taste of walnuts and almonds.

China accounts for nearly half of world walnut production (600,000 tonnes) and as at 2014, was a net importer. The United States (mainly California) produces large quantities of walnuts and almonds. Australia is currently a small producer of walnuts and almonds globally however being a southern hemisphere producer is able to supply the freshest walnuts on the world market for several months of the year. As discussed previously, walnut production in this area is expected to undergo large-scale expansion as over 80% of planted trees become fully bearing. Almond production will also increase (although at a much lower scale).

Market opportunities for new growers seem somewhat influenced by scale of production, i.e. producers of significant quantities of nuts have the opportunity to supply export markets; whereas smaller-scale producers target supply of in-shell nuts to local outlets, farmers markets, wholesalers and online customers[23].

The industry comprises family farm operations of small, sometimes older orchards and large, new orchards that are managed by a few companies, where orchards are a combination of joint venture, investor funded, private ownership or company-owned entities.

BUSINESS SCALE TRENDS

APPLES AND PEARS

There are more than 600 growers of apples and pears in Australia. An ongoing decline in grower numbers indicates a consolidation of the industry where smaller-scale growers are exiting the industry and medium- and large-scale growers taking over. This trend can also be observed in the Riverina Murray where the number of farms with an EVAO of less than $350K have decreased from 2001 to 2011 and the number of farms with an EVAO of greater than $350K have increased from 2006 to 2011 (Figure 6.8).

[21] Apple and Pear Australia Ltd
[22] Wine Federation Australia (2014)
[23] Walnuts, farmdiversity website, Rural Industries Research and Development Corporation

There has been a clear trend towards larger apple and pear businesses (Figure 71) with a reduction in the number of business generating less than $500K and increase in the number of business generating more than $500k. There is also a clear trend in concentration of output. 30% of orchard fruit businesses generate more than $500K and account for 84% of the total orchard fruit EVAO.

FIGURE 71: CHANGE IN APPLE AND PEAR BUSINESS SIZE, RIVERINA MURRAY (INCLUDING PERCENTAGE CHANGE WITHIN EACH CATEGORY BETWEEN 2001 AND 2011)

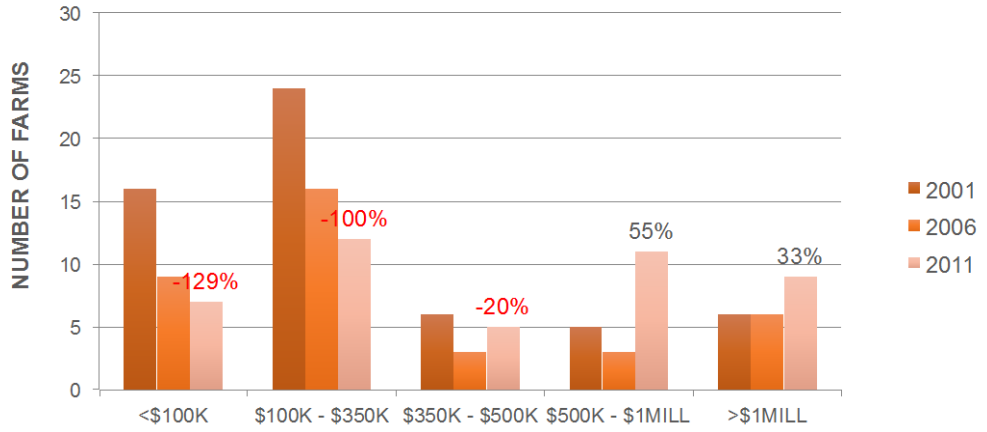
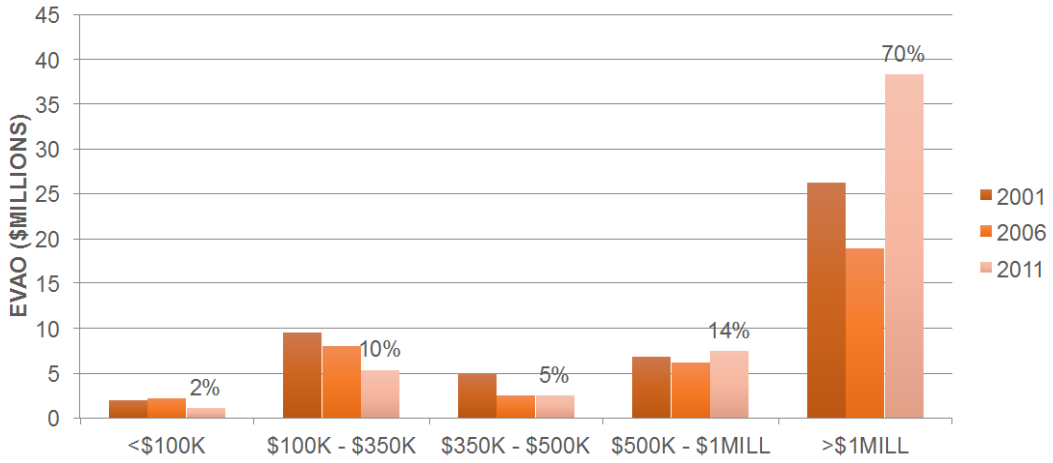


FIGURE 72: CHANGE IN EVAO OF APPLE AND PEAR PRODUCTION, RIVERINA MURRAY (INCLUDING PROPORTION OF 2011 CATEGORY CONTRIBUTION TO TOTAL 2011 EVAO)



WINE GRAPES

The downturn in the industry has resulted in significant restructure with a reduction in the number of small to medium size wine grape businesses (Figure 73). An increase in the number of large wine grape businesses indicates some amalgamation of businesses, but also the greater resilience of larger scale businesses to withstand changes to economic conditions.

Consistent with other agricultural industries, there is a concentration of output in the wine grape industry with 54% of the total EVAO produced by the businesses generating more than $500k, which make up just 10% of total wine grape producers (Figure 74).

FIGURE 73: CHANGE IN BUSINESS SIZE OF WINE GRAPE FARMS, RIVERINA MURRAY (INCLUDING PERCENTAGE CHANGE WTHIN EACH CATEGORY BETWEEN 2001 AND 2006)

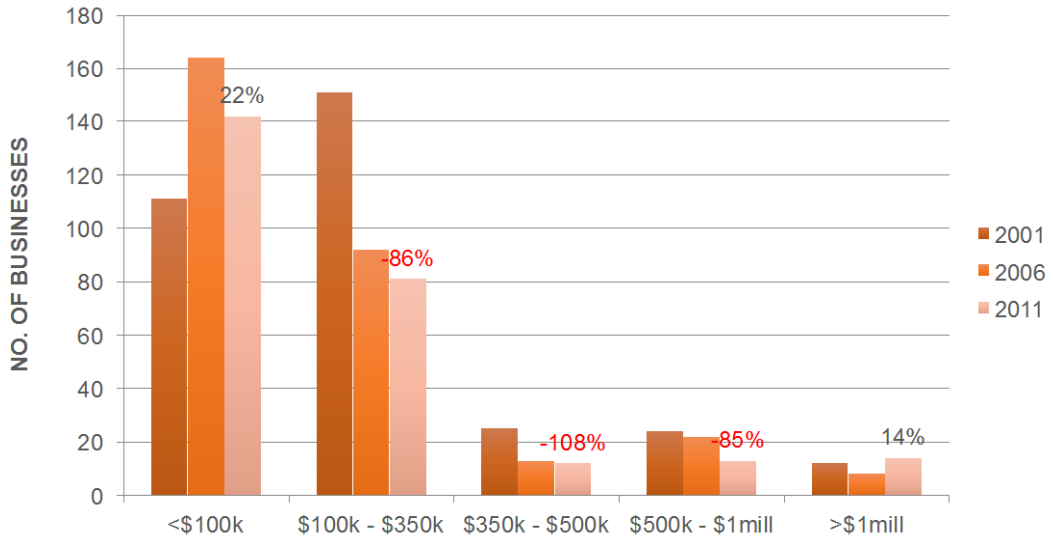
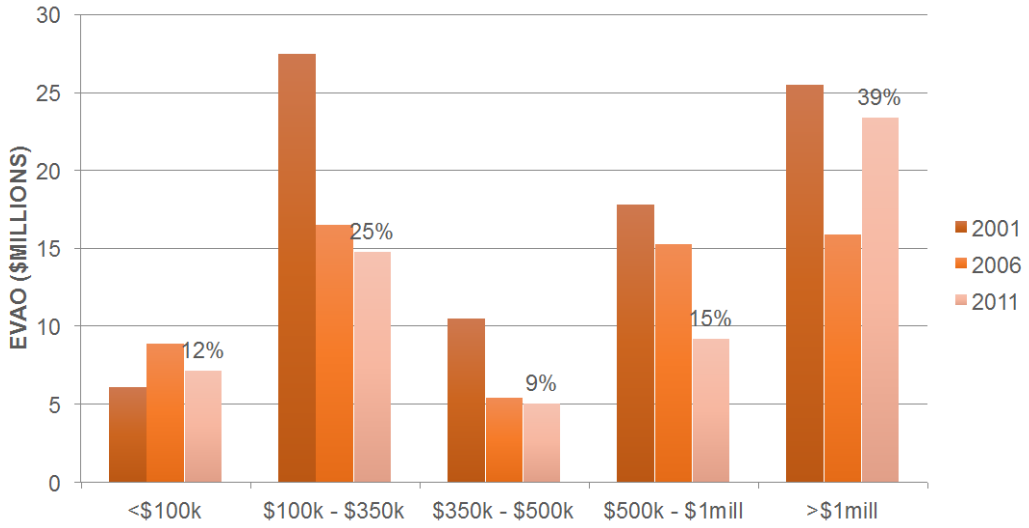


FIGURE 74: CHANGE IN EVAO BY BUSINESS SIZE CATEGORY, RIVERINA MURRAY (INCLUDING PROPROTIO OF 2011 CATEGORY CONTRIBUTION TO TOTAL 2011 EVAO)



STRATEGIC IMPLICATIONS

Riverina Murray produces nearly 50% of NSW orchard fruit and wine grapes. The industry is concentrated in the irrigation valleys where there is access to High Security irrigation water supplies and suitable climatic conditions. Economies of scale are a significant factor in the success of perennial horticulture. Increasing scale has provided opportunities for introduction of mechanisation and improved water use efficiency.

8 ANNUAL HORTICULTURE - VEGETABLES

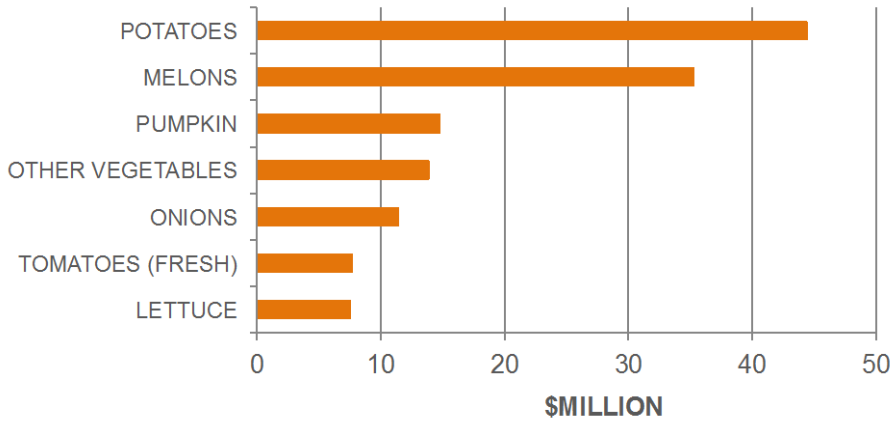
MAIN FINDINGS

- Vegetable farms cover a very small proportion of the regional land area occupying around 8,000 hectares in 2011.
- The GVAP of vegetables decreased from $141 million in 2001 to $134 million in 2011.
- The main annual horticultural crops grown in the region include potatoes, melons, pumpkins, onions, tomatoes and lettuce.
- The number of farms producing vegetables in the region has decreased from 107 in 2001 to 73 in 2011.
- Vegetables are mostly grown in the local government areas of Griffith, Carrathool, Hay and Leeton.
- The Australian vegetable industry is facing rising input costs, with many growers increasing economies of scale to maintain profitability.
- Annual horticulture is dependent on access to a secure water supply and is grown in areas with access to High Security water entitlements and groundwater.

CURRENT SITUATION

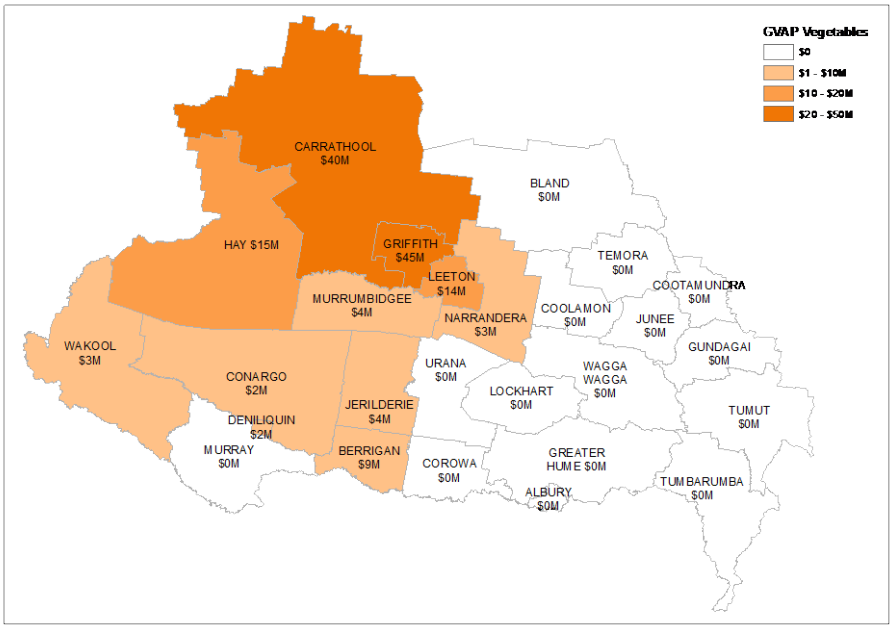
Annual horticulture contributed $141 million to the gross value of agriculture in the Riverina Murray during 2010-11. The most important crop was potato, which accounted for 31% ($44 million) of the total vegetable output (Figure 75). The second most important vegetable crop was melons which contributed 25% ($35 million) followed by pumpkins ($15 million), other vegetables ($14 million), onions ($11 million), fresh tomatoes ($8 million) and lettuce ($8 million). Broccoli, carrots, cauliflower, sweet corn and seed vegetable contributed minor amounts to regional GVAP.

