NSW GOVERNMENT | Department of Primary Industries

# Agriculture Industry Snapshot for Planning

# Western Riverina Sub Region

August 2020

*The value of agricultural production in the Western Riverina Sub Region was over $1.885b (2015/16). The value of agriculture averages over $358 per ha, compared to $245 per ha for the rest of NSW. This is significant as it shows that the Western Riverina is important for the State's agricultural industry, being 14.3% of NSW's land area. The Western Riverina supplies nearly 100% of Australian rice and is the third largest sheep producing region in NSW. However, key constraints for agricultural production include access to water (surface and ground), changing climate, and non agricultural land uses on rural zoned lands. Intensive agriculture and value-adding industries may have to deal with some land use conflicts and satisfy planning requirements. Despite these challenges, the Western Riverina has potential to grow and support agriculture, important given the expected population and proximity to Sydney and Melbourne.*

## Purpose

To develop effective land use planning policy for agricultural industries it is important to understand their location, the reasons why they exist in that location, the opportunities they take advantage of and the challenges they face.

This profile details the key agricultural industries in the Western Riverina and their interactions with suppliers, processing facilities and markets.

Identifying the significance of agriculture allows its recognition and management in land use planning by councils. By providing the evidence base for strategic planning, agricultural land and local agriculturally-based economies can be protected and supported in planning instruments.

The Western Riverina agricultural industries operate in an environment of increasingly global competition and opportunities, external challenges and changing land use. This profile will inform local council strategic planning for these key agricultural industries considering their linkages to infrastructure and secondary industries throughout southern NSW.

Land use planning is guided by the Riverina Murray Regional Plan 2036 (2017). The Regional Plan has clear directions for the need to identify, protect and appropriately capitalise on the region's agricultural industries, infrastructure and rural land.

## Agriculture in the Western Riverina Sub Region

Agriculture is a key industry for the Western Riverina both economically and for the scenic and environmental qualities of the rural lands where agriculture is undertaken. The Western Riverina is richly diverse in agricultural commodities and highly innovative in the processing and development of food and beverage products. The area is particularly important for broadacre cropping, horticultural activities, beef and poultry.

The Western Riveirna is 52,447 km$^2$ in area and includes Bland, Carrathool, Griffith, Hay, Leeton, Murrumbidgee and Narrandera local government area (LGA), and is home to approximately 58,118 people (ABS 2016).

The Western Riverina makes a significant contribution to agricultural production in NSW. The following table shows the Gross Value of Production (GVP) and percentage share of agricultural output for the Riverina Murray Region for each of the top industries. These industries account for 87% of all agriculture in the Western Riverina.

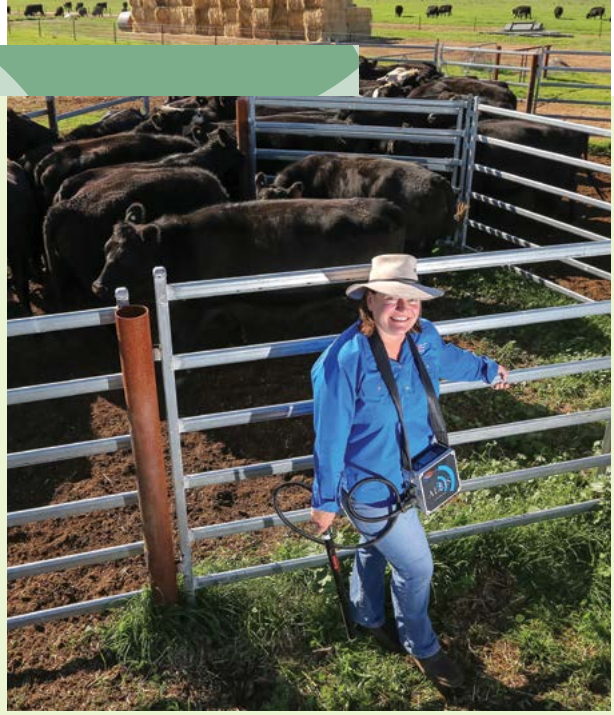
| Industry | Gross Value of Production ($) | % share of total Riverina Murray | Number of businesses | % share of NSW |
|---|---|---|---|---|
| Broadacre cropping | $953m | 24 | 1,122 | 19 |
| Fruit and Nuts | $198m | 5 | 288 | 32 |
| Poultry (meat & egg) | $180m | 6 | 25 | 21 |
| Beef | $94m | 2 | 429 | 4 |
| Vegetables | $93m | 2 | 59 | 22 |
| Grapes | $88m | 2 | 273 | 42 |
| All other Agriculture | $279m | | | |
| TOTAL | $1,885m | | | 14 |

Source: ABS 2015/16 (note: some businesses cover multiple industries).

Broadacre cropping of cereals is the dominant industries in terms of GVP, contributing $953 million (ABS 2015/16). The Western Riverina produced 32% of the state's fruit and nuts, 42% of NSW's grapes. The fruit and nut industry had a value of $198 million. It also produced 21% of the state's poultry and 22% of NSW's potatoes.

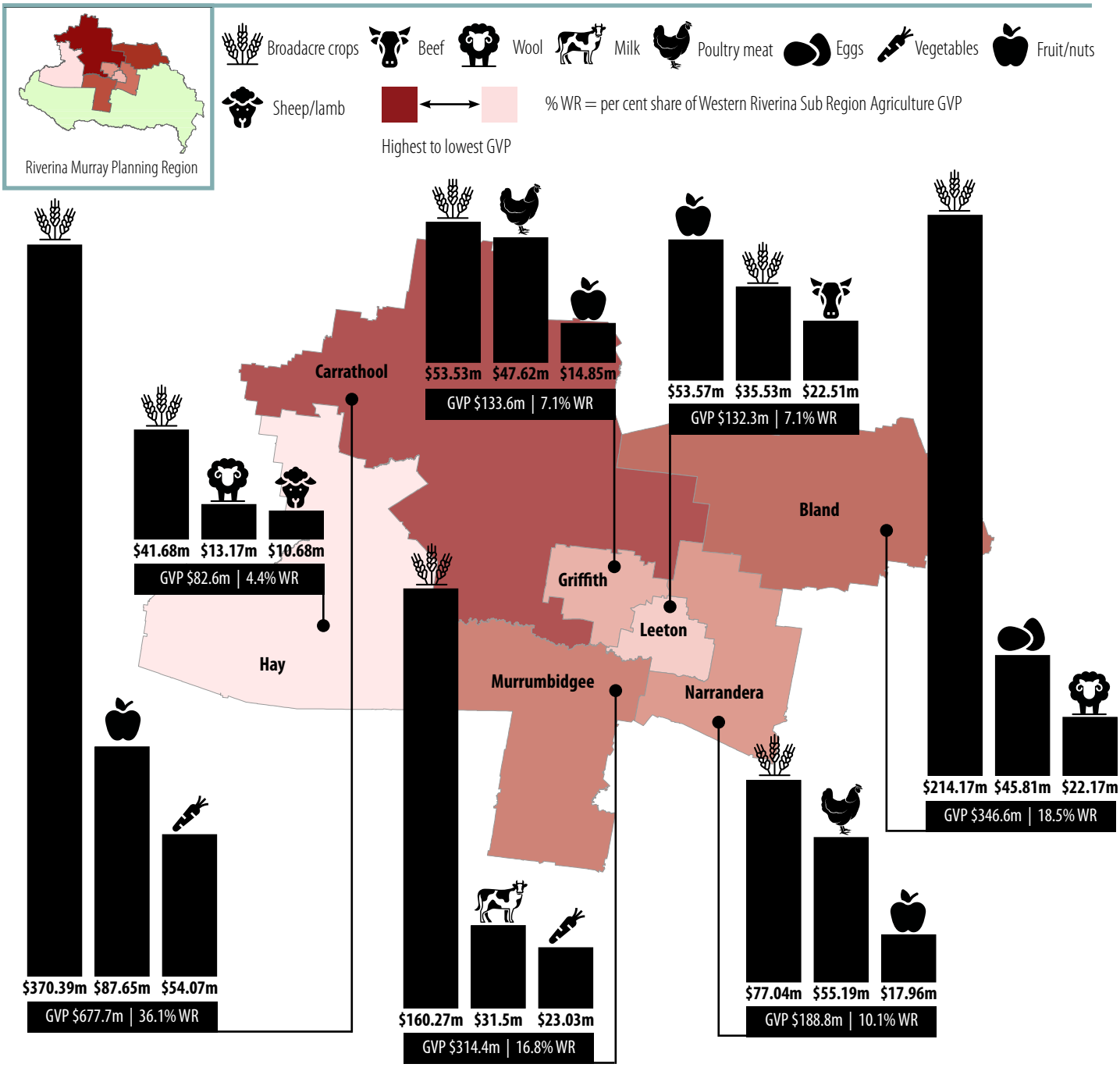
## Employment

Agriculture employs over 4,160 people across the Western Riverina (ABS 2015/16). The biggest employer is sheep, beef cattle and grain farming (52.9%) followed by fruit and nut faming (17.7%) and poultry (6.2%). The LGAs with the highest agriculture employment are Griffith (28.4%) and Bland (16.3%). These are people employed in the primary production of agriculture and do not include the vast workforce within the key secondary industries. It does not include employees that are hired on a seasonal basis that were not working in the Western Riverina at the time of the ABS census.



## Local government distribution

The following map shows the local government areas and agricultural GVP of the three leading industries for each. The biggest individual contribution is Carrathool with $668m followed by Bland Shire Council which contributed $347m and Murrumbidgee with $314m.



