



# SUPPLY CHAIN PERSPECTIVE

COTTON



**QTLC**

QUEENSLAND TRANSPORT  
AND LOGISTICS COUNCIL

## Overview

Since recovering from drought in recent years, the Australian cotton industry has undergone a period of renewal. The industry broke records in crop size in the two years to 2012. The 2011/12 season covered around 583,000 hectares, making it the largest cotton crop ever planted in Australia<sup>1</sup>.

Cotton is produced in central and southern Queensland and central northern New South Wales. The cotton industry employs 15 times as many people as grazing and the same number of people as dry land farming and cropping.

In a typical year, Australian cotton production is sufficient to clothe 500 million people. Queensland can produce up to 40%<sup>2</sup> of the national crop, which is grown in the Darling Downs, St George, Dirranbandi and Macintyre Valley regions. The balance of the crop is grown near Emerald, Theodore and Biloela<sup>3</sup>. As grading operations are based in South East Queensland, all export cotton is shipped through the Port of Brisbane.

<sup>1</sup> Cotton Australia, Cotton Education Kit

<sup>2</sup> Queensland Agriculture Land Audit Statewide Overview, Queensland Department of Agriculture, Fisheries and Forestry, 2013

<sup>3</sup> <http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-the-australian-cotton-industry>

## Dimensions

Cotton is one of Australia's largest rural export earners and helps underpin the viability of more than 50 rural communities.

- Australia is the world's fourth largest cotton exporter.
- Australia's cotton growers produce yields two and a half times the global average, having produced the world's highest cotton yields for 20 years running.
- Australia produces 600,000 to 700,000 tonnes of cotton per year.
- Although there are a number of corporate cotton producers, most cotton growers are independently operated by families. Farmers are generally organised into cooperatives that arrange machinery purchases, provide seed, advise on pest control and undertake processing and marketing<sup>4</sup>.
- The average Australian cotton farm<sup>5</sup>:
  - is family owned and operated
  - provides jobs for eight people
  - grows 656 ha of cotton
  - is run by farmers with an average age of 39
  - grows other crops and often grazes sheep and cattle.

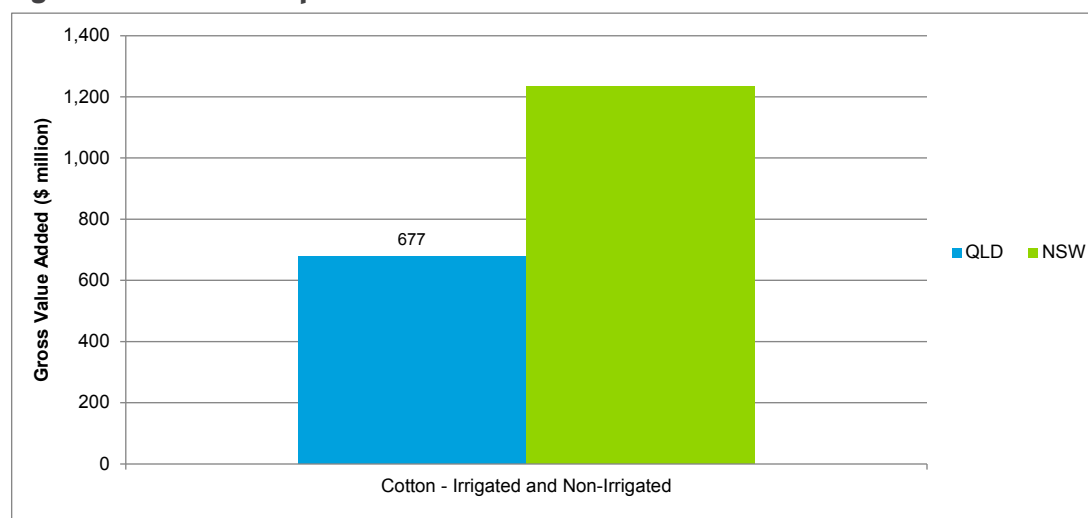
In 2012/13 the gross value of total cotton production was \$667m in Queensland and \$1.2b in New South Wales, as shown in Figure 1 below<sup>6</sup>.

<sup>4</sup> IBIS, Cotton growing in Australia July 2014

<sup>5</sup> <http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-the-australian-cotton-industry>