FIGURE 75: GVAP VEGETABLES, RIVERINA MURRAY 2010-11



The total area of annual horticulture is small relative to the broad acre industries due to its intensive nature. In 2010-11 approximately 8,000 ha was utilised for vegetable production. Vegetable production is widespread across the Riverina Murray with most LGA's contributing to the gross value of vegetable production in the region (Figure 76). The most economically important LGA's were Griffith ($54 million) and Carrathool ($40 million). Significant output also occurred from Hay ($15 million), Leeton ($14 million), Berrigan ($9.5 million) and Wakool ($6 million). Albury, Conargo, Corowa, Deniliquin, Greater Hume, Jerilderie, Murrumbidgee, Narrandera, Tumut Shire and Wagga Wagga also contributed minor amounts to the GVAP (less than $5 million).

FIGURE 76: DISTRIBUTION OF VEGETABLE GVAP, RIVERINA MURRAY 2010-11



INDUSTRY AND BUSINESS SCALE TRENDS

The gross return from vegetable production has decreased from $141 million in 2001 to $134 million in 2011. The total number of farms has also decreased during this time with reductions in the number of properties in all of the business size ranges. There is evidence of consolidation and increasing scale particularly in the 100 – 500 ha and 5,00 – 10,00 hectare size ranges (Figure 77, Figure 78). Around 92% of total vegetable EVAO is generated by 48% of growers that all generate more than $1million in EVAO (Figure 79).

Annual horticulture is highly dependent on the availability of irrigation water and production in Riverina Murray is focussed in areas with access to High Security and groundwater irrigation.

FIGURE 77: CHANGE IN VEGETABLE FARM SIZE, RIVERINA MURRAY

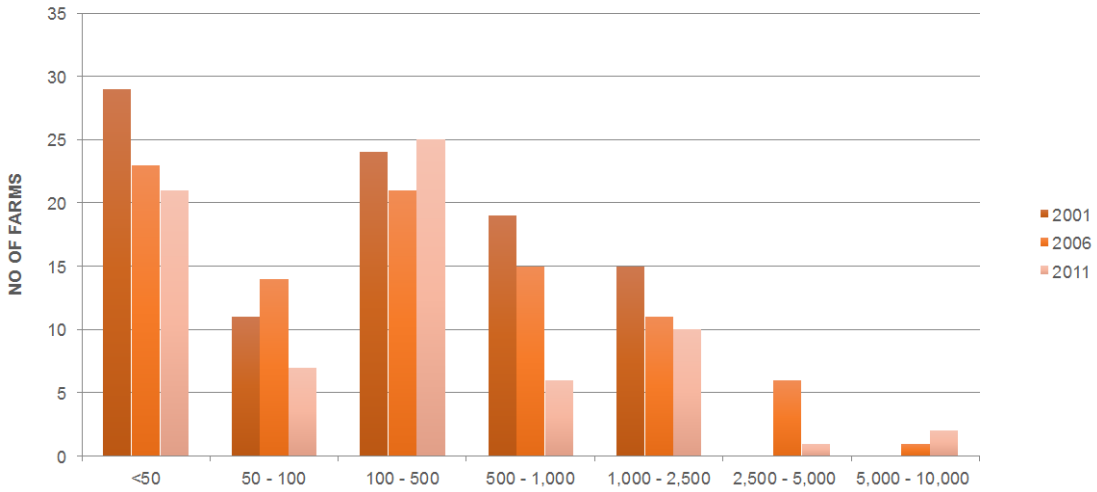


FIGURE 78: CHANGE IN VEGETABLE BUSINESS SIZE, RIVERINA MURRAY (INCLUDING PERCENTAGE CHANGE WITHIN EACH CATEGORY BETWEEN 2001 AND 2011)

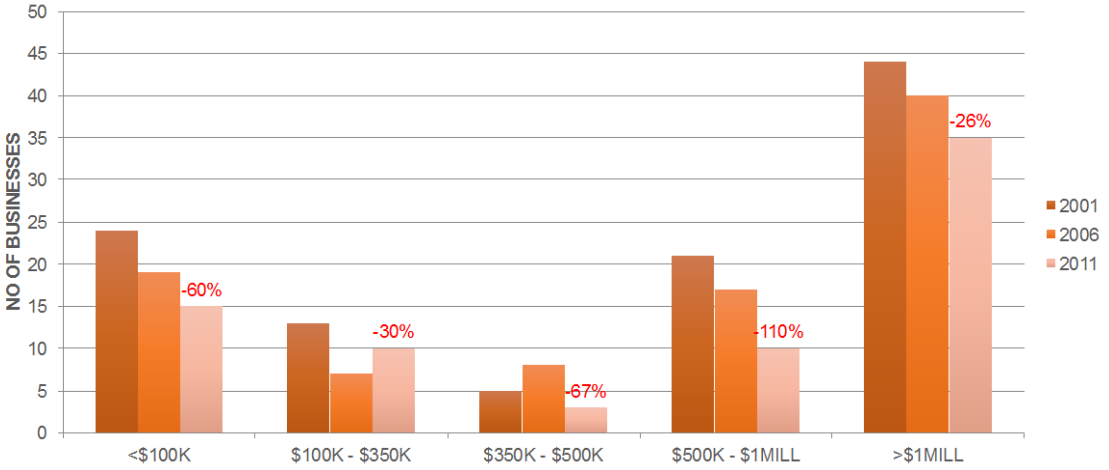
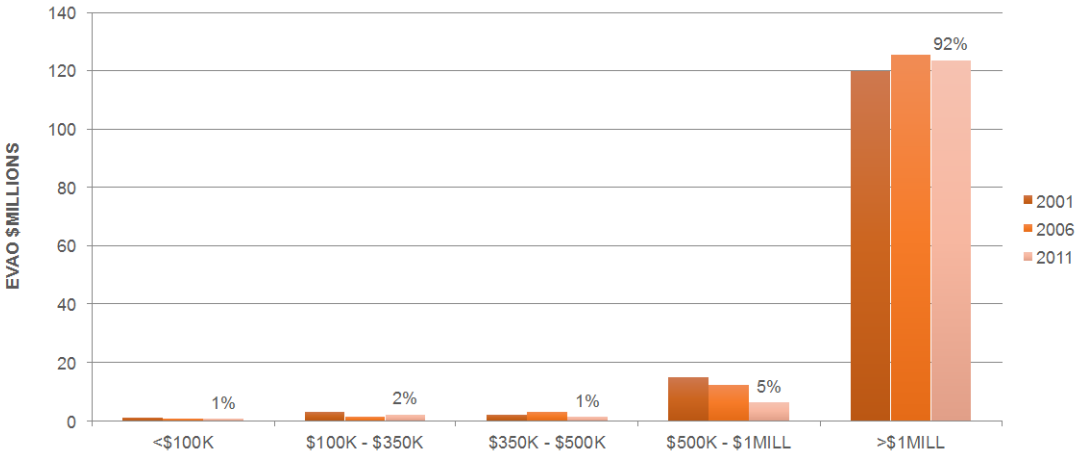


FIGURE 79: CHANGE IN TOTAL EVAO BY BUSINESS SIZE CATEGORY, RIVERINA MURRAY (INCLUDING PROPROTION OF 2011 CATEGORY CONTRIBUTION TO TOTAL 2011 EVAO)



ECONOMIC CONDITIONS AND PRODUCTIVITY

The Australian vegetable industry has made little headway in expanding exports in recent years. The main reason for this is usually cited to be lack of price competitiveness due to high cost structures. Export markets are not easy and require hard work, dedication, consistency of supply and good working arrangements with supply line participants in the country of destination. Despite this there are a number of Australian vegetable growers who have successfully built markets in Singapore and Japan and are among the leading sources of imports for several vegetables. This success has been achieved despite the price of vegetable imports from Australia often significantly exceeding the price of imports from lower cost and geographically closer countries in East Asia. Australia's success, albeit in a relatively small number of vegetables, is clear evidence that factors other than price (such as quality, reliability, availability and good supply line connections) are important in achieving success in Asian vegetable markets[24].

Australian vegetable producers have faced rising input costs for a number of years, in particular from 2005-06 to 2010-11[25]. This has forced them to push through larger volumes of product to stay abreast of rising cost pressure. However this action by individual growers also leads to supply depressing prices and undermining grower profitability.

The impact of rising input costs can be off-set to a degree by economies of scale. Recent ABARES data suggests that the impact of cash costs on vegetable growers varies depending on the size and scale of the business in question. Growers that produced vegetables on less than five hectares had significantly higher

[24] Sourcing of vegetables by Asian economies – a look at the data. AUSVEG 2012
[25] ABARES *Australian vegetable growing farms: An economic survey*, 2011-12 and 2012-13, (2013-14).

average cash costs than those that grew vegetables on five or more hectares, and average cash costs continue to decline as the area sown increases. This is largely due to the cost advantages that are achievable with increased vegetable production. For example, the cost to produce a vegetable unit tends to decrease as total vegetable production increases as the costs are shared over a larger sum of vegetables. Increased scale may also reduce costs per vegetable unit due to efficiency gains.

According to ABARES data, hired labour continues to be the highest cash cost for vegetable growing farms, accounting for approximately 17% of total average cash costs in 2011-12. This was followed by contracts paid (10%), fertiliser (9%) and seed (7%). Other cash costs used during the production of vegetables, such as fuel and electricity accounted for 6% and 2% respectively.

Typically, vegetable growing in Australia is more labour-intensive than other agricultural industries. The delicate nature of the produce commonly requires the use of labour to hand pick the vegetables. This puts the vegetable industry at a disadvantage to other agricultural industries as it limits vegetable growers' ability to introduce mechanised technologies as a substitute for labour.

STRATEGIC IMPLICATIONS

The Riverina Murray region produced over 40% of NSW vegetables and generated around $134million GVAP in 2011. The industry is focused in the western parts of the region where there is access to High Security irrigation water supplies and suitable climate conditions. Economies of scale are a significant factor in the success of annual horticulture. Increasing scale provides opportunities for introduction of mechanisation and improved water use efficiency.

9 DAIRY

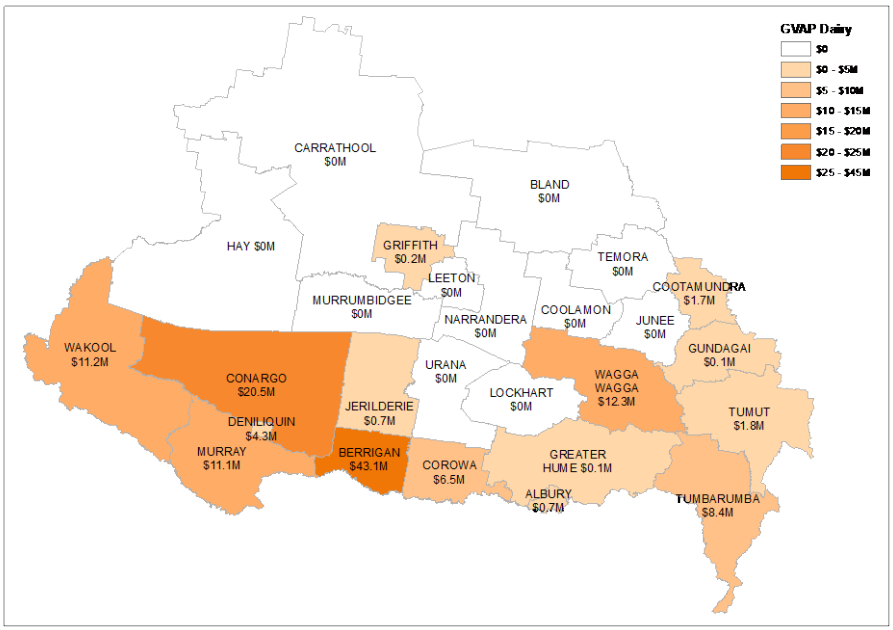
MAIN FINDINGS

- Dairy is the seventh largest agricultural sector in the Riverina Murray region with a GVAP of $123 million in 2010-11.
- Riverina Murray region produces around 25% of NSW milk. The Murray section falls within the broader Murray Dairy region, which is one of the largest dairy producing regions in Australia. Riverina Murray contributes around 10% of the milk produce in the Murray Dairy region.
- Dairy is concentrated in the south around the Murray and Murrumbidgee Rivers, where there is access to irrigation water.
- There has been little consolidation of dairy farms in terms of physical size between 2001 and 2011. Most farms range in size from 100 to 500 hectares.
- There has been a 28% decrease in the total number of dairy enterprises between 2001 (265) to 2011 (190). This is most likely due to successive years of low or zero water availability.
- Despite the decrease in the total number of farms, there was a significant increase (23%) in the number of farms generating more than $1 million between 2011 and 2011. This represents an intensification of the industry through the increases in bought in feed, higher water use and water use efficiencies and productivity gains on farm.
- Dairy production is concentrated in the local government areas of Berrigan, Conargo, Wagga Wagga, Wakool and Murray.

CURRENT SITUATION

In 2010-11 dairy contributed $123 million to the regional GVAP. The local government areas that contributed the most to dairy production are located in the south of the region in proximity to the Murray River and included Berrigan ($43 million), Conargo ($21 million), Wagga Wagga ($12 million), Wakool ($11 million) and Murray ($11 million) (Figure 80).

FIGURE 80: DISTRIBUTION OF DAIRY GVAP, RIVERINA MURRAY 2010-11



There were around 190 dairy enterprises in the Riverina Murray region in 2011. More than half (around 106 or 56%) of these farms generate more than $500,000 gross turnover. Around 24 properties (13%) had a turnover of less than $100,000 (Figure 81).

The distribution of the property size range of dairy enterprises is shown in Figure 82. In 2011, more than half (58%) of the dairy properties were in the 100 – 500 hectare range. Thirty-one per cent of properties were greater than 500 hectares, while 11% were less than 100 hectares.

The majority of dairy enterprises in the region will be irrigating pastures and crops. In 2009/10, there were around 1,140 properties in the region that were irrigating pasture and cereal crops for grazing, applying irrigation at an average rate of 2.3ML/Ha[26]. It is noted that on dairy farms, there will be parts of the farm that will have much higher irrigation intensities due to the nature of the crop or pasture being grown. Irrigated lucerne for example would use upwards of 10ML/ha compared to a winter crop, which may only require 1 to 2 ML/ha.