# Agricultural highlights of the Western Riverina Sub Region

The Western Riverina has some of the most highly productive agricultural land in the Murray Darling Basin. The landscape, which is largely made up of plains, supports a diverse range of agricultural industries that build on the reliable water supply, enhanced by irrigation districts. The main agricultural enterprises include broad-acre cropping (cereals, oilseed and pulses), beef and sheep grazing, intensive poultry and pigs, irrigation cropping (cotton, rice, maize), and rangeland grazing in the west. Irrigated agriculture (including cotton, rice, horticulture – citrus, grapes, nuts) is a key feature.

There are some pockets of non agricultural land uses impacting individual farming enterprises, eg rural residential proposals and renewable energy developments. Griffith Council has stated that its city development is restricted by the surrounding intensely irrigated land. However, elsewhere there are limited land use pressures on the productivity of existing broadacre cropping and extensive grazing agricultural systems. Western Riverina local governments generally support the development of intensive farming systems provided normal planning procedures are followed and mitigation measures are developed and established.

This section highlights the prominent industries for the Western Riverina with further detail provided in Appendix 1.

## Broadacre crops

### Irrigated summer cropping

Irrigated summer cropping including cotton, rice, sorghum and maize occurs primarily where irrigation (surface and groundwater) is available. Cotton is grown around Hillston, Hay, Jerilderie, Griffith, Coleambally, and Narrandera. Cotton has specific water and temperature requirements for germination and growth, and new varieties have been developed to suit the shorter southern season. Processing facilities are located at Carrathool, Hillston and Leeton. Rice is concentrated in the Murrumbidgee Valley with flat land, clay-based soils, and water availability. Rice storage and milling infrastructure is at Leeton and Coleambally. The rice industry has strict regulations in place to ensure production has minimal impact on the environment. After harvest, the subsoil moisture remaining in the soil is used to grow other crops such as winter cereals.

### Dryland winter cropping and hay

Dryland winter cropping includes cereals (wheat, barley, oats, triticale), oilseed (canola) and pulses (chickpeas, faba beans, lupins, lentils). Wheat, barley and canola are the major crops by value. Crops are grown in varying rotations depending on site characteristics, seasonal variations, disease control, market demand and production preferences. Hay is produced across the Western Riverina with cereal hay closely linked with the main broad-acre cropping areas. Lucerne hay production follows the Murrumbidgee River where it is grown primarily on river flats.

### Industry requirements

Irrigated cropping systems are based on access to reliable water supply through dedicated infrastructure as well as the physical environment of soil type, topography and climate. Historically the irrigation areas and districts of the Western Riverina were developed from resumption of large holdings then subdivided into soldier settler blocks. With changes in technology and economies of scale these blocks require amalgamation to ensure future viability. A wide range of secondary industries are required to support the inputs and outputs of irrigated production.

## Livestock - meat and wool

Livestock production for red meat (cattle, sheep and goats) and wool occurs over most of the Western Riverina. Although there are some large livestock operators, the majority of animals are produced on family farms. The beef industry is a major contributor to agricultural production in the Western Riverina. The GVP of beef was $51.1m in 2015/16 accounting for 2% of NSW production. In recent times, beef prices have increased along with global demand for protein.

Livestock production is often part of mixed-farming enterprises where the cropping of cereal, pulses and oil-seed combined with the grazing of cattle and sheep (meat and wool) provide diversification and production flexibility. The Western Riverina is recognised as part of the third highest sheep production area in Australia both for wool and prime lamb. Goat harvesting has moved from pest control to rangeland management in both lower rainfall areas and tough terrain. Most goats are shipped out, particularly south into Victoria, for processing and/or export.

### Industry requirements

Livestock production requires unconstrained land with opportunity for producers to increase scale without risk of land use conflict. Pasture-based cattle and sheep production needs access to suitable land and water supply, and a range of infrastructure for livestock handling, husbandry, fodder production, storage and road access. Typically, livestock are managed in a system of rotational grazing, with paddocks recuperating after grazing. Some producers may operate more intensive lot feeding on farm, which will increase the amount of stock, feed and transport movements. As with all farmers, producers manage plant and animal pests with a variety of methods. Transporting stock and wool requires a reliable road system. In the Western Riverina saleyards are located at Griffith, Hay, Finley and Wagga Wagga, providing opportunities for livestock trade across the broader region.

## Livestock - intensive/housed

Most poultry are produced under intensive indoor production systems, housed in large sheds. The Western Riverina provides a combination of ready access to grain supplies, level land at a reasonable price, secure water supply, separation distances from potential conflict interfaces, and good transport networks. Some large-scale pig producers are located along the Murrumbidgee River in irrigation areas. There is a large concentration of poultry (meat/broiler) producers around Griffith where there is a processor, feed mill and hatchery facilities. There are also large egg production facilities around Griffith and West Wyalong.

### Industry requirements

Intensive beef, pig and poultry operations require large separation distances from sensitive receptors, reliable feed and water supplies, adequate drainage and manure disposal systems, and quality road access. Usually large areas of unfragmented rural zoned land are required for intensive operations to incorporate buffers to manage biosecurity, amenity, odour and noise. Legitimate agricultural activities may cause external emissions such as noise, dust and lightspill anytime during 24 hours including early mornings and late evenings, depending on the enterprise and should be protected by right to farm policies.

## Fruits, nuts and vegetables

In the irrigation areas of the Western Riverina most of the region's and state's citrus (oranges and lemons 80% and 55% NSW GVP, respectively) stone fruit and nuts are grown. The irrigation areas around Griffith produce 95% GVP of grapes for wine production. As with fruit most of the vegetable production in the Western Riverina occurs under irrigation. This represents over 26% NSW GVP in vegetables for human consumption. The highest contributing vegetables in 2015/16 included potatoes at $44m, followed by pumpkins, melons, tomatoes and onions.

### Industry requirements

Fruit and nut orchards require a reliable water supply for irrigation and good quality well drained soils.

Modern large-scale developments require seasonal workers for picking and, often, on farm processing.

Quality, well maintained roads are required to transport the produce and labour.

Legitimate horticultural activities are likely to cause noise, odours, dust, spray emissions, smoke, vibration, etc. anytime over 24 hours including early mornings and late evenings and should be protected by right to farm policies.

# Western Riverina Sub Regional assets for Agriculture

The Western Riverina is characterised by floodplains and rangelands, based on the Murrumbidgee and Lachlan Rivers. Agriculture is carried out on a wide range of soil types and different rainfall regimes, as well as irrigation from ground and surface water. There are considerable advantages for agriculture given the proximity to markets, freight networks and infrastructure, and a highly innovative and skilled workforce.

## Supporting industries and infrastructure

Agricultural production in the Western Riverina supports a significant value chain including food processing and manufacturing, transport and logistics, professional services and farm suppliers. The value chain is concentrated in Leeton and Griffith, although also locally significant in most other smaller population centres. The Western Riverina offers a comprehensive and diverse supply of support services and infrastructure required by agricultural industries, and specifically, irrigation water delivery companies and equipment suppliers. Other key secondary industries include cotton gins, wineries, packing sheds and saleyards. More information on these industries are provided in Appendix 1. The interactions between agricultural industries and their secondary industries should be strategically considered at all levels of land use planning.

## Climate

The climate of the Western Riverina shifts from the temperate, no dry season (hot summer) in the east to the grassland, warm ('persistent dry') climate class in the west. This semi-arid zone has rainfall in the 230 to 600mm range. Temperatures fall to around 2$^0$C in winter and in summer are regularly over 32$^0$C, often peaking above 45$^0$C for many days. The area known as the Peneplain is in the grassland, warm ('persistent dry') climate class and is similar as described for the Plains, except rainfall is between 250mm to 540mm range. The area known as the Depression is in the grassland, warm ('persistent dry') climate class and is similar as described for the Plains, except temperatures are slightly higher (by 2$^0$C) in summer and rainfall is lower: falling in the 200mm to 400mm range (OEH 2016; BoM 2018).

## Soils

The Riverine Plains landscape is dominated by plains, floodplains, river channels, wetlands, lakes and lunettes. Within the Plains landscape are the main irrigation areas. These occur in an arc extending from Hillston (water supplied by groundwater and the Lachlan River) in the north, through to Griffith, Leeton and Coleambally (water supplied by the Murrumbidgee River). This extensively cleared, usually land-formed and highly modified landscape has a focus on irrigated cropping enterprises.

Originally much of the Plains landscape, now irrigated, was semi-arid grass/shrub-land known as rangelands. The remaining rangelands landscape is now largely west of Hillston and around Hay.

The Peneplains landscape extends from north of Griffith to north-east of Roto. The area stands out from the surrounding landscapes due to rocky hills and outcrops (250 to 450m altitude) and low undulating plains (150 to 250m altitude). The Depression is a small landscape component in the north of the region adjoining the Peneplain, east and north of, but excluding, Hillston. In the south-west the Depression occurs south-east of Balranald. The landscape is characterised by sandplains, dunefields and drainage depressions (OEH, 2016).

## Water access and irrigation

Within the Western Riverina irrigation water is supplied from the Murrumbidgee River and tributaries, directly by licenced river pumpers or diverted into the Murrumbidgee and Coleambally Irrigation areas and districts. There is also licenced access to water entitlements from groundwater systems, and rainfall runoff captured in farm dams.

- The Murrumbidgee Irrigation Area (MIA) was established in 1912 following construction of Burrinjuck Dam, on the Murrumbidgee River, Berembed Weir and associated canals. Water is also supplied from Blowering Dam.
- Coleambally Irrigation Area was developed in the 1950s and uses water from Blowering and Burrinjuck Dams via the Murrumbidgee River.
- The irrigation areas were governed by the State Government until privatisation in 1990's. Other major water reforms have included separating land and water ownership, water sharing plans, and the Murray Darling Basin Plan.
- There are also numerous small Private Irrigation Districts and individual river and groundwater pumpers that manage their own water distribution.