<sup>6</sup> ABS, Value of Agricultural Commodities Produced, Australia, 2012-13

**Figure 1: Value of cotton produced**



Source: ABS, Value of Agricultural Commodities Produced, Australia, 2012-13

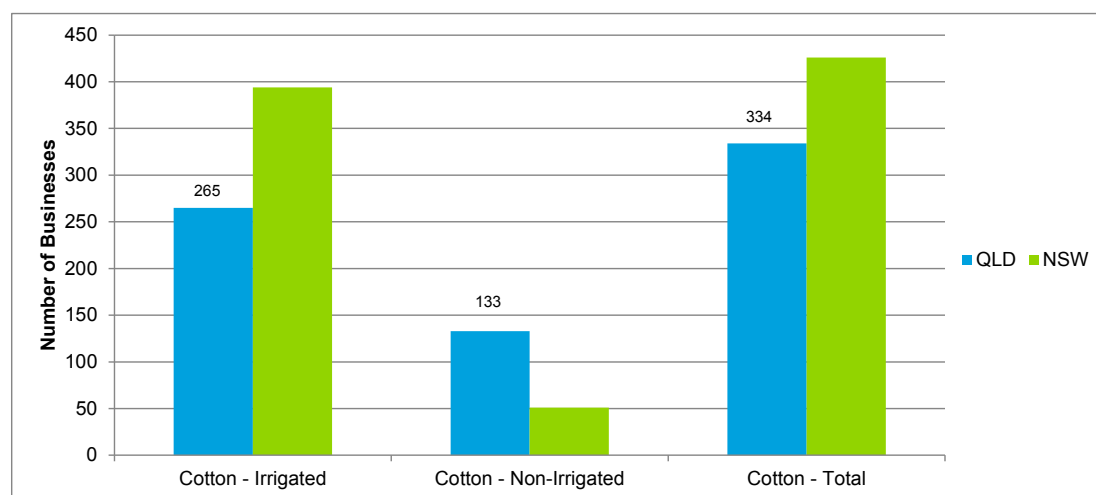
## ➔ People working in cotton

In 2012, cotton provided employment for 8,000 people across northern New South Wales and southern Queensland alone<sup>7</sup>. In Queensland, approximately 87% of businesses employed 19 people or less.

## ➔ Cotton businesses

As at May 2014, there were 334 cotton businesses in Queensland and 426 in New South Wales, as shown in Figure 2 below.

**Figure 2: Businesses in the cotton industry**



Source: ABS, *Agricultural Commodities, Australia, 2012-13*

## Areas of production

Cotton production areas in Australia are inland in southern Queensland and various areas of New South Wales. They are grouped into three categories<sup>8</sup>:

- The northern region is located around Emerald and at Theodore and Biloela in eastern Queensland. The production area in this region accounts for 6.5% of total cotton production area in Australia.
- The central border region is in southern Queensland and northern New South Wales. The various districts are the Macintyre Valley (Goondiwindi), Darling Downs (Dalby/Toowoomba), St George/Dirrinbandi, Namoi Valley (Narrabri), Gwydir Valley (Moree). The production area in this region accounts for 79.2% of the total cotton production area in Australia.
- The southern inland region includes the Macquarie Valley (Warren), Darling River (Bourke) and southern New South Wales districts. The production area in this region accounts for 14.3% of total cotton production area in Australia.

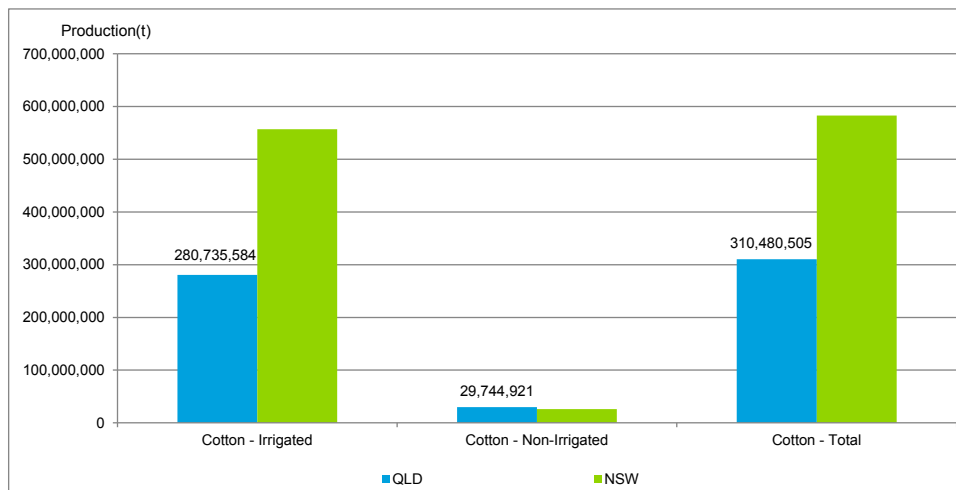
Queensland's cotton production accounts for approximately 40% of total Australian cotton production<sup>9</sup>; the remaining 60% is produced in New South Wales, as shown in Figure 3 on page 4.