FIGURE 81: DAIRY ENTERPRISE TURNOVER, RIVERINA MURRAY 2010-11

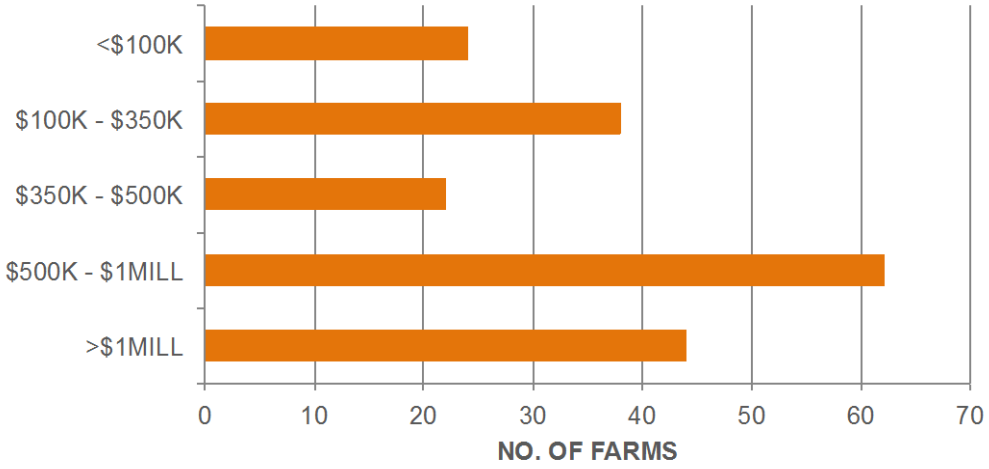
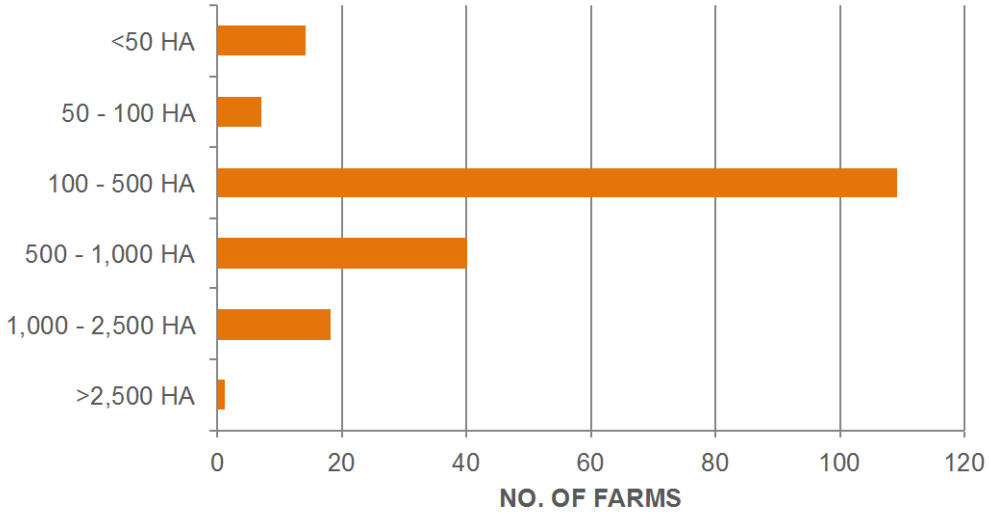


FIGURE 82: DAIRY ENTERPRISE HOLDING SIZE, RIVERINA MURRAY 2010-11



INDUSTRY TRENDS

The southern areas of the Riverina Murray region fall within the broader Murray Dairy region, which spans northern Victoria and southern New South Wales (Figure 83). It incorporates the southern Riverina (including the Murray – Murrumbidgee region), north-east Victoria and the Goulburn Murray Irrigation District. The Murray Dairy region is one of Australia's largest dairy regions, generating 30% ($4.3 billion) of the Australian dairy industry turnover and employing more than 10,000 people or 23% of the Australian dairy workforce[27]. The Murray – Murrumbidgee region contributes around 10% of the milk produced in the Murray Dairy region[28].

[26] ABS Water Use on Australian Farms, 2009-10. Table 1 Pastures and crops irrigated, NSW.
[27] Murray Dairy (2015) URL: www.murraydairy.com.au
[28] Murray Dairy pers. comms. (2015)

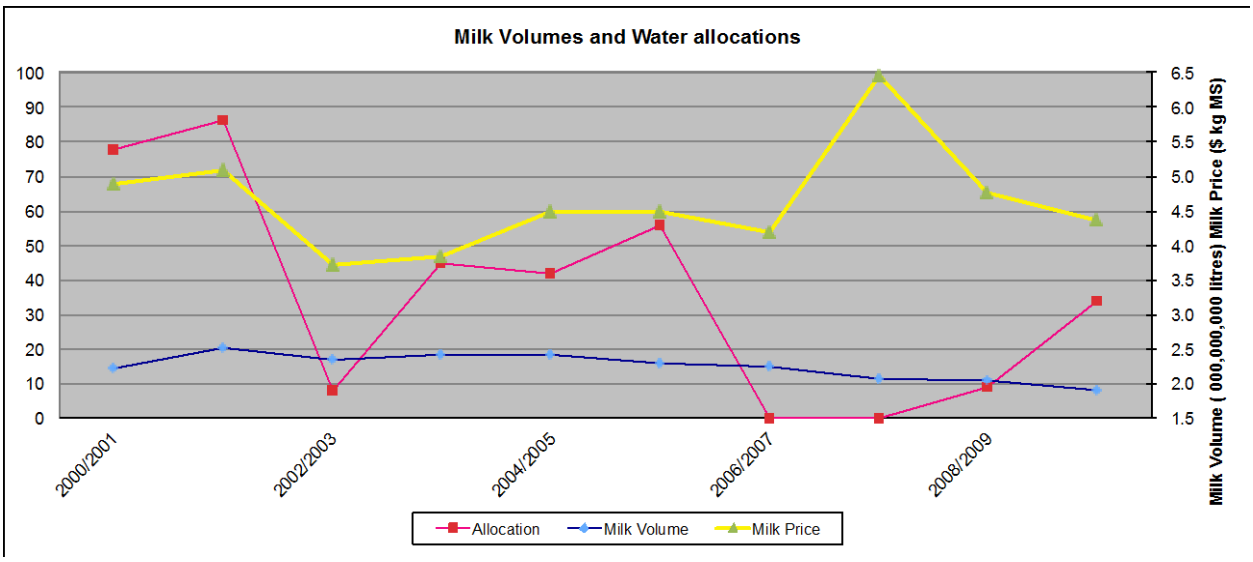
FIGURE 83: MURRAY DAIRY REGION[29]

Prior to the drought, Murray Dairy was the largest milk producing area within Australia and, with the majority of its production being exported, saw the development of world-competitive farming systems. The combination of affordable land and a reliable water supply enabled development of low-cost, low-risk farming systems based on perennial pasture that was flood irrigated and predominately harvested by direct grazing. Further competitive advantages also facilitated this development, including proximity to large grain and fodder growing areas.

From 1990 to 2001-02 the industry experienced steady growth with milk production close to doubling. In turn, there was also new investment in dairy farms from people outside the region who could see the competitive advantages that the area provided[30]. Milk processing companies also invested heavily in the Murray Dairy region and all major milk processing companies in Australia now have a presence in the region[31]. The majority of the processing occurs in Victoria.

The millennium drought led to successive years of low water availability, which impacted the volume of home-grown feed dairy farmers were able to produce. The result was a decline in milk production. The relative trends of water allocation, milk price and milk production for the Murray Dairy region are shown in Figure 84.

FIGURE 84: AVERAGE WATER ALLOCATION, MILK PRICE AND MILK VOLUME FOR SOUTHERN RIVERINA FROM 2000-01 TO 2009-10[17]



Milk production peaked at around 3.2 billion litres in 2001/02, then declined in accordance with decreasing water allocations (including two years with zero water allocation). The lack of irrigation combined with low rainfall during the pasture growing season limited the volume of home-grown feed, causing farmers to buy in more feed at a higher cost than growing their own. This put additional pressure on farms with many reducing

[29] Murray Dairy (2015) URL: http://www.murraydairy.com.au/murray-dairy-region.html
[30] RMCG (2012) *Draft Basin Plan - water availability and implications for the dairy industry in the Murray Dairy region*. Prepared for Dairy Australia.
[31] Value Statement – Murray Dairy Milk Processors – Submission to guide the proposed Basin Plan 2010

herd numbers to lower their exposure to the high cost of bought-in feed. There was a 50% increase in the milk price in 2007/08, however this did not reverse the trend in declining milk production, as farms continued to be challenged with low water allocations. The global financial crisis of 2008/09 saw milk prices drop and by 2010/11 milk production in the Murray Dairy region was around 1.9 billion litres.

The trends experienced in the southern Riverina are similar to those experienced in Northern Victoria; however Northern Victoria experienced a more dramatic decline in milk production. This could be attributed to the NSW dairy farms having developed production systems already based on less reliable water entitlements.

ECONOMIC CONDITIONS AND PRODUCTIVITY

Milk production has since increased to 2.36 billion currently and further recovery is expected given reasonable operating conditions however not to the extent of pre-drought levels. Water availability will continue to impact irrigated dairy production in the Murray Dairy region, particularly with the introduction of the Murray Darling Basin Plan, which targets a 2750GL reduction in river diversions. The two main risks for the dairy industry will be the extent of the buyback (to meet the reduction target) and the flow-on impacts for reduced milk production, and the cost of irrigation for those who remain[32]. Climate change is also expected to constrain water resources. All of this requires the irrigated dairy industry to achieve more with less water.

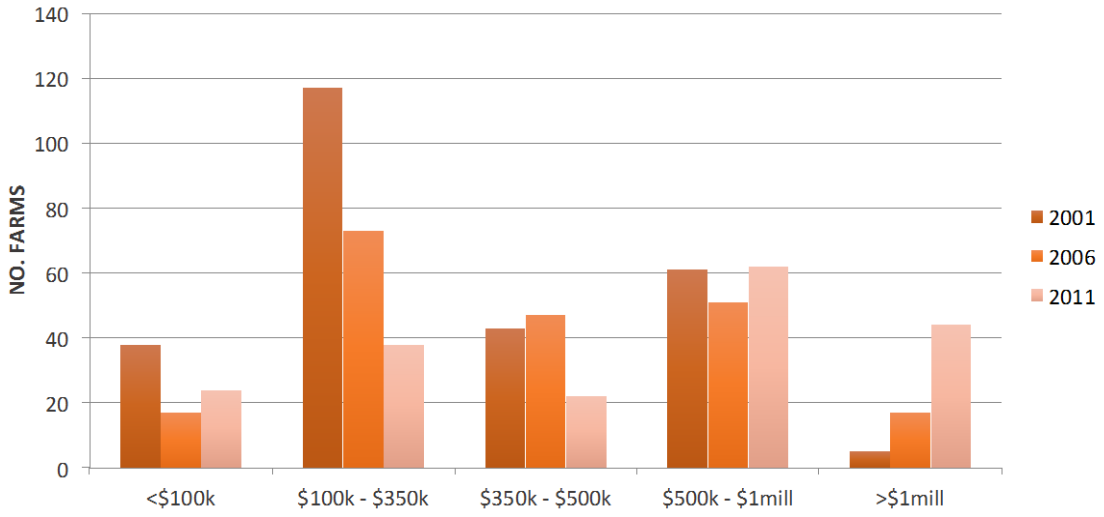
BUSINESS SCALE TRENDS

There has been some contraction of dairy enterprises in the Riverina Murray region, with the number of farms declining from around 265 in 2001 to 190 in 2011, representing a 28% decrease. It is likely that the millennium drought and successive years of low or zero water allocation contributed to the observed decline in farm numbers.

Even though the total number of farms decreased, there has been an increase in the gross value generated by dairy farms. In 2011, 23% of dairy farms derived more than $1 million in gross turnover, compared to only 2% of dairy farms in 2001. In 2001 a large proportion (59%) of dairy farms generated less than $350,000 in gross turnover, while in 2011 this had reduced to 33% of farms (Figure 85). This trend could be attributed to more feed being bought onto farms, water efficiencies and higher allocation years since 2006 all of which contribute to productivity gains.

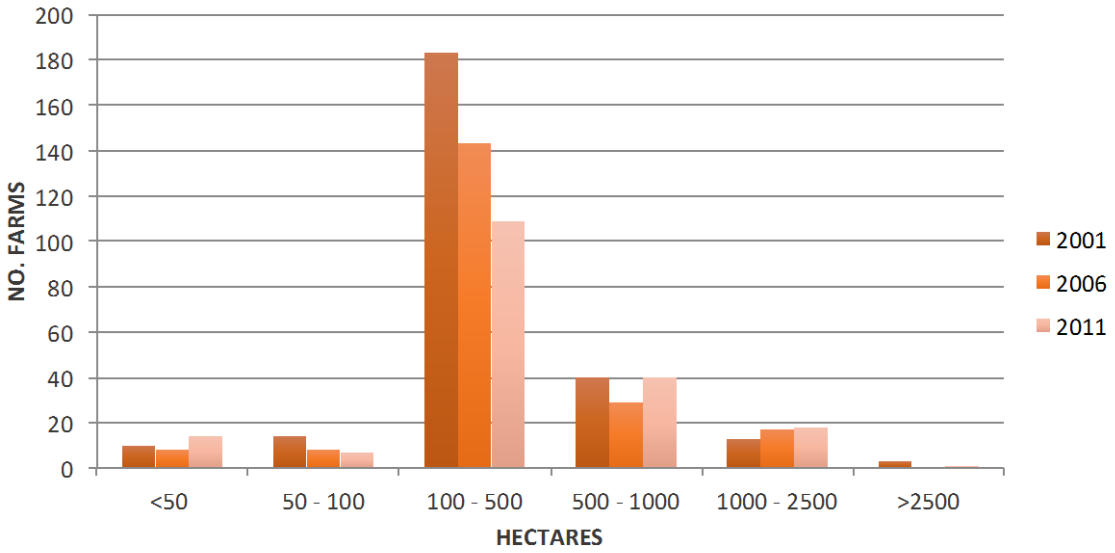
There has been little consolidation of dairy farms in terms of physical size in the Riverina Murray region. The range of dairy farms by area of holding changed little between 2001 and 2011. During these years, the majority of farms ranged from 100 to 1000 hectares, with the majority of these being less than 500 hectares (Figure 86).