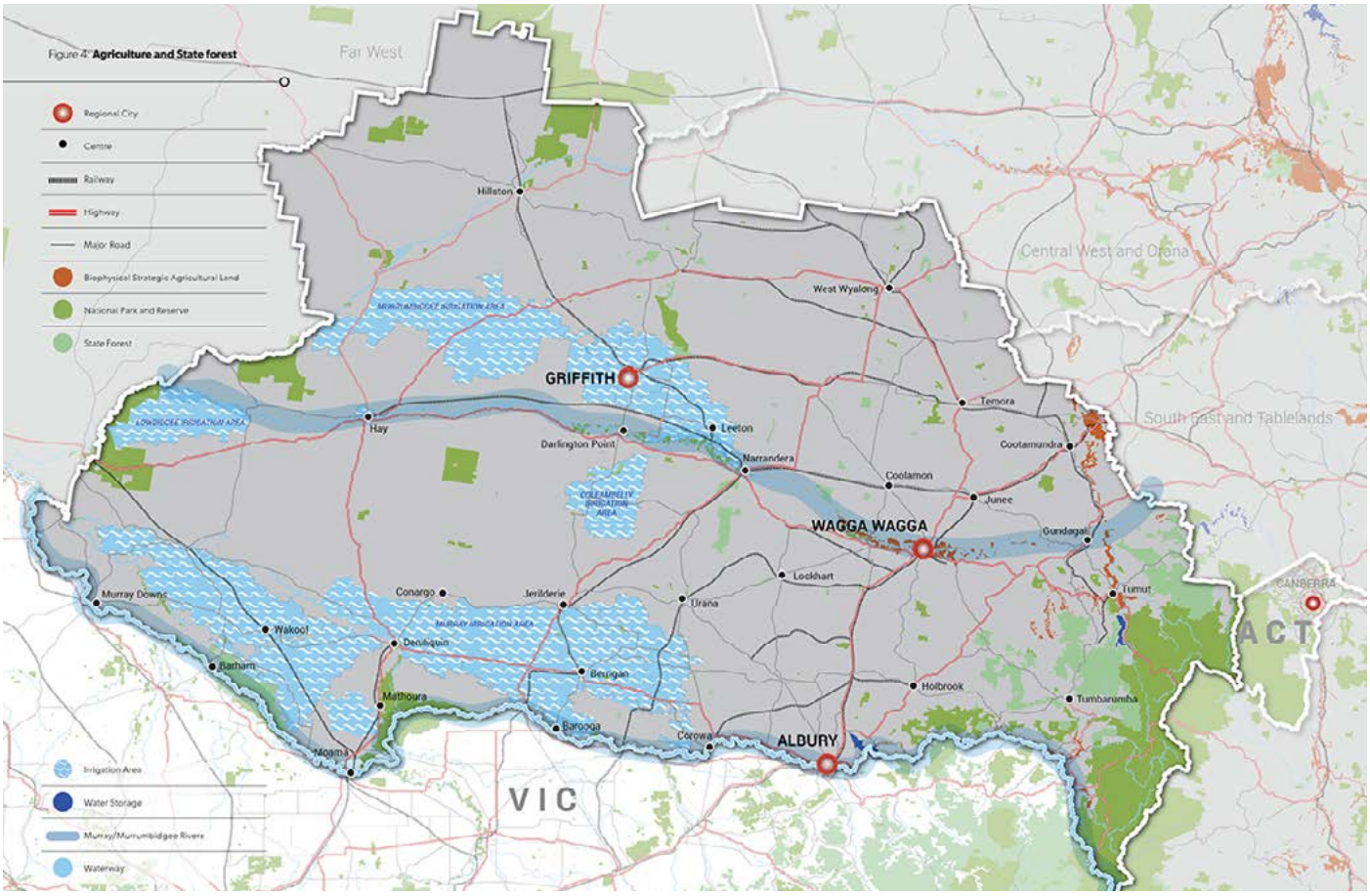
## Locational advantage

Rising interest in Australian agriculture is linked to awareness of food production systems, reducing 'food miles' and buying locally, as well as demand for fresh (seasonality) and high nutritional quality of food consumed ('clean and green'). It is also recognised that agricultural land provides ecosystem services, food security and other benefits for urbanising communities that warrant its support and preservation through planning instruments, despite inherent difficulties with coexistence with urban sprawl (Brinkley 2012). The Western Riverina has reciprocal advantages for producers providing these services with markets, export potential, access to supply chain and value adding.

The Western Riverina has climatic, marketing and scale advantages for high value agriculture. These advantages coupled with local innovation, adaptation and accessibility contribute to the diversity and growth of agriculture and value adding agribusinesses. Perishable (refrigerated) produce as well as long haulage of bulk and containerised commodities are transported to other regions in NSW and Victoria, and to export sea ports in Melbourne and Sydney

The largest exports by commodity flows are wheat and other grains, rice and food products. There is also substantial movement of products supplying grain to intensive animal producers and moving livestock to processing plants. The proximity to Melbourne and regional cities of Albury and Wagga Wagga also enables accessibility to extensive restaurant, café and other markets as well as interstate visitors for existing and future agri-tourism and value add enterprises.

### Diagram of irrigation areas (DPIE 2017)



# Challenges for agriculture in the Western Riverina Sub Region and planning solutions

Agricultural land is a finite resource where multiple challenges have adversely affected agriculture. This section highlights some of the challenges faced and planning solutions.

## Historic land use planning

Historic planning policy has not strategically valued and protected rural land in many areas, instead regarding it as 'urban land in waiting' (Houston 1993). The absence of dedicated planning policy for agriculture has resulted in local environmental plans (LEPs) that do not support agriculture in practice. Agriculture has spatial, biophysical and production criteria that can be similar to industrial development, especially intensive industries. However, in LEPs industrial zones are located in dedicated areas with development controls managing incompatible development. In contrast, rural planning provisions often allow incompatible development and subdivision that affect farm amalgamations, expansion or intensification plans and ultimately restrict a farmer's ability to make a living.

### Planning solution

Future land use planning must recognise the importance of agriculture to society and the economy and also that the land and resources on which agriculture depend need to be protected and managed to enable continued use of the land for agriculture.

The challenges can lead to the following adverse impacts for agriculture if they continue to occur:

- **Inflated land prices** prevent farm expansion as residential land value is often given priority over agricultural value.
- **Differing expectations**: Complaints are made to authorities from neighbouring residents about legal farming activities such as traffic movements, dust, noise, odour etc., resulting in adjustments being required to operations.
- **Loss of critical mass**: Urban encroachment gradually results in the loss of farmland and supporting services (a critical mass required for commercial viability), requiring farmers to source further afield.
- **Uncertainty**: land use conflict and the variable impacts on farming makes it difficult to plan for future investment in the industry. Pressures of encroaching development often result in farmers either selling land for non-rural uses or continuing to farm with the issue of land use conflict.

## Statutory land use decision making

The time and cost involved in the development approval process can constrain the capacity of agriculture industries to quickly respond to market forces. Intensive agriculture land uses often require extensive site and impact assessments from specialist consultants and state agencies, while perceived environmental impacts on neighbouring properties can raise concerns in a community about the potential impact of intensive agricultural land use.

### Planning solution

Clear development controls which specify requirements for intensive agricultural development, and non-agricultural developments near existing agricultural land uses, are integral to minimising community concerns and avoiding unnecessary cost and delays. Consistent requirements for information to support development applications can also streamline the application process for proponents and assist consent authorities to manage community expectations. It is important for both the agricultural industry and the community that the development approval process results in well managed agricultural land uses in the right location to enable the continued use of the land for agricultural production for the benefit of the wider community.

## Land use conflict

Expansion of urban land uses and rural residential housing in rural areas creates potential for this land use to conflict with agricultural land uses. This in turn places pressure on producers to adjust their normal farming practices to minimise impacts which can increase costs and threaten viability.

### Planning solution

Planning policy and controls which prevent land uses in rural areas that are incompatible with agriculture can minimize the potential for land use conflict. Planning controls which require adequate buffer distances between land uses can mitigate potential impacts from agricultural land uses. With land use conflict being largely driven by the divergence in knowledge, expectations and activities of rural neighbours, particularly between new residents and traditional rural landholders, collaboration and networking becomes critically important to addressing changing social landscapes (UoN 2019).

## Competing land uses

The land use zones that apply to land on which agriculture occurs often permit a wide range of other land uses that are unrelated to agriculture. For example, non agricultural land uses, such as renewable energy generation by solar panel arrays, wind turbines and waste plants, are putting pressure on the farming uses and character of rural land. Competition for rural land on which agriculture can occur can lead to increased land prices and uncertainty for agricultural industries and investors. Increased non agricultural development on rural zoned land results in competition for the land leading to community disharmony and in some cases reduced productivity and or transfer of agriculture to other areas.

### Planning solution

Planning controls which limit the range of non-agricultural land uses that are permissible in zones applied to agricultural land can prevent the encroachment of non agricultural land uses on agriculture. Clear and robust strategic planning policy and land use strategies are important to guide future non-agricultural developments to locations where it will not have adverse impacts on agriculture.

## Land fragmentation

Rural zoned land for agriculture (Primary Production - RU1, Rural landscape - RU2 and Rural Small Holdings - RU4 zones) make up approximately 96% of the Western Riverina.

Analysis of the rural zoned land in the Region found that:

- 12% is comprised of lots between 1 and 5 hectares in size
- 15% is between 5 and 20 hectares
- 10% is between 20 and 40 hectares
- 19% is between 40 and 100 hectares
- 44% is greater than 100 hectares in size.