FIGURE 85: CHANGE IN DAIRY BUSINESS SIZE (EVAO), RIVERINA MURRAY



[32] RMCG (2012) *Draft Basin Plan - water availability and implications for the dairy industry in the Murray Dairy region*. Prepared for Dairy Australia.

FIGURE 86: CHANGE IN DAIRY FARM SIZE OF HOLDING, MURRAY-MURRUMBIDGE



STRATEGIC IMPLICATIONS

The Murray – Murrumbidgee region produces around 25% of NSW milk and the Murray section falls within the broader Murray Dairy region, which is one of the largest dairy producing regions in Australia. Murray – Murrumbidgee contributes around 10% of the milk produce in the Murray Dairy region. Dairy is concentrated in the south around the Murray and Murrumbidgee Rivers, where there is access to irrigation water.

10 IRRIGATION

Irrigated agriculture is a significant component of the agricultural industry in Riverina Murray providing opportunities for production of high value commodities such as rice, fruit, vegetables and milk and continuity of production in low rainfall seasons. Water for irrigation is accessed via direct diversion from rivers, privately owned irrigation companies and groundwater pumping.

The main irrigation regions in the Riverina Murray are the New South Wales Central Murray and the Murrumbidgee Valley. Combined, these two valleys account for around 60% of NSW irrigation water use and 30% of irrigation water use in the Murray Darling Basin. The region also includes the lower reaches of the Lachlan Valley. In addition to private irrigators that extract water directly from the water source a number of private irrigation companies deliver water to farms across the region including:

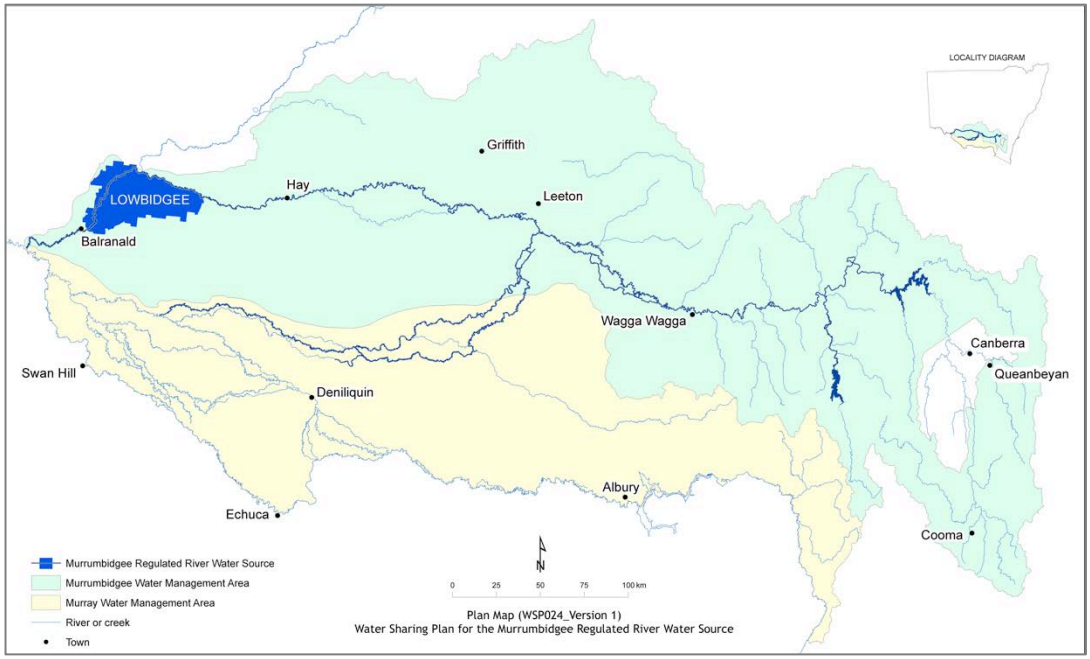
- Murray Irrigation Limited - 190,000ha of irrigation 2,300 farms
- Murrumbidgee Irrigation Limited - 160,00 ha irrigation, 3320 landholdings
- Coleambally Irrigation Cooperative Limited - 79,000ha and 490 farms

Investment in irrigation delivery and drainage infrastructure off-farm and on-farm represents a multi-billion dollar investment by government and the industry.

TABLE 7: WATER ENTITLEMENTS FOR IRRIGATION AREAS IN THE RIVERINA MURRAY REGION[33]

	SURFACE WATER (LONG TERM DIVERSION LIMIT) (GL)	HIGH RELIABILITY (GL)	GENERAL SECURITY (GL)	GROUNDWATER (GL)
Murrumbidgee	1,925	350	1,900	280
NSW Central Murray (including Lower Darling)	1,880	48	1,300	83
Lower Lachlan (below Lake Cargellico)	220			108

FIGURE 87: MURRAY AND MURRUMIDGEE WATER MANAGEMENT AREAS



[33] Murray Darling Basin Authority (2010) Guide to the Proposed Basin Plan

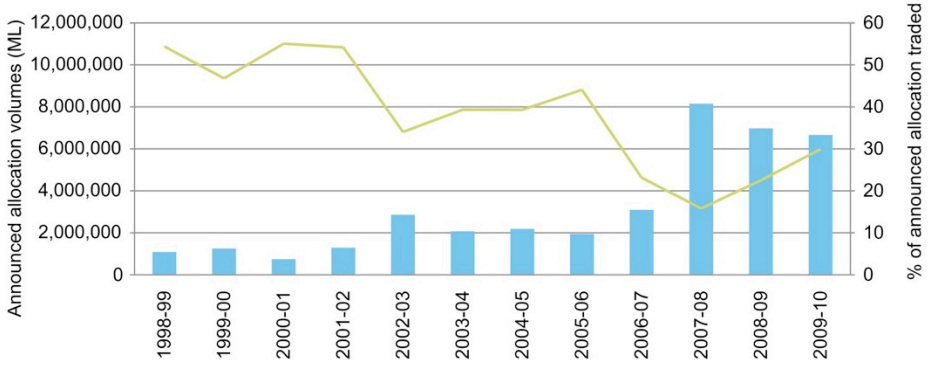
WATER AVAILABILITY

There has been substantial restructure in irrigated agriculture driven by changes to government water policy including the introduction of water trading, the Murray Darling Basin Plan, NSW Water Sharing Plans, ACCC Water Charge & Trading Rules and ACCC Water Price Determinations. Water trading has driven water into higher value irrigated businesses and environmental water recovery has reduced water availability in every traditional irrigation area throughout the Murray Darling Basin.

The Murray and Murrumbidgee surface water management areas fall within the southern-connected interstate trading zone of the Murray Darling Basin (Figure 88). The connectivity of the valleys and the current water trading rules allow for transfer of irrigation water between river valleys. Trade of permanent and temporary entitlements will be influenced by a number of factors but key drivers include seasonal availability of irrigation water, water prices and commodity prices. For example, the millennium drought resulted in significant reductions in water allocations across the southern Murray Darling Basin and prompted a doubling in water trade (Figure 89). In the drought year of 2008-09, water was generally traded downstream from rice growers in NSW to horticulturalists in Sunraysia and South Australia.

FIGURE 88: SOUTHERN CONNECTED SYSTEM OF THE MURRAY DARLING BASIN[34]

FIGURE 89: WATER ALLOCATION SALES AS A PERCENTAGE OF WATER ALLOCATED IN THE SOUTHERN MURRAY DARLING BASIN[35]



Source: NWC (2011b).

[34] http://www.mdba.gov.au/what-we-do/managing-rivers/water-trade/southern-connected-trading-zones accessed 20.7.2014
[35] National Water Commission (2011) Water markets in Australia: A short history

FUTURE AVAILABILITY

The Murray Darling Basin Plan has calculated Sustainable Diversion Limits (SDL) for each catchment within the Basin required to achieve environmental outcomes. In some catchments, achieving the SDL will result in less water available or irrigation. In the NSW Murray and Lower Darling and Murrumbidgee catchments, a reduction of 624 GL/year and 320 GL/year[36] respectively is required to achieve the SDL in each catchment. It is also likely that there will be further contributions to shared reductions in the southern Basin. The reduction in water availability will result in a reduced irrigation footprint and an increasing proportion of the available irrigation water used on high value commodities. Currently, this includes almonds, walnuts, dairy and cotton.

The water recovery targets under the Basin for the Lachlan catchment has been achieved. Therefore, there will be no further reduction in entitlements in this catchment.

STRATEGIC IMPLICATIONS

Irrigated agriculture is an vital component of the agricultural industry in Riverina Murray providing opportunities for production of high value commodities such as fruit, vegetables, rice and cotton and continuity of production in low rainfall seasons. There has been substantial restructure in irrigated agriculture driven by changes to government water policy and the experiences of the millennium drought. This restructure has been accompanied by significant investment in water efficiency improvements on farm and in water delivery infrastructure.

The water recovery targets set for the Lachlan catchment under the Basin Plan have been achieved. Therefore, it is expected that there will be no further reduction in irrigation entitlement in this catchments. However, achieving the SDLs under the Basin Plan in the Murray River and Murrumbidgee River catchments will require further reduction in water available for irrigation resulting in a reduced irrigation footprint and an increasing proportion of the available irrigation water used in the production of high value commodities.

[36] http://www.mdba.gov.au/what-we-do/basin-plan/development/eslt/ch09 accessed 20.7.2015

11 REGIONAL INFRASTRUCTURE NEEDS

OVERVIEW

The largest single regional infrastructure issue assisting agricultural market access and cost of production is the transport and distribution network servicing the Riverina Murray region. The regional freight task for agriculture is dominated by wheat, rice and bulk grains (90%), and the total annual agricultural production exceeds 6 million tonnes.

The freight task is especially diverse in the region with a range of irrigated and non-irrigated produce entering numerous industry supply chains. The agricultural sector requires seasonal transport of perishable (refrigerated) produce to market in addition to long haulage of bulk and containerised commodities. The agricultural primary and processing sectors require products to be transported to domestic and export markets in a timely and efficient manner to remain competitive. Produce is mostly transported to other regions in NSW, South Australia and Victoria.

Efficient freight flows from the Riverina and Western parts of the region into Victoria are reliant on strategically located river crossings with adequate bridge infrastructure. Several upgrades are planned for bridges to facilitate cross border access[37].

Griffith is an important rail freight origin for export by local producers, where there is an intermodal terminal for transfer of freight from road onto rail, destined to either Port Botany or Melbourne Port, and is conveniently located mid way between the two.

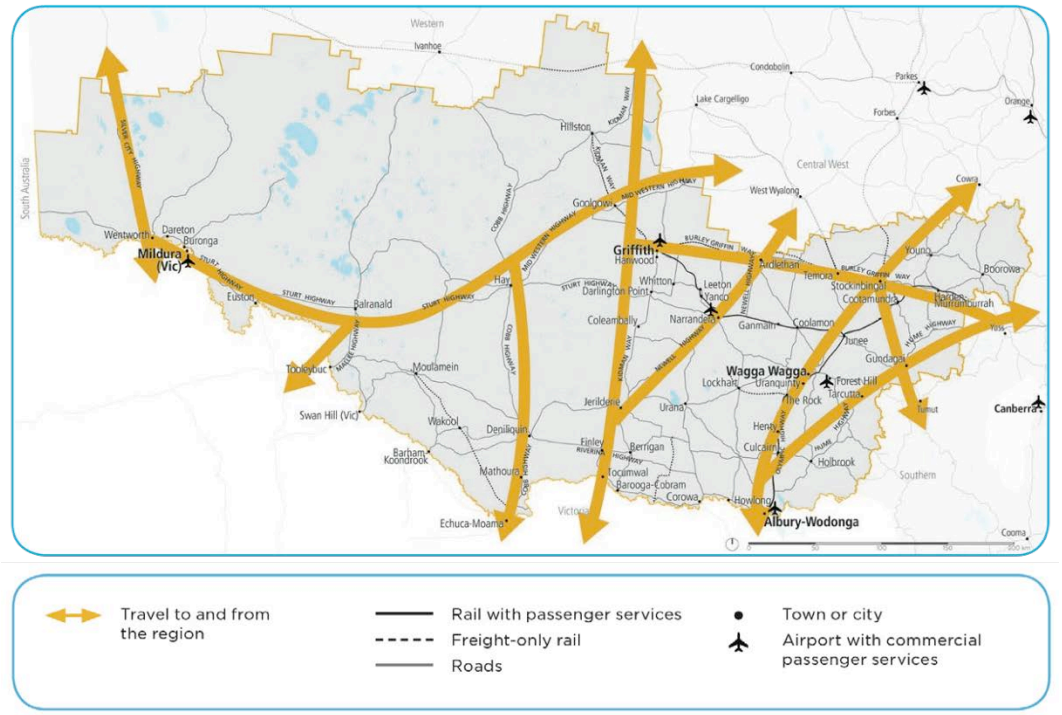
The largest exports by commodity flows are wheat and other grains, rice, wine and food. While road freight dominates the transport of agricultural commodities in regional NSW, including Riverina Murray, around 30% of wine and grains are tranpsorted to the ports by rail[38].

The major interstate freight flows coincide with the main road freight networks: mainly between Sydney and Melbourne, Sydney and Adelaide and between Melbourne and Brisbane. The major corridors to and from the region are shown in Figure 90**.** While rail frieght is increasing in volume, road freight dominates the transport of agricultural commodities in regional NSW. Increased B-triple access to a wider coverage of the main road corridors is improving road freight efficiency.

Given the growing trend in agricultural production, growth in freight demand from the agricultural sector could be higher than the forecast State-wide average (between one and three per cent). There is however a number of constraints on continued growth in agricultural production in Riverina Murray. These include irrigation water and plateauing grains yields and how these factors will be affected by a drying climate.

[37] Transport for NSW (2013) Murray-Murrumbidgee Regional Transport Plan. Transport for NSW, NSW Government, Chippendale, NSW.
[38] NSW Government (2013) NSW Freight and Ports Strategy. November 2013. Director General of Transport for NSW, Chippendale, New South Wales.

FIGURE 90: MAJOR CORRIDORS TO AND FROM THE RIVERINA MURRAY REGION[37]



GROWTH IN AGRICULTURAL PRODUCTION AND PROCESSING

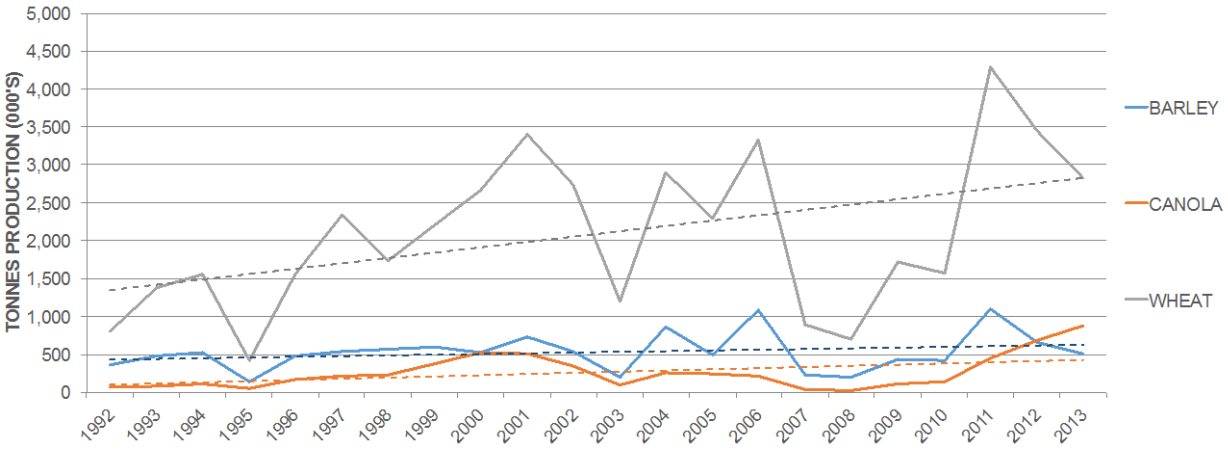
The NSW Freight and Ports Strategy[38] projected that the NSW freight task will double (to 794 million tonnes) by 2031. Freight needs for agricultural commodities (including bulk grain, cotton, wool, wine, horticulture and fresh produce) are forecast to grow between 1 and 3 per cent per annum. Average annual growth rates in production by weight of the main commodities grown in Murray Murrumbidgee are shown in Table 8.

TABLE 8: GROWTH IN PRODUCTION OF MAIN CROPS (TONNES) AND LIVESTOCK (ESTIMATED TONNES) IN MURRAY MURRUMBIDGEE OVER THE PERIOD 1992 TO 2013. NOTE GROWTH IS CALCULATED AS A COMPOUND ANNUAL GROWTH RATE USING THE FIRST AND LAST AVAILABLE DATA POINT IN THIS PERIOD.

COMMODITY	AVERAGE ANNUAL GROWTH	DATA YEARS	TOTAL TONNES (2013)	PERCENTAGE FREIGHT TASK
DRYLAND CROPPING				
Wheat	6%	1992 – 2013	2.82	47%
Barley	2%	1992 – 2013	0.51	8%
Canola	14%	1992 – 2013	0.88	15%
IRRIGATED CROPPING				
Rice	1%	1992 – 2013	1.16	19%
Cotton lint	21%	1992 – 2013	0.07	1%
LIVESTOCK				
Beef	<1%	1992 – 2013	0.12	2%
Sheep meat	-2%	1992 – 2013	0.03	1%
Wool	-5%	1992 – 2010	0.03	1%
HORTICULTURE				
Wine grapes	6%	1992 – 2013	0.25	4%
Oranges	<1%	1995 – 2013	0.18	3%
TOTAL			**6.05**	**100%**

The dryland grains sector has experienced sustained growth (in tonnages over the study period), despite large seasonal fluctuations in wheat production (Figure 91). However, this has been largely due to an increase in the area sown to wheat, rather than any increase in average yields. Given that dryland grains yields have plateaued it could be hard to sustain these production increases into the long term.

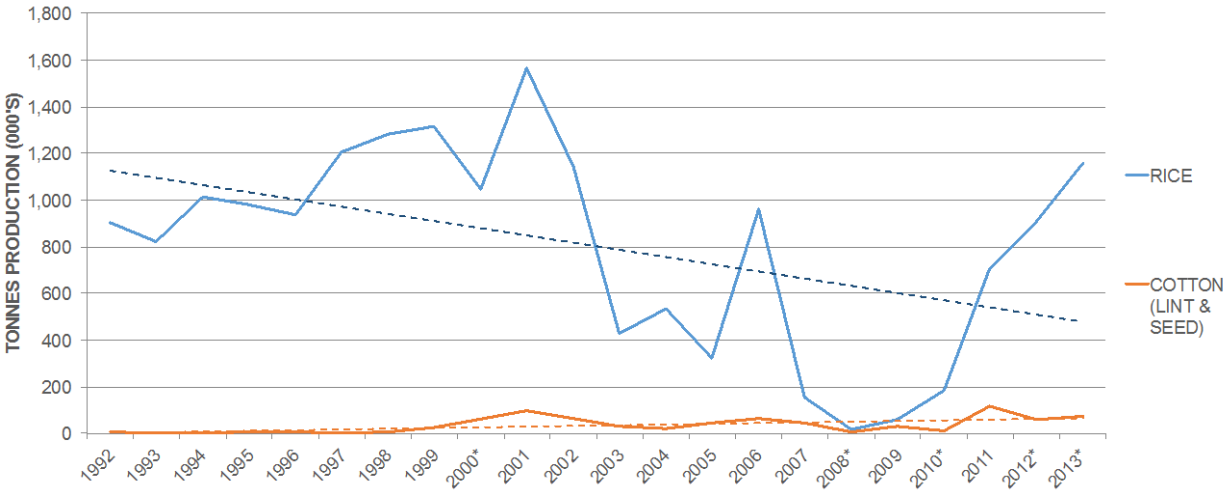
FIGURE 91: TRENDS IN PRODUCTION OF DRYLAND CROPPING 1992 – 2013. DASHED LINES INDICATE PRODUCTION GROWTH TREND



The crop mix is likely to keep diversifying to enable farmers to remain profitable. Shifts towards more specialised grains products could mean less bulk freight and more containerisation of grain for specialised export markets (in Asia and the Sub-continent, for example). Cotton is emerging as a significant crop in the region with substantial increases in areas grown in the past decade and this expansion is expected to continue. Rice and cotton production are however highly sensitive to seasonal irrigation allocations.

A massive decline in rice production occurred during the drought from which it has not fully recovered (Figure 92**).** There is unlikely to be expanded transport needs for rice, however by contrast, cotton production has grown with the availability of new cool climate varieties, buoyant prices, new markets for cotton seed and higher reliability of irrigation water supplies in NSW following the drought. Expansion of cotton storage, processing and transport facilities will be required in the coming years.

FIGURE 92: TRENDS IN PRODUCTION OF IRRIGATED CROPPING 1992 – 2013. DASHED LINES INDICATE PRODUCTION GROWTH TREND



Sheep numbers have almost halved over the last 20 years from around 13 million in 1992 to 7 million in 2013 while the number of beef cattle in Murray Murrumbidgee has remained stable (Figure 93). There has also been a steady decline in wool production over the past two decades (Figure 94) coinciding with a growing relative

importance of sheep for meat (lamb) production. There is unlikely to be any significant additional transport or infrastructure needs for livestock.

FIGURE 93: TRENDS IN LIVESTOCK PRODUCTION 1992 – 2013. DASHED LINES INDICATE PRODUCTION GROWTH TREND

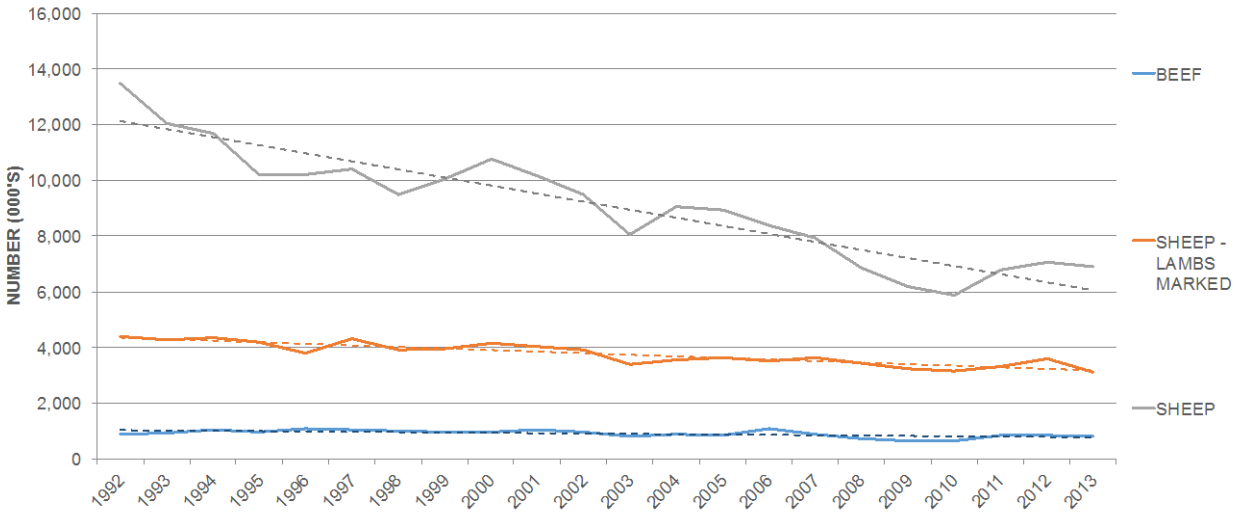
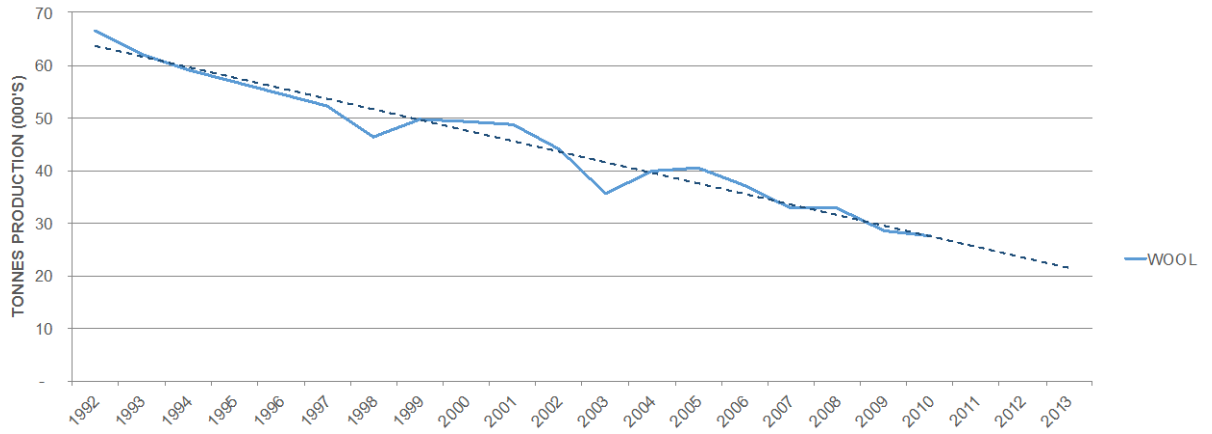


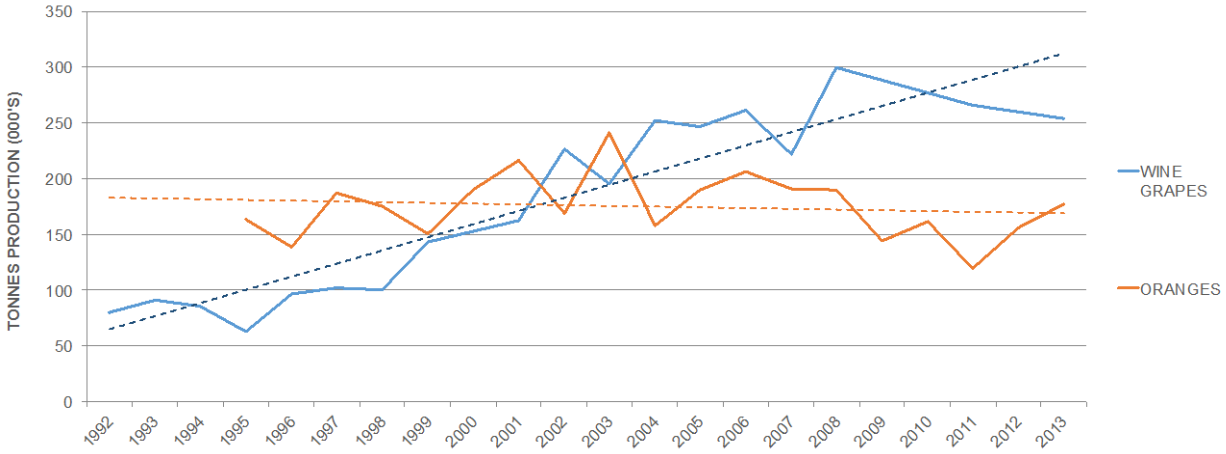
FIGURE 94: TRENDS IN WOOL PRODUCTION 1992 – 2013. DASHED LINES INDICATE PRODUCTION GROWTH TREND



Wine grape production experienced considerable expansion between 1992 and 2007 (Figure 95). However, the decline in profitability of the wine grape industry since 2007 is beginning to impact on production levels and will reduce the transport and infrastructure needs of wine grapes.

Orange production has been more or less stable over the period from 1992 to 2013, however, the emergence of a direct export route to China has shown some potential for future growth in oranges and could mean additional transport and infrastructure requirements in the near future.

FIGURE 95: TRENDS IN HORTICULTURAL PRODUCTION 1992 – 2013. DASHED LINES INDICATE PRODUCTION GROWTH TREND



STRATEGIC IMPLICATIONS

The agricultural industry generates significant freight flow, exporting products and importing production inputs such as fertiliser and fuel. Rail freight services move bulk commodities such as wine and grain to major ports. Road freight services move products within the region and to various destinations outside the region. Freight needs for agriculture are projected to grow at between 1 and 3% per annum until 2031. Maintaining road and rail infrastructure and upgrading strategic roads assets to accommodate larger and heavier loads will be important for efficient agricultural freight movement.