Agricultural land in the Western Riverina is based on minimum lot sizes of 40ha to 600ha. Adverse impacts on agriculture can occur where there is a high degree of land fragmentation from undersized rural lot sizes. The irrigation areas were developed with relatively small rural lot sizes (eg horticultural farms with high security water) which are now found to be limiting the ability of agricultural enterprises to achieve required buffer distances or expand their operations. Even the historically larger farms (eg rice farms with general security water) within the irrigation areas are no longer viable and the required expansion of their agricultural operations in a fragmented rural landscape often means significant investment to purchase additional land. When additional land is not available for expansion producers usually exit the area or increase productivity via intensification of operations. All these scenarios can increase the potential impacts on nearby non-agricultural land uses or require significant investment to mitigate potential impacts.

### Planning solution

Planning policy which sets an appropriate minimum lot size and prevents the further subdivision of rural land, except where there is a demonstrated agricultural need, can prevent the adverse impacts of land fragmentation.

## Critical mass

All agricultural industries have a critical level of production which ensures the economic viability of the enterprise. Where secondary industries rely on a minimum volume of agricultural product to remain viable it is imperative for the industry to maintain that critical mass for the benefit of all agricultural industries. This is important for the agricultural industries as well as the related supply chain, including ancillary services, infrastructure, markets, processing facilities and related industries.

### Planning solution

When land use planning decisions have the potential to affect one aspect of the agricultural supply chain it has the potential to threaten the entire industry. Land use planning needs to recognise that it is not only agricultural land with important biophysical characteristics that needs to be retained for agricultural purposes, but also those key secondary supporting industries which may be located on lower quality agricultural land which are still potentially impacted by encroaching non-agricultural land uses.

## Other challenges

### Climate change

Future climate in the Western Riverina is predicted to be:

- Warmer with an increased frequency of very hot days, longer duration hot periods and reduced frequency of frosts.
- Drier, with reduced rainfall, particularly spring rainfall, increased frequency of heavy rainfall events and or severe bushfire weather, and time spent in drought.
- The number of cold nights is projected to decrease with climate change. However, dry winter and spring seasons result in more cold nights.

The impacts of climate change highlight the need to protect land for its future productive capacity and/or where there is a combination of biophysical assets such as water, topography and soils. The Western Riverina supports high value agriculture now and it is important to sustain production of more specialised agricultural and horticultural enterprises.

Based on these forecasted climate conditions, a critical concern to agriculture in the Western Riverina is securing water for production in terms of quality, quantity and delivery. The demand for water supply continues to intensify with projected increases in the population, the associated higher water demand from expanding urban industrial developments, changing crops with different water requirements, and meeting environmental water requirements.

Much winter grain growing is totally reliant on rainfall. Unless grown after irrigated summer crops, cropping is an increasingly risky enterprise in the western and northern parts of the Western Riverina. Outside the irrigated areas, cropping profitability is reducing with lower crop yield and / or reduced grain quality. In the short to medium term, farming practices may change to different crop rotations, incorporating shorter growing season varieties, and fallowing 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.

The reduced water balance arising from the predicted climate will result in lower and more variable pasture production, with increased sheep grazing while cattle grazing contracts to higher rainfall areas. Reduced pasture production will require enterprises to increase scale to maintain productivity. Feedlotting is becoming more attractive as there is capacity to reduce heat stress by providing shade and managing feed and water intake.

## Biosecurity

Rural land is exposed to pests and diseases that could threaten agriculture, the environment and community safety. Biosecurity hazards are managed by the NSW Government through the Riverina Local Land Services and local government. The distribution, abundance and management of insects, pathogens and weeds is also being affected by climate change. The likelihood that tropical or semi-tropical pests will spread southward in Australia, or become established after an incursion, increases with climate warming. Western Riverina pig farming is particularly vulnerable if/when African Swine Fever enters Australia. Stressed plant systems (rice and cereals) will become more vulnerable to insect and disease outbreaks as the efficacy of current control measures could be altered.

The combination of urban areas, open rangelands, forested areas and water sources results in serious pests such as foxes, wild dogs, pigs, cats, rabbits and goats. Numerous plant species are already in the landscape and have a large impact on remnant vegetation and rural land operations.

## Social licence

A social license to operate refers to the perceptions of local stakeholders that an industry that operates in a given area or region is socially acceptable or legitimate.

It is important for agricultural industries to maintain a social licence for their operations. The agriculture industry's right to farm agricultural land and retain access to water needs to be balanced with responsible and ethical land and livestock management and adherence to best practice operations to minimise the potential for adverse environmental impacts. Producers can help to protect their social licence by open communication and education and positive contributions to their communities. Further detail can be found in the NSW Government Right to Farm Policy. Western Riverina intensive livestock industries (poultry and pork) continue to deal with gaining community acceptance for their operations. The rice industry has been successfully implementing a Rice Environmental Champions program to demonstrate its 'clean green' credentials to Australian consumers and world markets.

## Changing markets and economic conditions

Agriculture is vulnerable to changes in markets and economic conditions. Long lead times for crop production and the need for extensive capital and infrastructure investment to change commodity or farming systems means agricultural land uses are not capable of quickly adapting to changing markets and economic conditions. Due to the global market for agricultural produce, farmers in Australia are often price takers which can have significant adverse impacts on smaller operations.

In the Western Riverina agricultural and water reforms have led to removal of compulsory marketing arrangements, regulations and price supports. Farmers are now operating in a more competitive environment for growing and selling their produce as well as managing irrigation water access through water markets. Some farm businesses are undertaking their own marketing through contract selling to processors or major retailers, while others are focused on niche markets for premium produce. Vertical integration of agricultural enterprises across the supply chain is achieving efficiency gains and price competitiveness.

Western Riverina agricultural businesses are increasingly engaged in investigating the best economic use for their water resource and its seasonal availability. Traditional crop types are changing, with the water now being applied to large scale nut orchards and cotton growing instead of rice. Some businesses are also taking their produce into the processing, marketing and distribution stages. This enables businesses to maximise efficiencies and return on investment, control outputs and ensure compliance with industry standards and regulation. Land is required therefore not only for primary production but also for these secondary activities.

National trends of the reduction in the number of farms, increasing farm size and output concentration, are clearly evident in the Western Riverina agricultural industries such as grains and oil seeds.

# Opportunities for agriculture in the Western Riverina Sub Region and planning levers

Farming in the Western Riverina provides benefits and opportunities for both producers and urban populations. Agriculture not only provides food and fibre, it is beneficial to the broader population on many levels: providing ecosystem services, scenic values, open 'green space', value-adding including renewables and a range of benefits through reduced food miles, education, research and food provenance. It supports a supply chain that generates substantial productivity and employment across local, regional and national scales.

This section identifies practical landuse planning approaches and opportunities for agriculture in the Western Riverina and some planning considerations to help implement them.

## Sustainable farming requirements

Planning for sustainable agriculture requires measures that allow existing and future agricultural industries to operate, adapt, improve and/or expand their current operations and business. Maintaining agriculture requires land use planning that ensures:

- Farms are of a sufficient scale to:
  - support efficient sustainable and profitable operations
  - provide for essential on-farm infrastructure
  - manage environmental impacts (this may include effluent and run-off management, set-backs for streams, native vegetation and existing houses)
- The risks of land use conflicts are managed by avoiding non agricultural development in the vicinity of:
  - established intensive agricultural industries, and any future expansion
  - key infrastructure for agricultural industries such as saleyards, abattoirs, feed mills and major transport routes to markets
  - important natural resources used by a range of industries.
- Land use conflicts are also minimised by developing relevant planning controls and guidelines for primary production areas that recognise good industry practice and educate the community (on rural living and agricultural).
- The agricultural requirements of transport services and hubs, modern telecommunications and access to skilled workforces are available to take advantage of markets and consumers.

### Planning levers

Land use planning can support sustainable agricultural development and promote improved resource management, through planning controls, in the following ways:

a. identify lands that are highly suitable for agricultural industries

b. encourage and support appropriate zoning for agricultural land and appropriate land uses within these zones

c. encourage compatible development in important agricultural land areas

d. apply controls that separate incompatible land uses to minimise land use conflict

e. adopt and enforce relevant minimum lot sizes to minimise fragmentation of resource land

f. strategically plan for urban, residential, rural lifestyle, mining and other incompatible developments in locations away from highly productive important agricultural land

g. implement right to farm policies for legitimate agricultural uses of land.

## Intensification

Productivity growth is central to the performance and international competitiveness of Australia's agricultural sector. Producers can increase scale through expanding operations onto additional land and intensification of agricultural operations.

Commercially viable agricultural operations include intensive operations such as horticulture, viticulture, and lot feeding. Improvements in technology and reductions in capital costs mean that intensification is feasible. Some intensive agricultural operations can more closely resemble manufacturing processes as they occur in expansive sheds where climatic conditions are controlled and impacts from noise and odour mitigated.

Some intensive agricultural operations need to establish infrastructure such as sheds, greenhouses, irrigation systems and water storage, netting or vehicle access which requires significant capital investment. To secure this capital and see a return on the investment, businesses need certainty that production will be unencumbered by land use planning changes for approximately 25 years.

Intensive livestock production in the Western Riverina includes poultry farms, piggeries, and cattle feedlots. Recent improvements in the design, management and operation of intensive agricultural enterprises has resulted in productivity improvements and achievement of food safety, animal health, animal welfare and environmental sustainability standards. The Western Riverina has appropriate areas for siting these enterprises while minimising environmental performance and amenity issues such as odour, dust, noise, stormwater management, visual prominence and the protection of surface water and ground water. Further expansion of intensive animal and plant production is feasible in the Western Riverina due to the availability of suitable land, local feedstocks and reliable water supplies.