12 CLIMATE VARIABILITY AND CHANGE

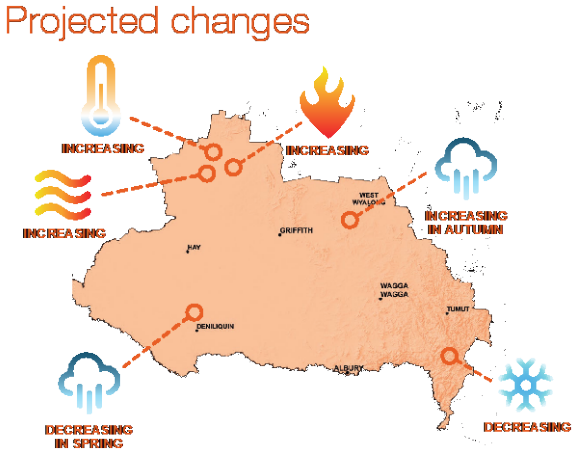
The climate of Riverina Murray reflects the diverse landscape. In the west and northwest there is generally lower rainfall, hotter and drier conditions. In the east and south east the rainfall is higher with mild summer temperatures and cold winters especially at higher elevations.

CLIMATE PROJECTIONS

The Office of Environment and Heritage have prepared regional climate change snapshots. The main findings and mapping are summarised here[39]

Based on long-term (1910–2011) observations, temperatures in the Murray Murrumbidgee Region have been increasing since about 1950, with higher temperatures experienced in recent decades. The region is projected to continue to warm during the near future (2020–2039) and far future (2060–2079), compared to recent years (1990–2009). The warming is projected to be on average about 0.6°C in the near future, increasing to about 1.9°C in the far future. The number of high temperature days is projected to risk nights anticipated. The warming trend projected for the region is large compared to natural variability in temperature and is of a similar order to the rate of warming projected for other regions of NSW.

The region currently experiences considerable rainfall variability across the region and from year-to-year and this variability is also reflected in the projections. However, all of the models agree that spring rainfall will decrease in the future.



Projected changes include:

- Maximum temperatures are projected to increase in the near future by 0.4 – 1.0 °C and far future by 1.6 – 2.5°C
- Minimum temperature are projected to increase by 0.4 – 0.8 °C and far future by 1.3 – 2.4°C
- The number of hot days will increase and the number of cold nights will decrease
- Rainfall is projected to decrease in spring and increase in summer and autumn
- Average and severe fire weather is projected to increase in summer and spring

Mapping indicates how climate change will impact across the region.

[39] Office of Environment and Heritage (2014) Murray Murrumbidgee Climate change snapshot

FIGURE 96: CHANGE IN HOT DAYS (202-2039)

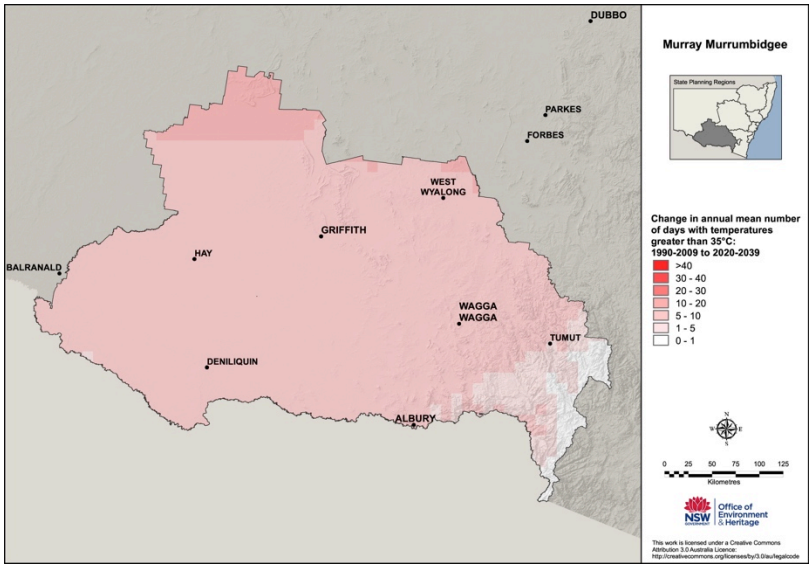


FIGURE 97: CHANGE IN MEAN MAXIMUM TEMPERATURES (2020-2039)

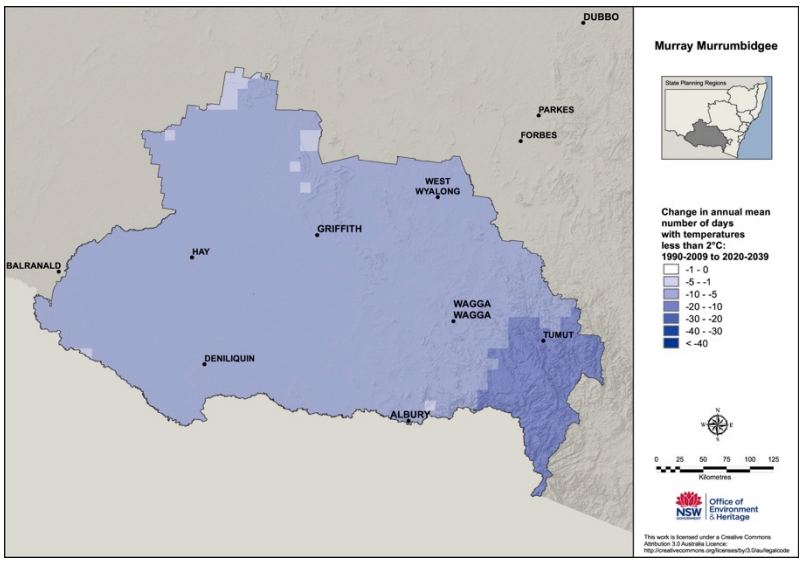


FIGURE 98: CHANGE IN MEAN MAXIMUM SUMMER TEMPERATURES (2020-2039)

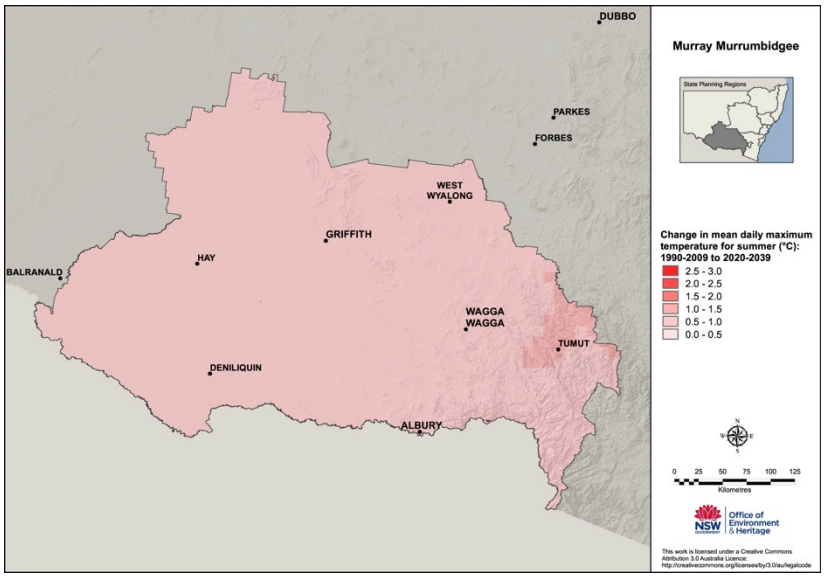
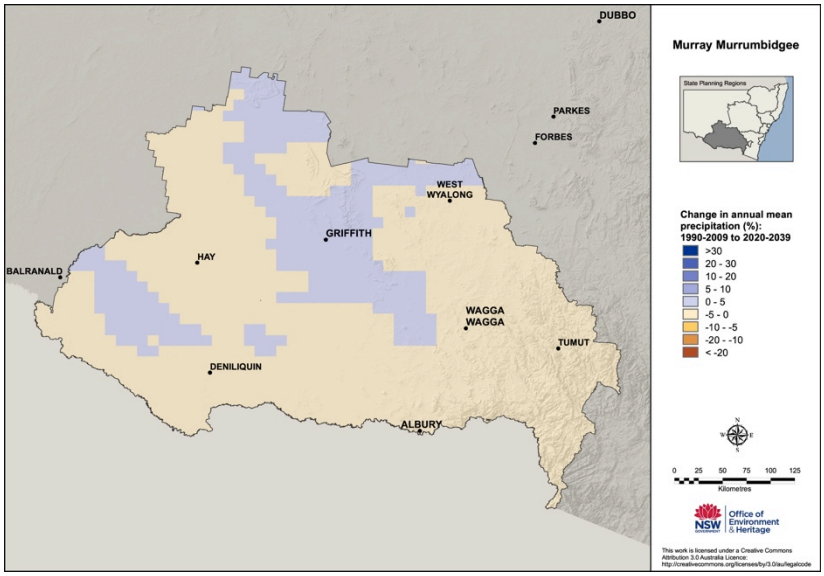


FIGURE 99: CHANGE IN ANNUAL RAINFALL (2020-2039)



CLIMATE CHANGE AND HORTICULTURE

The potential impacts of these changes to climate on the horticulture industry include:

- Decreased water availability due to higher temperatures.
- Increased water demand arising from greater evapotranspiration.
- Increased incidence of damage from sunburn and other breakdown disorders due to increase in the number of hot summer days (over 35ºC).
- A reduction in the number of frost days reducing winter chilling (which is important for some fruit trees for setting fruit, meaning that it may become necessary to consider low chill varieties and alternative management options).
- Increased intensity of frosts during spring may damage developing fruit and production.
- Increase in intense weather events (extremely heavy rainfall events) impacting on fruit quality.

Horticultural businesses would respond to a drying climate and uncertainty about water availability by buying more water to hold the same volume it initially held. Other short – to medium term measures include increasing use shade/hail netting. A projected decrease in frost frequency and severity would reduce the risk of damage to those fruits that are sensitive to frost late in the growing season. However, temperate fruits that require winter chilling to ensure normal bud-burst and fruit set are at risk of lower yields and reduced fruit quality.

Over the long term, climate change (extreme temperatures) may encourage some of these industries to relocate to cooler areas to reduce the impacts of prolonged periods of extreme temperatures during the growing season.

The risk of crop failures due to more variable/volatile growing conditions is also predicted to increase, affecting the industry's ability to meet increasingly specific and targeted quality assurance/market requirements. The horticulture industry may also be affected by policies to mitigate climate change, which are likely to result in higher energy, input and transport costs, for example cooling.

Climate change impacts on specific horticultural crops are provided here[40].

Almonds are a temperate nut that requires winter chilling to flower in the spring. Restricted winter chilling due to a warming climate is likely to delay flowering until later in spring, when high temperatures will restrict pollination and fruit set. Almond plants can also lose significant amounts of water at night, which will be exacerbated by higher night-time temperatures, negatively affecting the quality and quantity of production.

Apples are sensitive to extreme heat conditions with very hot conditions during the maturation period (January to April) potentially lowering yield and quality. As little as 10 minutes of extreme sunlight is enough to cause penetrative burns through apple skin, so with climate change expected to increase the number of days hotter

[40] University of Melbourne (2015) Appetite for change: Global warming impacts on food and farming regions in Australia

than 35°C in fruit-growing regions, higher rates of sun damage are likely. Adapting farm practices, such as using shade netting will be required but will also add to production costs.

Cabbages are easily grown under a wide variety of conditions. Cool, moist weather results in the best quality heads, though some varieties produce acceptable heads during warmer periods of the year. Climate change is likely to shorten the winter growing season of cabbage by up to a month by 2030 unless more adaptable varieties are developed. Higher temperatures will result in a longer period of pest activity, especially if production is extended into traditionally cooler periods.

Carrots can grow in temperatures between 10°C and 25°C but the best conditions are between 15°C and 18°C. Warmer temperatures adversely affect the carrot's flavour, texture and physical structure. Higher temperatures associated with climate change are likely to make carrot production less viable in warmer areas with shifts to cooler regions such as Tasmania.

Cauliflowers grow better in cool conditions. Excess heat negatively affects head development and size, while increases in soil temperatures promote a major soilborne disease, known as "clubroot", in brassicas. Rising temperatures may lead to cauliflower production shifting to cooler regions in Australia.

Olives are mainly produced in lower rainfall Mediterranean climates, meaning wet winters but hot, dry summers. Climate change could have a positive impact on the olive industry by extending the range in which the trees can viably grow, as they tolerate hot climates and drought conditions. In Australia, bush fires have destroyed large olive plantations, with younger trees more susceptible to death from fire. However, older olive trees can recover from fire with careful pruning.

In winter, peach trees enter a dormant phase, protecting the tree from cold weather damage. Once dormant, enough exposure to winter chill is needed before regrowth starts again. Without enough winter chill by spring, flowering is disrupted, leading to lower yields of fruit. Climate change effects on peach growing will differ greatly among regions. Minimal impacts are anticipated for Tasmania, for example, while the southwest of Western Australia is expected to experience notable declines in cold weather. Hormonal and other treatments can be used to partly compensate.

Plums are a perennial crop and ripen over spring and summer. Historical observations in Tasmania show plums are ripening earlier in the season. This trend is related to both warmer temperatures and drier conditions. If these trends continue, we may see various types of fruits ripen about the same time. This would compress the window of time for harvesting, requiring either more fruit pickers for a shorter period or, since securing such casual labour can be difficult, picking fruit too early or too late, reducing plum quality and value.

Walnuts are a perennial nut crop native to Mediterranean climates with warm, dry summers and mild, wet winters. As with other temperate nut crops, walnuts require winter chilling to flower in late spring. Global warming will affect winter chilling, resulting in late and erratic flowering. High temperatures at flowering and fruit set, together with potentially restricted supplies of irrigation water, make walnuts are particularly vulnerable to future conditions.

CLIMATE CHANGE AND BROADACRE AGRICULTURE

Winter grains are highly sensitive to climatic influences due to the relatively low winter / spring rainfall and high potential evaporation values as well as total reliance on rainfall. Cropping, particularly in the lower rainfall areas will be an increasingly risky enterprise. There will be an increase in the frequency of winters when cropping will be unprofitable due to reduced crop yield and / or reduced grain quality. In the short to medium term, farmers may change crop rotations, incorporate shorter growing season varieties and fallow to increase stored soil moisture. Incorporating a livestock component to the enterprise, purchasing additional cropping land or moving the cropping enterprise to areas with more reliable rainfall or access to irrigation are more significant responses to reduce climate risk. In the long term, the area of cropped land is likely to contract and total grain production reduce in Murray – Murrumbidgee.

A reduction in the net availability of irrigation water will have significant impacts for irrigators e.g. rice, cotton and dairy. This is particularly so within with the implementation of the Murray Darling Basin Plan and the Sustainable Diversion Limit targets. Irrigated crops are likely to reduce in the future due to an increase in seasons when there will be insufficient water for irrigation and heat stress impacts on crop yield, such as cotton. There has however been an increase in the area sown to cotton in the southern valley of NSW as cooler climate varieties have become available and growers have access to more reliable irrigation entitlements.

Within the dairy industry, there may be an increase in farmers exiting the industry due to the reduced availability of irrigation water. The trend has already been observed in the region; there was a 28% decrease in the number of farms from 2001 to 2011. The cost of irrigation for those who remain is likely to increase. The future of the dairy industry will depend on implementing water efficiencies so that more can be achieved with less water.

The reduced water balance arising from the predicted climate will also result in lower and more variable non-irrigated pasture production. In Murray – Murrumbidgee, there is likely to be a reduction in beef cattle and increase in sheep grazing with cattle grazing contracting to higher rainfall areas. Reduced pasture production will require enterprises to increase scale to maintain productivity. Feed lotting may become more attractive as there is capacity to reduce heat stress by providing shade and managing feed and water intake.

In addition, the distribution, abundance and management of insects, pathogens and weeds will be affected by climate change. For example, the likelihood that pests, particularly those of tropical or semi-tropical origin, will spread southward in Australia, or become established after an incursion, increases with climate warming. Stressed plants also are more vulnerable to insect and disease outbreaks and the efficacy of current control measures could be altered.

High rainfall areas of the region where the suitability for dryland cropping and grazing may improve in a future climate, have limited capacity to accommodate growth in these sectors due to fragmentation and the small scale of properties.

Climate change impacts on specific horticultural crops are provided here[40]

Climate change has three key effects on barley. More atmospheric carbon-dioxide increases yields of crops such as barley by about 0.2 per cent a year and may lead to reduced grain protein. Hotter temperatures will lower yields. It is predicted that by mid-century these two factors will largely cancel each other out, followed by net declines in both yield and quality. There remains uncertainty about how global warming will affect rainfall but the risk appears to be for less rain, and hence lower grain yields, across southern Australia's cropping belt, although small increases in some areas are possible.

Beef production in southern Australia typically relies on cattle breeds of temperate origin, such as Angus and Hereford, grazing intensively managed pastures. Warmer and drier climates in the future will pose significant challenges to these beef- production systems. Pasture- growing seasons are expected to contract, leading to lower and more variable animal stocking rates and increased reliance on supplementary grain feeding. Reduced rainfall will limit capture of runoff to supply drinking water, an issue highlighted during the Millennium Drought. Increased heat stress may lead to farmers choosing more heat- tolerant cattle breeds possibly of lower meat-eating quality.

Canola oil is classified as being cardio-protective because of its substantial amounts of essential unsaturated fatty acids but low amounts of saturated fatty acids. Increased carbon-dioxide levels in the atmosphere predicted by mid-century will diminish canola oil's health benefits, reducing the level of healthier unsaturated fatty acids by about 23 per cent while the level of unhealthier saturated fatty acids will remain the same.

Chickpeas are grown from northern Western Australia to Mediterranean-climate regions in south-western Australia, sub- tropical southern Queensland and more recently in eastern Australia. Climate changes are expected to bring more drought, heat and cold weather events in different climatic zones. Heat stress (35°C or above) during flowering and pod setting leads to flower drop, reduced pod and seed set, and consequent yield loss, especially in eastern Australia. Frost (below 0°C) and cold (below 10°C) also reduce the yield of winter sown chickpea, due to damage to flowers, reduced early pod formation and seed filling.

The "Spring lamb" production system relies on sheep grazing on highly nutritious pastures during winter and spring. Climate projections for reduced spring rainfall, and greater variability in rainfall patterns in southern Australia, will challenge this traditional production system. Alternative systems will be needed to adapt. In some regions this could include greater use of drought-tolerant native shrubs such as saltbush, and perhaps also increased feedlot-finishing of lambs to manage the uncertainty of seasons.

Wheat growing is strongly affected by rainfall and temperature. Future projections indicate lower and more variable production and increasing proportions of grain of low dietary value. While higher levels of carbon-dioxide in the atmosphere will increase plant growth, termed the "fertilisation effect", this extra growth requires more nitrogen and can reduce baking quality with lower grain levels of protein and important micronutrients. Zinc and iron concentrations, for example, are projected to be 5- 10% lower mid-century, adding to the already significant pressure of disease associated with malnutrition. Increased heat stress will also reduce wheat's dough-making characteristics.

STRATEGIC IMPLICATIONS

Climate change has and will impact the agricultural industry within Central West & Orana. In the short to medium term producers will modify practices, production mixes and varieties to spread risk and reduce the impacts climate change. Some strategies are already being adopted such as buying or leasing land in areas with more reliable rainfall or irrigation water security. In the longer term, some areas may see significant change in the mix of agricultural industries.

13 MAINTAINING REGIONAL COMPETITIVE ADVANTAGES

The Riverina Murray is the largest contributor to the GVAP of NSW and in 2010-11 provided employment for over 11% of the regional workforce. The region has a number of key competitive strengths that support this high level of agricultural production. These include:

- The scale, diversity and productivity of agricultural land in the region
- Significant water infrastructure and irrigation capacity
- Good transport networks, with most major highway and rail corridors crossing the region
- An international reputation for food manufacturing with strong processing and supporting industries.

In order to capitalise on these advantages the region's farmers will need to find ways to address and manage the range of issues facing agricultural producers across Australia now and in the future. These include[41]:

Rising input costs - Input costs, such as costs of water, electricity, fuel, and labour, are a primary concern and placing increasing pressure on producers to cut costs and remain price competitive. There are two aspects to this – one is the reality of rising input costs, the other is the significance placed on minimising costs to squeeze profit from low commodity prices. There is little farers can do to change this however where possible farmers are increasing economies of scale and using increased mechanization to reduce labour costs.

Reduced water availability - The rate and implementation of innovation within the irrigation industry in response to increasing pressures on water has been significant. For annual growers of rice and cotton, flexibility has been essential to success, as they choose to plant irrigated crops based on predictions of the availability of water and commodity prices. This flexibility may be affected by high infrastructure costs, but has also been enabled by diversity of products grown on these farms. Irrigators are changing their behaviours, and seeing water rights as tradeable part of their business operations. This means that in some circumstances production will fall, while a component of irrigator incomes will remain, buffered by water sales. The significance of agriculture therefore remains in the region, while the means by which this is realised (asset trading rather than growing) changes.

Reduced labour and skills availability - Most sectors of the agricultural industry in the Riverina Murray are experiencing issues relating to labour and skills. Particularly, there is a perceived lack of reliable, good quality employees, and a widely acknowledged shortage of trained professionals, such as agronomists. Skill shortages could be eased through work visas, technical innovation, improving the perception of opportunities within agriculture and better links between different parts of the education system and within industry to ensure people enter the industry and learn the required skills.

Meeting consumer demand - there is potential to improve the profits and economic value of agriculture to the region by better ensuring the product meets the standards desired by all parts of the supply chain, and ultimately the consumer. Many of the agricultural production and processing success stories in the region demonstrate an emphasis on consumer desires. In some sectors of the agricultural industry, a lack of trust between suppliers and buyers appears to be limiting the exchange of information, and therefore the ability of growers to best meet buyer demand. In industries where growers have more ownership over the supply chain, communication appears to be much more effective.

STRATEGIC IMPLICATIONS

Planning can support Riverina Murray maintain its competitive advantages for agriculture.

[41] Agriculture in the Riverina: Value, importance and impediments to increased competitiveness. RIRDC 2015

14 OPPORTUNITIES AND FUTURE OUTLOOK

The anticipated growth in demand for food and agricultural products in Asia should provide opportunities for further export of food manufactured from the Riverina Murray. Numerous free trade agreements (FTAs), both agreed and currently being negotiated, will facilitate flow of locally grown agricultural produce and value-added food products from Australia e.g. Australian Government negotiations are well advanced for FTAs with China, India and Indonesia; and newly signed agreements with Korea and Japan have already paved the way for tariff free exports of goods such as beef, lamb, wine and cotton.

Global growth in the "middle class" in Asia is leading to increased demand for quality food, including high end agricultural products such as fruit, dairy and high grade meats. This means potential opportunities for the Australian agricultural sector to grow in export significance (in terms of proportion of National GDP) given it has been falling since the 1980s[42].

Agricultural production in the Riverina Murray is strong in wheat, meat and fruit, so the region is well positioned to service the identified strong points of growth expected in developing country Asian markets. The region also has the capacity to produce the kinds of products forecast for strong growth. However, these opportunities will only be realised if current supply constraints can be overcome, as volume increases would challenge current systems in terms of capacity, quality control, transport and distribution. To facilitate future growth in the agricultural sector the 2013 – 2016 RDA Riverina Regional Growth Plan has identified a number of priorities that will encourage greater economic growth, diversity and industry innovation. These are discussed in Table 9.

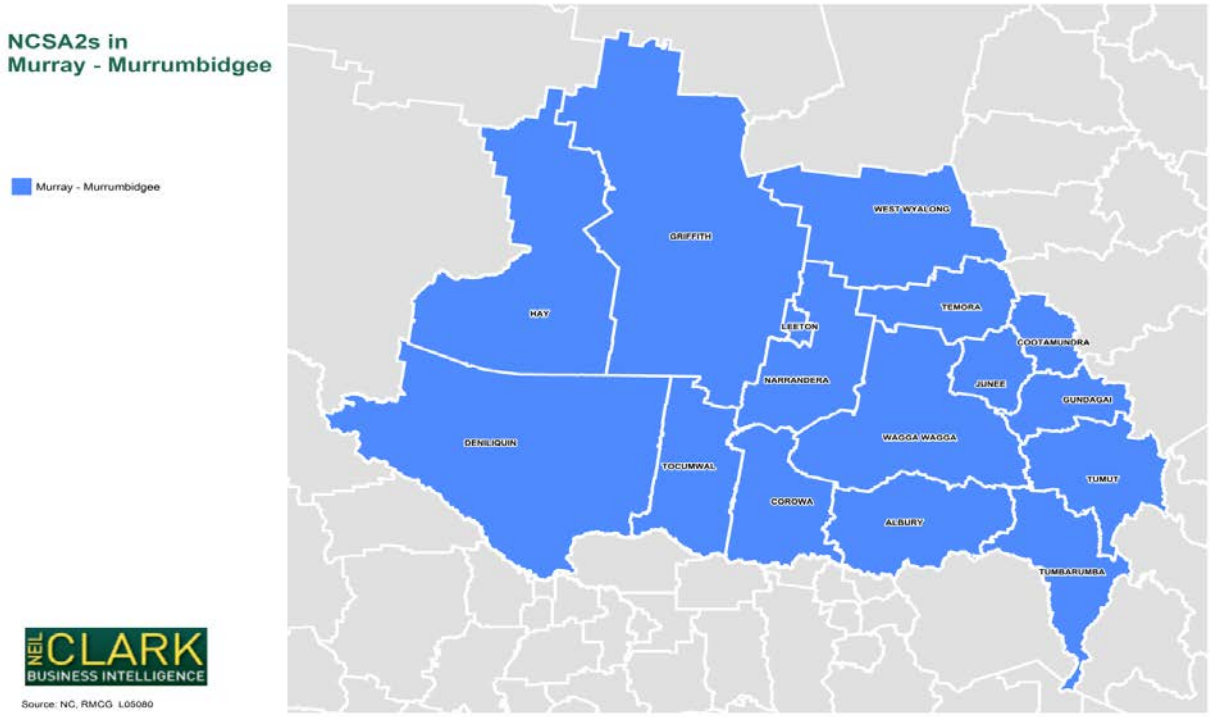
TABLE 9: PRIORITIES OUTLINED IN THE RDA RIVERINA REGIONAL GROWTH PLAN 2013 – 2016[43]

Transport	Support initiatives that position the Riverina as a logistics and transport hub with improved systems for the movement of freight and people. The priority infrastructure project is the development of the Western Riverina Freights & Logistics Hub allowing the efficient transport of freight from the western Riverina region via rail to port (Melbourne or Sydney). Support the development of an integrated (road/rail) Management Plan or Transport Road Map for the Riverina/Murray region such as the expansion of the Riverina Eastern
Business/Industry	Promote the diversification and value adding opportunities from agriculture (food & fibre economy), education and training & health. In partnership with Riverina Regional Tourism build the visitor economy and the opportunities available from agri-tourism. Investigate the possible establishment of a "Research Centre of Innovation Excellence". The centre would act as a vehicle for successful commercialization of new technologies.
Water	Encourage a balanced and considered approach to the management of water ensuring sustainable outcomes for communities and the environment. Support the implementation of the Murray Darling Basin Plan in a considered and collaborative manner. Ensure social & economic indicators are used to monitor communities in the process as well as environmental indicators.
Workforce development	Monitor the current and future labour or skills shortages and support training or skill development for these industry occupations. Ares identified Health & Allied Service (including aged care), Agriculture (semi skilled & professional occupations), engineering, trades & early childhood. Promote opportunities in the food and fibre economy, particularly the diverse range of workforce opportunities. Use multi-media to promote the message.

[42] Australian Government (2012). Australian Government (2012). Challenges and opportunities for the Australian economy Dr Martin Parkinson, Secretary to Treasury, Commonwealth of Australia. Accessed 27/5/15 http://www.treasury.gov.au/PublicationsAndMedia/Speeches/2012/Challenges-and-opportunities-for-the-Aust-economy

[43] 2013 – 2016 RDA Riverina Regional Plan

APPENDIX 1: STATISTICAL AREA BOUNDARIES



APPENDIX 2: LGA GVAP DATA

LGA GVAP data for the Agriculture Census years 2000-01, 2005-06 and 2010-11. Data was sourced from http://www.dpi.nsw.gov.au/agriculture/resources/lup/analysis-census-data.