### Planning levers to support intensification

a. Certainty in strategic planning policy and land use planning controls for intensive agricultural operations and neighbouring land can provide the appropriate investment environment for industry expansion.
b. Preparation of a rural land use strategy develops an understanding of the needs of various agricultural industries and investigates opportunities and mechanisms to support intensive agricultural industries through LEP controls.
c. Appropriate LEP zones and provisions should be applied over intensive agricultural precincts; with land use tables structured to permit intensive agriculture and related industries while prohibiting incompatible land uses such as residential accommodation, tourist and visitor accommodation, commercial, heavy industrial and recreational activities.
d. Minimum lot sizes should be large enough to limit fragmentation of agricultural land, incorporate industry requirements, enable expansion of existing agricultural industries and provide for adequate buffers to incompatible land uses.

## Food security

Maintaining food security in the face of local and global upheavals relies on the ability to produce fresh and processed foods in Australia. This is also key for the health of the community and the environment by reducing food miles, reducing the cost of the food and making it more available for more people. Western Riverina irrigators consider that food produced in their region should be marketed to differentiate their product in the market. Continued population growth will increase and sustain demand for food and fibre.

### Planning levers to increase food security

a. Strategic planning for rural land must ensure productive land is identified and protective mechanisms provided through the planning framework to enable provision for intensive production, food security and education purposes.
b. Councils should zone agricultural land for primary production and only permit agriculture and a narrow range of supporting land uses in that zone.
c. Some forms of horticulture may be a suitable permissible use in a range of zones, with opportunities for associated agri-tourism and roadside stalls.
d. Minimum lot sizes should be large enough to limit fragmentation of agricultural land, incorporate industry requirements, enable expansion of existing agricultural industries and provide for adequate buffers to incompatible land uses.

### Non-Planning levers to increase food security

e. An education program will assist councils in delivery of planning mechanisms to protect agriculture.

## Diversification and value-adding

Access to Sydney and Melbourne and biophysical assets (rangelands, rainfall, irrigation, productive soils and farming infrastructure) means that the Western Riverina is well positioned to capitalise on growing community interest in food provenance and agri-tourism. The Riverina Murray Regional Plan and various Regional Economic Development Strategies all identify the need for diversification of agricultural commodities to include agri-tourism, boutique and artisan produce, and value adding. Identifying and protecting important agricultural land is fundamental to the expansion of agricultural production, incorporating value-added manufacturing and driving diversity in the economy.

Value-adding agricultural produce and farm gate sales provide the opportunity to increase or augment the income generated from agricultural production. Value-added manufacturing and food processing in the region already include: rice and grain milling; oil seed processing; animal produce and fibre processing; animal feed manufacturing; packing of raw fruits, nuts, vegetables and meats; and processing of wine, and food products.

Primary production in the Western Riverina supports a significant value chain including food processing and manufacturing, transport and logistics, professional services and farm supplies. Value-added manufacturing facilities require significant investment. The co-location of related industries will maximise efficiency and infrastructure use, decrease supply chain costs, increase economies of scale and attract further investment.

Diversification approaches can range from selling direct to the community to specialised processing facilities, that require significant capital investment and the development of new skills but have the potential to significantly improve the economic viability of agricultural operations. Currently in the Western Riverina, leasing of farm land to other farmers and to developers for renewable energy projects is considered a means of farm income diversification.

Tourism ventures that are underpinned by an agricultural activity can provide opportunities for income diversification and value adding. This includes some boutique food outlets and wineries in the Murrumbidgee Irrigation Area around Leeton and Griffith, where production is combined with other visitor experiences. Research has found rural landscape features associated with some agricultural activities (such as pastures, vines and grazing cattle) positively influence the demand for rural tourism. However, agri-tourism developments should be restricted to properties undertaking primary production and should be sited with sufficient separation distances to minimise land use conflict with neighbouring agricultural enterprises. Appropriate road access and biosecurity controls should be put in place to protect agricultural enterprises.

### Planning levers for diversification and value adding

a. Certainty in strategic planning policy and land use planning controls for value adding operations and neighbouring land provides the appropriate investment environment for industry expansion.

b. Preparation of a rural land use strategy develops an understanding of the needs of various value adding industries and investigates opportunities and mechanisms through LEP controls.

c. Appropriate LEP zones and provisions should be applied over value adding facilities; with land use tables structured to permit industries related to the primary production while prohibiting incompatible land uses.

d. Agri-tourism (farm stays, bed and breakfast accommodation) should be associated with and complement the continued agricultural production on the land.

e. Agri-tourism should be directed away from intensive agricultural operations or precincts.

### Non-planning levers for diversification and value adding

f. Intensive agricultural production precincts and businesses may be used for education of the community and tourists around how food supply chains work.

g. Roadside stalls, artisan food and drink industries and cellar door premises all offer opportunities to promote NSW's clean green image to the international tourism market.

h. Farmers markets could prioritise locally grown or made produce to support local growers.

## Farming research promotion and education

The Western Riverina is uniquely positioned to provide promotion and education opportunities for the broader agricultural industry. Agricultural research by CSU, Deakin University, the rice industry and NSW DPI provide further opportunities for education of farmers, local governments and communities on sustainable production, innovative farming systems, climate change and the challenges facing agriculture and producers. This education is important for consumers who might not otherwise understand how their food is produced and the intricacies of the food production chain.

### Planning levers

a. Provide agricultural education to local governments and consultants to ensure planning decisions are based on understanding up to date farming practices.

b. Information and education facilities should be a permissible land use on agricultural land to enable producers to educate the community on how food supply chains work.

## Circular economies

A circular economy is one that exchanges the typical cycle of 'make, use, dispose' in favour of maximising re-use and recycling. The longer materials and resources are in use, the more value is extracted from them. The circular economy concept is best, and most often, applied in relation to resource consumption and regeneration.

For the agricultural industry a circular economy presents possibilities for significant efficiencies and input cost reductions through energy generation and smart grid distribution; innovative off-grid energy solutions; recycled water use; and opportunities for renewables and waste solutions.

### Planning levers to facilitate circular economies

a. Primary production zones should permit resource recovery facilities as a means of reusing waste products while also restricting incompatible uses to prevent rural land use conflict.

b. Minimum lot sizes should account for a potential increase in the need for land area requirements as farming trends towards circular economies. Reuse of effluent and other products on farm to vertically integrate farm inputs and outputs may result in additional and diversified production areas on farm.

# Planning toolkit

Best practice land use planning for agriculture includes recognition of the industry as a significant contributor economically, environmentally and culturally, providing recognition and management through all levels of the planning framework. Dedicated land use zones, provisions and minimum lot sizes are available to councils and can effectively support primary production even in contested areas. This section highlights the parts of the planning system to facilitate this.

## Strategic planning

### Local strategic planning statement

A local strategic planning statement (LSPS) identifies the vision and trends for agriculture in an LGA and sets out the direction for agricultural land uses for the next 20 years. It is important that agriculture, the land it depends upon and the infrastructure and other secondary industries which interact with agricultural land uses are considered at this initial strategic planning stage. The LSPS should explain the economic contribution that agriculture makes to the local economy and reflect the community's expectations for the provision of food and fibre locally. Further information can be found in the following DPI guideline Local Strategic Planning Statements – Agricultural Planning Advice for Councils.

### Local land use strategy

The Riverina Murray Regional Plan 2036 and LSPSs set out the framework and expectations for preparation of local land use strategies. The agricultural component of a land use strategy should identify the agricultural industries in the LGA, land on which they are located and the essential infrastructure and secondary industries. A land use strategy is also an effective tool in communicating to the community the scale and importance of agriculture in the LGA economically, physically and socially. It is an important step in identifying where agricultural land should be protected from incompatible land uses.

A rural land use strategy will identify the linkages primary industries have with secondary industries, infrastructure and other components of the production chain to establish a holistic picture of relationships and dependencies. The strategy will also clarify the relationship of rural land with residential development and specify the circumstances in which additional fragmentation and residential development may or may not be appropriate. The strategy will also assess the policy framework including existing LEP provisions and make recommendations to retire and/or remove redundant provisions concerning rural subdivision and non-strategic residential development.

Agriculturally productive lands contribute to a strong foundation for the agricultural economy and underpins investment for growth. Pre-conditions for increased agricultural production exist on these lands it is important that the land is separated from urban areas and has sufficient space to evolve and expand.

### Local environmental plan (LEP)

An LEP allows councils to tailor planning controls to address the issues facing agricultural industries in their LGAs. The LEP is informed by the rural land use strategy. The following are mechanisms that can result in positive outcomes for agriculture:

**Land use zones**: the RU1 Primary Production or RU4 Primary Production Small Lots zones are the most appropriate zones to apply to land which is currently used for agriculture and/or is suited to future agricultural land uses.

**Land use zone objectives and tables**: The use of specific zones for agricultural land allows the zone objectives to be specific for agricultural land uses and require other permissible land uses to be compatible with agriculture.

**Limiting permissible land uses**: LEPs can reduce the potential for land use conflict by restricting the range of permissible land uses where incompatible with agriculture. This is executed by careful construction of land use tables for the rural zones. Councils should review the permissible land uses in rural zones applied to agricultural land or where agricultural industries are located to prevent inappropriate land uses and limit potential for land use conflict. Land use tables for rural zones should be 'closed' to enable more control over the range of specific land uses.

**Minimum lot sizes**: The minimum lot size specified in an LEP for rural land needs to be of a scale to prevent fragmentation into lots which cannot support the locally typical agricultural land uses. Generally larger minimum lot sizes facilitate the establishment of larger and more appropriate buffer distance between potentially conflicting land uses. Larger lot sizes also enable expansion or diversification of the agricultural activities without the need to purchase additional land which can be an economically prohibitive option for farm expansion. While it can often be difficult to execute, the breaking of the nexus between minimum lot size and dwellings is a way to prevent new settlement on rural land, and a positive advance in promoting agriculture and preventing future rural land use conflict.

## Development control plans and other approaches

### Development control plans (DCP)

A DCP for rural zones should include practical guidance for agricultural land uses. A DCP can specify buffer distances to be applied to all land uses, both agricultural and non-agricultural, to ensure that new land uses do not increase the potential for land use conflict with existing neighbouring properties. Guidance on appropriate buffer distances is provided in the Department's Buffer Zones to Reduce Land Use Conflict with Agriculture - An Interim Guideline.

### Novel approaches

In some cases councils may need to apply both planning approaches and non-planning advocacy to achieve positive outcomes for agriculture. For example, under the current legislative framework, councils can:

- Set up a rural industry liaison committee to establish links between council and farmers and provide a forum for discussion of the issues facing agriculture in the LGA.
- Propose a highly contested area as a special planning precinct with planning provisions to protect from incompatible land uses.

Industry can provide advocacy through active involvement in land use planning decision making and strategic planning to raise the profile of agriculture. The land use planning system is only one mechanism available to reduce the potential for land use conflict. Agricultural industries can decrease the potential for land use conflict by adopting industry best practice operations which at best eliminate or reduce the impact of their operations on neighbouring land owners.

Similarly, clear communication with neighbouring properties and an education program targeting sensitive neighbours can help increase understanding of the reasons for some agricultural practices and prevent nuisance complaints.

## References


Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (2019) Irrigated farms in the Murray Darling Basin. https://www.agriculture.gov.au/abares/research-topics/surveys/irrigation

Australian Bureau of Statistics (ABS) (2017) 7121.0 Agricultural Commodities, Australia 2015-16 and 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

Australian Bureau of Statistics (ABS) (2017a) "Browse statistics, People: Population & People" statistics (sum of SA within Riverina Murray region). Accessed 2018 from: http: //www.abs. gov.au/websitedbs/D3310114.nsf/Home/Browse+Statistics

Australian Bureau of Statistics (ABS) (2018) Value of Agricultural Commodities Produced, Australia–2015-16.

Australian Farm Institute (2020) Managing farm related land use conflicts in NSW (unpublished). Research Report for NSW DPI.

Australian Soil Resource Information System (ASRIS) (2013) Physiographic Regions of Australia. CSIRO, ACLEP & Australian Government, Department of Agriculture, Fisheries and Forestry. Spatial data downloaded. Accessed 2018: http: //www.asris.csiro.au/themes/PhysioRegions.html#PhysioRegions_References.

Boult C and Chancellor W (2020) Productivity of Australian broadacre and dairy industries, 2018–19, ABARES research report, Canberra.

Brinkley C (2012) Evaluating the Benefits of Peri-Urban Agriculture, Journal of Planning Literature, 2012 Aug; 27(3): 259–269.

Bureau of Meteorology (BOM) (2001) Map of Climate Zones of Australia. Bureau of Meteorology. Australian Government. Accessed 2018 from: http://www.bom.gov.au/climate/how/newproducts/images/zones.shtml

Bureau of Meteorology (BOM) (2018) Climate Data Online. Bureau of Meteorology, Australian Government. Accessed 2018 from: http://www. bom.gov.au/climate/data/

Department of Planning and Environment (2018) Agribusiness Diversification and Value Added Manufacturing Options Paper – Planning Barriers in Local Plans

Department of Planning and Environment (2017) Riverina Murray Regional Plan 2036. NSW Government. ISBN 978-1-76039-488-2.

Department of Primary Industries (NSW DPI) (2019) Local Strategic Planning Statements, https://www.dpi.nsw.gov.au/__data/assets/pdf_ file/0005/849857/dpi-ag-advice-to-assist-councils-to-prepare-local-strategic-planning-statements.pdf

Department of Primary Industries (NSW DPI) (2018) Value of agricultural production data 2016-17, derived from ABS data 2017. Insight & Industry Development Unit. Department of Industry, NSW Government.

Department of Primary Industries (NSW DPI) (2018) IAL Mapping spatial data for Riverina Murray. NSW Government.

Department of Primary Industries (NSW DPI) (2018) Buffer Zones to Reduce Land Use Conflict with Agriculture - An Interim Guideline, Primefact 1624, First edition.

Department of Primary Industries (NSW DPI) (2108) Mapping important agricultural land in NSW. http: //www.fmansw.org.au/wp-content /uploads/2018/06/IAL-Mapping-flyer.pdf

Department of Primary Industries (NSW DPI) (2107) A guideline to identifying important agricultural lands in NSW. https: //www.dpi.nsw.gov.au/agriculture/lup/ agriculture-industry-mapping/pub16-323-a-guideline-to-identifying-important-agricultural-lands-in-nsw

Department of Primary Industries (NSW DPI) (2015) NSW Right to Farm Policy. https: //www.dpi.nsw. gov.au/agriculture/lup/legislation-and-policy/right-to-farm-policy

Department of Primary Industries (NSW DPI) (2015) NSW pork industry overview 2015. NSW Government. ISBN 978-1-74256-779-2. Accessed 2018 from: https://www.dpi.nsw.gov.au/animals-and-livestock/pigs/pork-industry/overview

Department of Primary Industries (NSW DPI) (2012) Best Practice Management for Meat Chicken Production in NSW Manual 1 – Site Selection & Development. NSW Government. ISBN 978 1 74256 249 0. Accessed 2018 from: https //www. dpi.nsw.gov.au/animals-and-livestock/poultry-and-birds/poultry-planning-and-keeping/planning -for-poultry-development/bpm

Department of Primary Industries (NSW DPI) (2011) Policy 0-104: Maintaining land for agricultural industries. http: //www.dpi.nsw.gov.au/__data/assets/pdf_ file/0008/396458/ Policy-O-104-maintaining-land-agricultural-industries.pdf

Goodall A (2018) Right to Farm- Agricultural Land Use Survey: Final Report, Institute for Public Policy and Governance, University of Technology Sydney, Sydney; prepared for the NSW Department of Primary Industries.

Office of Environment & Heritage (NSW OEH) (2014a) Integrated Regional Vulnerability Assessment: Riverina Murray, Vol 1. NSW Government. ISBN 978 1 74359 742 2. Accessed 2018 from: https: //climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Regional-vulnerability-and-assessment/Riverina-Murray

Office of Environment & Heritage (NSW OEH) (2014b) Murray Murrumbidgee Climate change snapshot. Adapt NSW. NSW Government. ISSN 1837–5650. Accessed 2018 from: https: //climatechange. environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Murray-Murrumbidgee-Climate-Change-Downloads

Office of Environment & Heritage (NSW OEH) (2016) Bioregions of NSW: Bioregion overviews. NSW Government. Accessed 2018 from: https: //www. environment.nsw.gov.au/bioregions/BioregionOverviews.htm

Regional Development Australia (RDA) (2018) Riverina Regional Profile. Riverina NSW, Regional Development Australia. Accessed 2018 from: https: //rdariverina.org.au/our-region/

Productivity Commission (2005) Trends in Australian Agriculture, Research Paper, Canberra. https://www.pc.gov.au/research/completed/agriculture/agriculture.pdf

RMCG Consultants (2015) Riverina Murray Agricultural Industries – Final Report. Prepared for Department of Planning and Environment.

Wine Australia (2018) Riverina. Australian Government. Accessed 2018 from: https: //www.wineaustralia.com/discover-australian-wine/new-south-wales-wines/riverina

# Broadacre cropping

Broardacre cropping delivers the highest gross value to the Western Riverina of $953m. Key annual crops include wheat, cotton, barley, rice and canola. Irrigated summer cropping including cotton, rice, sorghum and maize occurs primarily where irrigation (surface and groundwater) is available. Cotton is grown around Hillston, Hay, Jerilderie, Griffith, Coleambally, and Narrandera. Cotton has specific water and temperature requirements for germination and growth, and new varieties have been developed to suit the shorter southern season. Processing facilities are located at Carrathool, Hillston and Leeton. Rice is concentrated in the Murrumbidgee Valley with flat land, clay-based soils, and water availability. Rice storage and milling infrastructure is at Leeton and Coleambally. The rice industry has strict regulations in place to ensure production has minimal impact on the environment. After harvest, the subsoil moisture remaining in the soil is used to grow other crops such as winter cereals.

Dryland winter cropping includes cereals (wheat, barley, oats, triticale), oilseed (canola) and pulses (chickpeas, faba beans, lupins, lentils). Wheat, barley and canola are the major crops by value. Crops are grown in varying rotations depending on site characteristics, seasonal variations, disease control, market demand and production preferences.

Hay and cereal hay crops are often grown in conjunction with the main broad-acre cropping areas. Lucerne hay production follows the Murrumbidgee River where it is grown primarily on river flats.