2011-10	Albury	Berrigan	Bland	Carrathool	Coolamon	Coolamunda	Corowa	Cowanga	Deniliquin	Greater Hume	Griffith	Gundagai	Hay	Jerilderie	Junee	Leeton	Lockhart	Murray	Murrumbidgee	Narrandera	Temora	Tumbarumba	Tumut	Urana	Wagga	Wakool
General crops	478,739	83,237,094	203,108,571	138,484,531	82,145,371	20,503,385	58,392,107	40,221,149	19,852,711	72,912,193	77,455,708	2,956,225	12,387,235	78,338,971	49,858,435	23,081,814	70,253,048	54,581,115	85,483,782	105,815,214	83,030,110	818,503	1,228,257	78,909,980	53,588,000	83,184,969
Other broadacre crops	182,270	15,728,759	27,998,531	38,080,843	24,142,837	10,180,119	14,256,850	3,270,200	1,228,511	27,318,521	8,347,355	392,705	23,878,248	13,578,393	15,081,233	8,171,794	20,902,750	4,529,339	13,558,900	17,852,802	23,030,593	213,389	158,873	17,200,284	14,390,178	3,901,744
Nurseries, cut flowers and cultivated turf	210,241	178,949	-	-	-	-	890,884	-	-	153,573	8,407,850	-	-	-	43,151	148,558	-	-	292,743	-	-	-	789,553	-	1,206,091	2,292,582
Crops for hay	391,497	11,582,268	4,468,902	2,152,810	3,439,875	2,485,883	4,011,374	4,351,330	1,888,581	9,214,998	2,578,589	2,830,991	383,357	2,171,548	2,815,778	2,279,181	2,582,891	7,274,005	911,826	2,854,375	3,268,553	3,268,781	1,817,081	1,072,148	9,039,910	8,588,245
Vegetables	1,342	9,318,788	4,563	40,349,452	-	-	33,438	1,522,347	2,377,853	-	45,370,195	-	14,000,252	3,707,597	-	14,352,283	-	45,378	3,583,499	3,077,087	-	-	35,027	-	-	3,548,503
Citrus Fruit	-	594	523,038	9,301,341	157	-	337	-	-	5	29,978,434	-	-	-	-	29,347,035	-	10,949	-	884,419	-	-	288,153	-	-	5,491,453
Grapes (wine and table)	5,290	1,809,280	-	4,187,994	-	1,844	-	-	-	4,565	58,520,707	526,088	70,873	108,358	4,599	10,422,121	8,826	1,290,993	2,048,324	801,459	-	225,050	2,575	-	189,001	1,387,845
Pome Fruit	-	53,313	-	-	158	-	128	-	-	8	11,053	-	-	-	-	-	-	-	-	25,487	-	3,312,814	41,252,538	-	-	-
Stone Fruit	312,475	4,874,781	26,042	3,885,728	1,477	2,428,178	340,849	15,088	-	20,267	2,219,928	5,549	24,293	838,068	133,919	175,297	-	41,583	4,351,489	-	-	1,826	911,059	1,998	197,723	4,815,969
Other Fruit	-	-	-	-	-	-	44	-	-	-	582	-	-	-	-	23,270	-	-	-	-	-	-	-	-	-	592,102
Berry Fruit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,883,524	29,023	-	-	-
Plantation Fruit	-	-	-	-	-	-	32,248	-	-	-	37,488	-	-	-	-	-	-	-	-	-	-	-	32,915	-	-	-
Nuts	-	2,079,737	-	10,435,170	-	31	-	-	-	-	555,035	57,523	-	-	137,030	858,300	-	-	-	8,759,144	-	40,082	188,775	-	130	3,037,909
Wool	327,781	8,171,451	22,284,278	13,099,285	9,372,878	8,714,804	8,211,830	11,485,519	3,495,844	23,738,584	3,787,421	9,412,457	12,584,159	5,188,819	11,384,480	2,811,868	10,190,334	9,473,852	2,844,520	10,584,215	11,037,108	3,751,899	3,285,288	8,258,938	15,841,870	10,005,789
Milk	715,445	43,050,751	17,511	21,150	-	1,713,581	8,523,788	20,458,414	4,304,827	150,985	150,782	58,971	-	735,000	3,018	8,970	-	11,131,453	-	-	8,024	8,410,710	1,785,322	23,729	12,341,875	11,181,922
Eggs	829	878	38,878,814	208	235	868,469	8,019,794	181	1,998	98,817	408	78,302	-	38	323	1,788	197	570	3,450	871	79,309	1,003	17,537	-	95,885	3,950
Meat	2,012,329	28,911,738	30,473,818	18,882,973	8,828,204	13,791,853	81,042,942	20,435,202	5,900,338	58,231,488	45,278,848	28,005,173	19,968,018	7,889,287	15,952,885	2,378,910	9,773,403	15,380,730	5,882,315	20,091,853	28,141,214	30,819,037	28,488,743	9,512,213	42,749,259	25,382,327
Total agricultural commodities	4,038,267	188,478,335	377,522,955	276,849,284	125,730,842	80,053,979	159,514,223	101,737,499	38,931,503	191,850,723	281,157,568	42,231,981	83,895,335	112,398,844	96,570,709	91,017,237	119,809,956	103,959,403	99,003,909	168,201,707	147,350,909	52,567,537	80,090,488	114,984,348	149,515,852	185,732,269

2005-06	Albury	Berrigan	Bland	Carrathool	Coolamon	Coolamunda	Corowa	Cowanga	Deniliquin	Greater Hume	Griffith	Gundagai	Hay	Jerilderie	Junee	Leeton	Lockhart	Murray	Murrumbidgee	Narrandera	Temora	Tumbarumba	Tumut	Urana	Wagga	Wakool
General crops	717,235	41,803,088	95,538,970	19,511,810	48,217,335	17,225,510	41,234,037	18,240,301	2,527,921	48,794,912	78,074,202	3,115,881	10,371,800	88,450,544	33,149,250	35,791,317	83,200,845	47,351,751	95,185,085	80,450,875	52,753,022	267,388	130,138	47,258,452	37,749,329	82,331,534
Other broadacre crops	123,338	4,140,819	2,948,518	22,144,911	3,255,508	4,057,284	9,748,951	2,192,173	78,317	12,028,272	3,498,977	184,498	8,174,389	4,245,298	4,354,891	3,484,523	10,893,457	1,317,019	2,034,294	2,584,415	4,191,277	81,311	-	7,859,583	3,914,155	2,104,542
Nurseries, cut flowers and cultivated turf	80,349	481,284	39,255	-	-	-	885,538	-	-	20,491	9,114,032	2,214	-	-	43,320	371,298	-	48,038	-	232,528	-	3,241,838	1,181,738	-	2,529,857	5,148,453
Crops for hay	14,038	312,034	33,009	188,425	205,375	189,942	215,344	82,232	-	854,267	500,581	35,479	-	737,434	188,215	810,392	113,077	89,127	256,315	85,451	-	983,529	1,335	-	278,331	582,057
Vegetables	38,017	7,552,872	-	14,038,751	-	-	23,957	3,792,178	-	-	28,010,758	-	14,212,229	5,754,889	-	2,269,831	1,275	18	1,458,563	4,288,927	-	-	31,573	3,032,003	-	3,257,009
Citrus Fruit	-	1,479,881	-	8,370,944	-	-	-	-	-	5	38,381,408	-	-	-	-	25,502,135	-	57,038	2,042,359	847,080	-	-	455,771	-	-	11,457,259
Grapes (wine and table)	25,241	2,555,518	-	8,906,491	-	30,777	80,090	48,317	-	45,987	84,448,886	1,286,020	358,022	267,587	2,174	14,017,358	-	1,008,733	823,564	2,023,744	-	1,027,288	84,885	9,318	139,714	4,245,155
Pome Fruit	120,977	993	-	-	-	-	110	-	-	2,849	25,330	3,749,258	-	-	-	-	-	-	-	-	-	1,784,810	28,989,827	-	1,232,278	10,911
Stone Fruit	-	2,138,277	-	4,008,324	1,311	-	1,034,984	4,887	-	2,081	4,875,803	114,305	43,027	218,057	1,512	830,218	-	80,074	1,258,072	57,835	1,288	3,778	3,713,358	-	57,047	5,888,035
Other Fruit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22,428	-	113	-	-	-	-	7,043	-	-	256,027
Berry Fruit	-	-	-	-	-	-	-	-	-	1,955,485	-	-	-	-	-	-	-	-	-	-	-	8,877,706	-	-	-	-
Plantation Fruit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nuts	-	407,180	-	918,288	-	44,568	873,441	-	-	-	2,009	-	-	2,377,282	79,792	-	-	-	410,834	829,934	-	200	314,885	-	-	-
Wool	423,322	2,818,783	14,439,039	12,512,191	8,382,587	8,951,199	5,571,504	10,333,809	110,572	18,454,192	1,245,510	9,359,338	8,184,950	4,980,505	8,294,975	1,010,381	8,374,584	5,918,047	2,973,827	8,313,802	8,800,255	2,918,119	2,458,209	4,029,031	13,792,381	8,880,938
Milk	-	38,881,888	2,139	-	-	1,883	5,528,885	27,488,333	1,870,899	586,913	4,447	52,035	-	1,252,202	-	-	-	8,150,752	4,000	2,187	-	8,241,856	1,789,577	-	8,819,538	14,423,718
Eggs	-	-	510	-	71,308	80	3,179,093	323	-	79	-	-	-	-	-	-	158,051	-	852	83	21,456	-	304	-	35,810	-
Meat	3,273,087	23,354,059	14,088,293	33,918,152	8,819,328	11,441,538	84,225,079	23,988,145	1,257,993	80,214,795	78,779,374	23,818,822	10,881,710	8,481,575	12,445,278	45,873,749	9,949,024	28,541,751	3,889,733	23,262,788	34,471,190	18,942,384	15,498,358	7,358,248	40,904,774	39,974,848
Total agricultural commodities	5,084,177	123,325,984	127,918,140	192,811,965	80,308,479	39,922,835	152,179,021	128,748,188	5,929,108	140,771,227	323,252,032	43,887,593	58,072,840	94,824,984	58,894,168	130,348,548	92,705,485	90,837,045	70,419,782	101,248,268	100,048,281	44,211,894	53,118,222	70,144,838	107,825,398	158,787,743

2001-02	Albury	Berrigan	Bland	Carrathool	Coolamon	Coolamunda	Corowa	Cowanga	Deniliquin	Greater Hume	Griffith	Gundagai	Hay	Jerilderie	Junee	Leeton	Lockhart	Murray	Murrumbidgee	Narrandera	Temora	Tumbarumba	Tumut	Urana	Wagga	Wakool
Cereal crops	-	58,320,009	104,437,082	126,815,859	48,090,728	19,395,704	30,422,829	58,467,918	5,877,175		78,405,512	2,473,208	35,744,975	78,245,884	38,844,904	35,570,004	52,387,341	51,888,992	57,888,075	54,349,883	42,385,147	312,412	282,388	45,712,478	38,181,474	84,905,382
Other broadacre crops	-	15,052,088	19,268,979	74,357,085	19,520,128	8,429,748	8,891,582	5,580,344	105,333		8,921,178	1,544,254	3,431,383	13,270,430	14,204,904	5,766,137	19,178,855	6,915,985	9,288,234	25,885,325	10,584,800	75,029	137,148	13,215,248	19,588,425	3,037,430
Nurseries & cut flowers	197,830	-	18,488	-	-	8,243	-	-	140,129		5,984,345	-	-	-	8,243	-	-	48,215	-	57,700	-	1,023,351	1,238,435	-	148,372	3,585,882
Crops for hay	1,520	8,384,383	1,258,943	1,854,873	2,412,382	845,492	2,773,752	2,388,448	218,891		954,918	1,000,110	159,553	988,443	1,385,548	884,508	1,784,325	2,886,888	188,498	883,385	1,269,887	3,481,173	780,127	378,088	8,885,473	2,812,018
Vegetables	-	13,023,189	-	28,923,219	-	-	47,008	1,333,978	-		45,730,298	387,401	11,725,898	8,886,332	8,513	8,789,875	-	382,681	953,481	10,753,714	-	-	142,922	5,121,288	198,280	7,518,903
Citrus Fruit	-	537,718	58	9,801,391	-	-	80,228	-	-		44,987,850	-	-	-	-	22,380,714	-	123,986	2,153,478	1,378,429	-	1,298	-	-	-	8,924,958
Grapes (wine and table)	-	4,017,470	-	4,455,758	-	8,742	85,378	1,814	-		81,458,953	745,231	-	485,387	3,900	11,791,077	12,104	3,418,372	1,177,380	81,733	-	1,881,072	75,440	-	175,245	5,011,853
Other Fruit	-	3,131	-	182,858	818,438	14,587	-	-	-		8,315,192	1,100,255	240,418	-	455	1,021,178	-	1,885	1,240,971	47,253	391	1,518,779	24,873,940	-	1,564,778	1,238,971
Nuts	-	-	-	-	-	-	-	-	-		3,909	-	-	497,545	183,013	118,437	-	-	424,273	-	-	-	78,322	-	78,900	-
Wool	14,235	4,040,079	22,358,798	17,171,232	7,305,142	10,138,792	8,210,752	8,817,542	832,470		2,398,552	13,124,579	15,951,445	8,100,097	10,814,814	2,083,389	10,829,980	7,508,254	2,800,485	8,008,335	11,440,701	4,529,925	4,078,263	7,068,109	18,417,147	11,889,237
Milk	-	20,888,122	23,322	88,283	32,538	3,743	1,578,988	19,347,731	2,014,039		113,875	-	-	2,018,948	-	1,440	125,879	4,843,807	-	133,453	22,458	7,032,474	1,744,529	-	4,712,784	13,919,815
Eggs	-	173	-	433	120,035	2	3,258,243	34	-		19,558,850	-	-	-	-	122,004	-	84	-	24	17,553	-	22	-	41,584	-
Livestock slaughterings	300,720	15,288,695	13,771,455	85,007,801	8,814,072	9,573,888	80,457,220	11,307,212	2,178,392		3,780,021	19,217,782	13,333,802	8,137,433	9,293,940	4,021,459	8,804,549	13,500,159	3,338,335	17,483,702	28,527,455	17,005,071	15,132,269	8,954,784	45,088,878	49,327,701
Total agricultural commodities	514,305	135,555,508	181,071,021	328,278,002	84,589,939	48,213,149	133,781,958	103,702,017	11,102,429	-	294,585,151	40,124,920	80,585,870	114,538,897	72,948,298	93,125,578	92,922,717	91,159,424	79,150,150	118,020,321	100,577,972	37,321,882	48,537,781	78,447,891	134,023,788	191,943,950

Note changes in some LGA boundaries will affect comparisons of GVAP between 2000-01 and 2005-06