## Distribution of broadacre cropping producers by local government area

| LGA | Gross Value of Production ($) | % share of WR broadacre crops | % share of NSW |
|---|---|---|---|
| Bland | $214.2m | 22.5% | 4.3% |
| Carrathool | $370.4m | 38.9% | 7.4% |
| Griffith | $53.5m | 5.6% | 1.1% |
| Hay | $41.7m | 4.4% | 0.8% |
| Leeton | $35.5m | 3.7% | 0.7% |
| Murrumbidgee | $160.3m | 16.8% | 3.2% |
| Narrandera | $77.0m | 8.1% | 1.5% |
| **Total** | **$952.6m** | **100.0%** | **19.0%** |

## Trends

Long-term productivity growth in broadacre industries is around 1% per year (Boult and Chancellor 2020). This is also an analysis supported by RMCG Agricultural Expansion Analysis which identifies a plateau in wheat yields. A simplistic comparison between ABS 2010/2011 and the 2015/2016 census data shows a decline in tonnes of many broadacre crops and an increase in Pulse crop production.

Irrigation dependent crops such as rice and cotton rely on annual water allocation announcements. The amount of water available and the timing of its availability all affect the amount of crop grown in any given year.

## Locational requirements

Broadacre cropping in the Western Riverina is based on the reliable winter rainfall and irrigation allowing for a wide variety of crops to be grown. The large tracts of land available allow for continued investment in broadacre technology, equipment and plant breeding to ensure competitive and profitable enterprises. This area is usually free of land use conflicts and competing non agricultural land uses.

Secondary industries include freight services, grain processing, grain storage and handling, and grain trading and marketing, as well as seasonal labour. As well as exports, the cereal grain industry in Western Riverina supports feedlots, piggeries and poultry production. Rice byproducts include animal feeds, alcohol and food products.

## Challenges

### Water availability for irrigation

Within the Western Riverina irrigation water is supplied from the Murrumbidgee River and tributaries, directly by licenced river pumpers or diverted into the Murrumbidgee and Coleambally Irrigation areas and districts. There is also licenced access to water entitlements from groundwater systems, and rainfall runoff captured in farm dams.

Commonwealth and State government water policy reforms have seen the introduction of water trading, the Murray Darling Basin Plan, NSW Water Sharing Plans, Australian Competition and Consumer Commission (ACCC) Water Charge and 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 Murrumbidgee surface water management area falls within the southern-connected interstate trading zone of the Murray Darling Basin. Depending on seasonal water availability, the current water trading rules allow for transfer of irrigation water between river valleys. For example, the millennium drought between 2001 and 2009, resulted in significant reductions in water allocations across the southern Murray Darling Basin and prompted a doubling in water trade. In drought years, water has generally been traded downstream from rice growers in NSW to horticulturalists (permanent plantings) in Sunraysia and South Australia.

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 for irrigation. In the NSW Murray and Lower Darling and Murrumbidgee catchments, a reduction of 624 GL/year and 320 GL/year 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.

This extensively cleared, usually land-formed and highly modified Western Riverina landscape has had a focus on irrigated cropping enterprises such as rice, lucerne, maize, millet and sorghum. Winter cereals are often grown in rotation with irrigated summer crops to utilise the sub-soil moisture stored from irrigation and as a break crop. The reduction in water availability is resulting in a reduced irrigation footprint and an increasing proportion of the available irrigation water used to diversify into high value commodities. Currently, this includes almonds, hazelnuts, walnuts, and cotton and intensive livestock farming of poultry and pigs which take advantage of the grain and feed grown in the area.

### Biosecurity

Growers are facing challenges from increasing herbicide resistance and increasing soil-borne pathogens in their farming systems.

### Production rates

Declining soil fertility is having an overall effect on production rates even with advances in plant breeding, machinery/ technology development, and improved agronomic practices. Agricultural land of the Western Riverina has the capacity to support a diverse range of crop types of high quality under best practice farming systems.

## Opportunities

### Export markets

To increase gross value of broad acre crops, opportunities lie in gaining capital investment, accessing global market and improving farm productivity. Farming practices therefore need to focus on opportunities to attract a high price premium from nutrient continent, GM free, organic, environmentally sustainable production, or other value added premium niche.

### Planning considerations

LGA planning need to ensure large holding sizes are maintained, fragmentation and land use conflict is minimised and there is continued access to water resources.

# Beef

The beef cattle industry is the fourth highest contributor to agricultural production by GVP in the Western Riverina at $94m. The biggest processor, JBS, operates two beef feedlots in the Riverina (Yanco and Griffith), with capacity reported at around 90,000 head combined.

## Distribution of beef producers by local government area

| LGA | Gross Value of Production ($) | % share of WR beef | % share of NSW |
|---|---|---|---|
| Bland | $7.1m | 7.6% | 0.3% |
| Carrathool | $22.5m | 24.1% | 0.9% |
| Griffith | $2.3m | 2.4% | 0.1% |
| Hay | $9.9m | 10.6% | 0.4% |
| Leeton | $22.5m | 24.0% | 0.9% |
| Murrumbidgee | $20.4m | 21.8% | 0.8% |
| Narrandera | $8.9m | 9.5% | 0.3% |
| **Total** | **$93.7m** | **100.0%** | **3.7%** |

## Trends

The gross value of Australian cattle and calf production (including live cattle exports) in 2017/18 was $11.4 billion (ABARES Agricultural Commodities June 2018).

In 2017/18, 71% of Australia's beef and veal (1.1 million tonnes) was exported to over 78 countries (ABS DAWR) at a value of $8 billion.

In 2016/17, the Australian red meat and livestock industry directly employed just over 191,800 people (Ernst & Young 2018).

## Locational requirements

Critical mass is crucial for the ongoing viability of the industry across the region and within NSW given variations in seasonal conditions across the state. The Western Riverina provides a locational advantage given the availability of land, reliable water supply and integration of grazing, feedlotting and processing. Beef production in the Western Riverina is based on the reliable rainfall and/or irrigation allowing for a wide variety of pastures and hay to be grown.

The large tracts of land available allow for continued investment in technology, equipment and breeding to ensure competitive and profitable enterprises. This area is usually free of land use conflicts and competing non agricultural land uses.

Secondary industries include freight services, grain and hay production, livestock handling and trading facilities, as well as seasonal labour. As well as exports, the beef industry in Western Riverina supports local, state and national markets.

## Challenges

### Biosecurity

Noxious weeds are an ongoing challenge for rural landowners, particularly those in the beef industry as they are often the owners of large tracts of land that require ongoing management of weed species. The costs of weed control including product purchase and time, can be substantial and can impact on profitability. This is also a major challenge for producers on smaller holdings located in high lifestyle areas where these neighbouring landowners may be unaware of their biosecurity responsibilities or are 'weekenders' and often absentees. Pest animals, for example feral dogs, can result in loss of calves.

## Opportunities

### Export markets

While the majority of Australian meat production is sold in domestic markets, export markets offer opportunity for diversification and offsetting risks. There is ongoing development of integrated supply chains through joint ventures to supply growing export markets and value-added meat exports based on distinguishing attributes such as grass-fed, organic and provenance attributes.

### Capital input

Feedlotting operations require significant capital expenditure and need assurances that production will be unencumbered by land use planning changes for approximately 25 years to justify the capital expenditure needed. Similarly the technology required for commercial sensing and objective measurement in processing to improve cost-competitiveness of supply chains need significant capital expenditure.

### Planning considerations

The encroachment of urban land uses and resulting increased land use conflict and higher land prices will restrict the opportunity for expansion of the feedlots and meat processors. New land use conflict is likely to result as production mechanisms transition from extensive farming to intensive production mechanisms based on significant infrastructure which may not satisfy the rural character expectations of the community. Legitimate livestock farming activities are likely to cause noise, odours, dust, spray emissions, smoke, vibration, etc. anytime during 24 hours including early mornings and late evenings and should be protected by right to farm policies.

# Vegetables

Vegetable production is a large agricultural industry in the Western Riverina producing $93m worth of gross value product (ABS, 2015/16), mainly potatoes. This is 22% of the state's production.

## Distribution of vegetable producers by local government area

| LGA | Gross Value of Production ($) | % share of WR vegetables | % share of NSW |
|---|---|---|---|
| Bland | $0.8m | 0.8% | 0.2% |
| Carrathool | $54.1m | 57.9% | 12.9% |
| Griffith | $5.3m | 5.7% | 1.3% |
| Hay | $5.4m | 5.7% | 1.3% |
| Leeton | $3.4m | 3.6% | 0.8% |
| Murrumbidgee | $23.0m | 24.7% | 5.5% |
| Narrandera | $1.4m | 1.5% | 0.3% |
| **Total** | **$93.3m** | **100.0%** | **22.2%** |

## Trends

In the Western Riverina large holdings and access to irrigation water supplies allow vegetables to be grown under broadacre farming systems.

The trend towards protected cropping and high-tech glasshouse production does not require the same high-quality soil as inground cropping systems do. The intensive horticulture industry does however require relatively inexpensive land as the development of structures requires a lot of capital investment. The industry requires reliable access to electricity water and skilled labour.

## Locational requirements

The Western Riverina provides some good quality soils, a Mediterranean climate and access to irrigation water supplies, which are important for broadacre vegetable cropping. It also has good freight connections to Sydney and Melbourne

The vegetable industry is reliant on a number of ancillary industries that are also utilised by other agricultural enterprises in the western Riverina. These industries relate to machinery and irrigation equipment suppliers, mechanics, freight – logistics, competent trades, rural supply stores for crop husbandry inputs (fertiliser, pesticides, shade houses, hail netting), processing facilities for grading, packing, storage (incl. refrigeration) and seasonal labour requirements.

## Challenges

Vegetable production is moving from small scale production systems to larger broadacre systems or intensive protected cropping facilities

Additionally, competition from foreign vegetable imports, particularly processed and frozen vegetables has increased.

## Opportunities

### Export markets

The majority of Australian vegetable production is sold in domestic markets with locally produced vegetables accounting for approximately 85% of vegetable products sold in Australia (Clark 2017). Therefore, export markets offer the greatest opportunity for the vegetable industry. Growing demand from international markets and freeing of trade barriers presents opportunities for vegetable growers (Horticulture Australia Limited 2013). ABARES (2014) found that the more profitable vegetable growers are more likely to be exporting their produce as expansion into overseas markets mitigates the risks of the domestic market and increases the scope for future growth.

### Capital input

Intensive horticultural operations which need significant capital expenditure need assurances that production will be unencumbered by land use planning changes for approximately 25 years to justify the capital expenditure needed. When changes to the planning system enable encroachment by non-agricultural land uses and result in land use conflict investment in agricultural businesses can be reduced and infrastructure can become rundown and production decreases.

### Planning considerations

The encroachment of urban land uses and resulting increased land use conflict and higher land prices will restrict the opportunity for expansion of the vegetable growing industry. New land use conflict is likely to result as production mechanisms transition from extensive in ground production to reliance on intensive production mechanisms necessitating the development of greenhouses and other infrastructure which may not satisfy the rural character expectations of the community.

# Poultry

Poultry meat is a very high value agricultural industry in the Western Riverina contributing $180m, representing 21% of NSW total poultry meat by GVP.

Baiada Poultry operate a chicken processing plant near Hanwood in the Riverina. The plant provides an important service to chicken producers, with the chickens and most inputs provided by Baiada and the husbandry and facilities provided by the grower.

Most growers are dependent on the processor remaining in their immediate area to remain viable, with no competition available for processing capacity.

## Distribution of poultry producers by local government area

| LGA | Gross Value of Production ($) | % share of WR poultry meat | % share of NSW |
|---|---|---|---|
| Bland | $18.3m | 10.2% | 2.1% |
| Carrathool | $44.3m | 24.6% | 5.1% |
| Griffith | $47.6m | 26.4% | 5.4% |
| Hay | $0.0m | 0.0% | 0.0% |
| Leeton | $3.9m | 2.2% | 0.4% |
| Murrumbidgee | $10.7m | 5.9% | 1.2% |
| Narrandera | $55.2m | 30.7% | 6.3% |
| **Total** | **$180.0m** | **100.0%** | **20.6%** |

## Trends

Although there has been a reduction in the number of poultry meat businesses across the State the poultry meat business has experienced significant growth in the Western Riverina based on new businesses.

The industry is undergoing on farm changes due to animal welfare and consumer tastes. Producers are now reducing bird densities to achieve certification under RSPCA guidelines and respond to market pressures.

There are also farms undertaking free range and cage free production systems. These changes in production systems are leading to producers needing to increase the area of land used for poultry to increase production and maintain profitability.

## Locational requirements

### Farming system

Commercial poultry meat and egg production is predominantly undertaken within sheds. The poultry industry is not reliant on land with favourable biophysical characteristics, however there are specific locational considerations for poultry meat producers which include:

- a trained workforce
- means of disposing of dead birds, manure and other wastes
- access to:
  - grain
  - road access for feed and livestock vehicles
  - reliable supply of suitable quality water
  - electricity
  - processing plant and feed mill
  - labour
- scope for future expansion
- biosecurity issues.

### Secondary industries

The poultry meat industry developed in the Western Riverina due to its close proximity to processing plants and major markets. Farms need to be within 150-200km of processing plants to ensure that birds are not transported long distances. The major processing plant is located in Hanwood (Griffith) along with other vital infrastructure such as a hatchery and feed mill. Most poultry sheds are located in the Leeton, Carrathool and Griffith LGAs. The industry is dependent on a cheap and reliable source of feed. Grain is transported from storage facilities locally and across NSW to Griffith.

The poultry industry is supported by industries supplying labour, water, affordable land, and access to utilities like power and gas. The industry requires good transport connections to markets, processing plants and feed suppliers. The poultry meat industry uses predominantly shed raised birds. The poultry meat farms are generally vertically integrated with birds being raised by a farmer, who has a contract with the processor who in turn provides hatchlings and the feed.

## Challenges

### Land use conflict

Due to land use conflicts and sensitive neighbouring land uses in more built up areas the poultry industry has moved to more rural areas. At the same time, to maintain economic viability, producers need to increase the number of sheds on farms. Suitable land in more remote rural areas can mitigate against land use conflict and allow significant expansion.

### Biosecurity

Biosecurity issues can arise if there is a concentration of producers adjacent to each other. Industry recommends that poultry farms are located at least one kilometre from each other to ensure that diseases do not spread rapidly. The sheds of new developments to be operated by the one owner may be located closer.

## Opportunities

### Byproduct use

The industry provides an organic product which is in high demand for organic farming and soil ameliorant. The industry uses a by-product from the timber industry (sawdust) which is used in the sheds as a bedding material.

### Planning considerations

The predominant planning consideration for the poultry meat industry is mitigation of the impacts of land use conflict. The farms and processing facilities in regional areas have improved viability and reduced biosecurity and land use conflict risks.

# Fruit and nuts

The Western Riverina produces about 32% of the state's fruit and nuts, in particular, almonds, grapes and citrus. This includes 80% NSW GVP Oranges, 55% NSW GVP lemons, and 95% NSW GVP wine grapes. As the state's largest wine production region, there are major wine makers Casella, De Bortolli and McWilliams and many others based in the Western Riverina. Grapes are sourced locally and afar to meet demand for the warm climate wine market, largely abroad. Significant walnut and almond orchards have been established to meet Northern Hemisphere seasonal demands. Hazelnut orchards are being established near Narrandera.

## Distribution of fruit and nut producers by local government area

| LGA | Gross Value of Production ($) | % share of WR fruit and nuts | % share of NSW |
|---|---|---|---|
| Bland | $1.6m | 0.8% | 0.3% |
| Carrathool | $87.6m | 44.3% | 14.3% |
| Griffith | $14.8m | 7.5% | 2.4% |
| Leeton | $53.6m | 27.1% | 8.7% |
| Murrumbidgee | $22.1m | 11.2% | 3.6% |
| Narrandera | $18.0m | 9.1% | 2.9% |
| Total WR | $197.8m | 100.0% | 32.2% |
| **Total** | **$180.0m** | **100.0%** | **20.6%** |

## Trends

The nut industry in Australia is currently experiencing considerable expansion, with new plantings occurring across all tree nuts. With a lead time of 5-10 years, this expansion will push the national farm gate value close to AU$1.7 billion by 2025. Almonds, macadamias, walnuts, pecans and chestnuts export to more than 65 countries with export sales of $750 million per annum (2018) and expected to increase by 75% to $1.3 billion by 2025. Tree nuts account for approximately 40% of all horticultural exports. Almonds are the nation's most valuable horticultural export commodity. Most Australian nuts attract a premium in markets that appreciate food safety, product quality and reliability of supply chains.

The Australian Grape Growing industry has been growing strongly with wine grapes making up an estimated 60.3% of industry revenue, so the industry is highly dependent on the downstream Wine Production industry.

Australia currently has over 2,000 wine exporters sending tens of thousands of different wines to 119 destinations worldwide at a value of over $3 billion. Volumes and values have not been as buoyant in recent years however exports have been strong to China, USA and Canada (to March 2020).

The Australian citrus industry is in the middle of a growth phase, with more plantings going in and existing trees set to bear more fruit in coming years. Nationally, the greatest plantings are coming from the Riverina in New South Wales, which accounts for 30% of plantings or around 8,000 hectares. Predominately this is oranges, split between the navel and juicing oranges.

## Locational requirements

The Western Riverina provides some good quality soils, a Mediterranean climate and access to irrigation water supplies, which are important for large scale permanent horticulture. It also has good freight connections to Sydney and Melbourne

The horticulture industries are reliant on a number of ancillary industries that are also utilised by other agricultural enterprises in the Western Riverina. These industries relate to machinery and irrigation equipment suppliers, mechanics, freight – logistics, competent trades, rural supply stores for crop husbandry inputs (fertiliser, pesticides, shade houses, hail netting), processing facilities for grading, packing, storage (incl. refrigeration) and seasonal labour requirements.

## Challenges

Permanent horticultural industries have been moving from small scale production systems to larger broadacre systems or in some case, intensive protected cropping facilities.

Competition from foreign fruit imports, particularly tinned, juiced, processed and frozen fruit products, has increased.

## Opportunities

### Export markets

While the majority of Australian fresh fruit production is sold in domestic markets, export markets offer the greatest opportunity for diversification and offsetting risks. Wine, nuts and some citrus varieties are exporting large quantities overseas to meet seasonal market requirements.

### Capital input

Permanent horticultural operations which need significant capital expenditure need assurances that production will be unencumbered by land use planning changes for approximately 25 years to justify the capital expenditure needed. When changes to the planning system enable encroachment by non-agricultural land uses and result in land use conflict investment in agricultural businesses can be reduced and infrastructure can become rundown and production decreases.

### Planning considerations

The encroachment of urban land uses and resulting increased land use conflict and higher land prices will restrict the opportunity for expansion of the horticultural industries. New land use conflict is likely to result as production mechanisms transition from extensive in ground production to reliance on intensive production mechanisms necessitating the development of greenhouses and other infrastructure which may not satisfy the rural character expectations of the community.



*Acknowledgments:*

Information for this profile was sourced from publicly available statistical and spatial data. This is supported by industry intelligence from NSW DPI staff and industry reports. Compiled by the NSW DPI Agricultural Landuse Planning Team. Special acknowledgement to Elton Consulting for editing and Epiphany-PR for graphic design. The Snapshot will be reviewed once updated ABS data on an LGA level is publicly available.

NSW GOVERNMENT Department of Primary Industries

For further information please contact us via email: landuse.ag@dpi.nsw.gov.au or visit our website: www.dpi.nsw.gov.au/agriculture/lup