<sup>9</sup> Queensland Agriculture Land Audit Statewide Overview, Queensland Department of Agriculture, Fisheries and Forestry, 2013

<sup>7</sup> [www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-the-australian-cotton-industry](http://www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-the-australian-cotton-industry)

<sup>8</sup> [www.pres.net/papers/DeGaris\\_THE\\_COTTON\\_INDISTR\\_%20IN\\_AUSTRALIA%202013.pdf](http://www.pres.net/papers/DeGaris_THE_COTTON_INDISTR_%20IN_AUSTRALIA%202013.pdf)

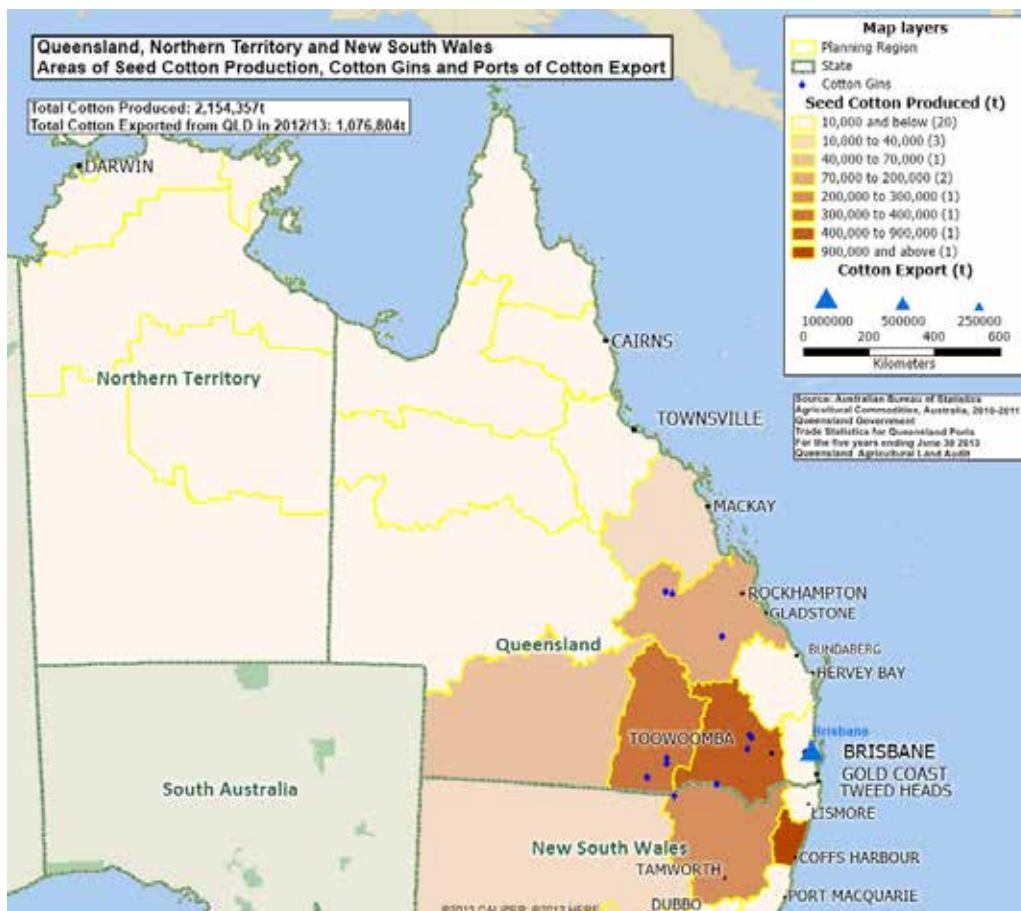
**Figure 3: Volume of cotton production**



Source: ABS, *Agricultural Commodities, Australia, 2012-13*

Figure 4 depicts cotton production areas, the location of gins and the ports from which cotton is exported in Queensland.

**Figure 4: Cotton producing regions, gins and export ports**



Sources: Australian Bureau of Statistics, *Agricultural Commodities, Australia 2010-2011*,

*Trade statistics for Queensland ports for the five years ending June 2013, Queensland Department of Transport and Main Roads*

## Points of value add, transformation and consumption

There are various stages of value adding for cotton products, for example; ginning and warehousing of lint, crushing of seeds, containerisation and bagging of seed.

Almost all parts of the cotton plant are used in some way, including the lint, cottonseed, linters, stalks and seed hulls<sup>10</sup>:

- About 60% of the world's total cotton harvest is used to make clothing, with the rest used in home furnishings and industrial products.
- Well known cotton products include denim jeans, socks, towels, t-shirts, bed sheets and underwear. More unusual uses of cotton fibre include tents, car tire cord, fishnets and book binding
- Products made from cotton lint/fibre: cotton lint is spun then woven or knitted into fabrics such as velvet, corduroy, chambray, velour, jersey and flannel.
- Products made from cotton linters: cotton linters are fine, very short fibres that remain on the cottonseed after ginning. They are curly fibres typically less than 3 mm long.
- Linters are used in manufacturing paper (such as archival paper and bank notes) and as a raw material in manufacturing cellulose plastics. Linters are commonly used for medical supplies such as bandages, cotton buds, cotton balls and x-rays.
- Products made from cottonseed:
  - Over half the weight of unprocessed cotton (seed cotton) is made up of seed. The most common uses of cottonseed are oil for cooking and feed for livestock.
  - Cottonseed is pressed to make cottonseed oil. Cottonseed can be made into a meal and is a popular feed for cattle and livestock.
  - Cottonseed oil can also be used in a range of industrial products such as soap, margarine, emulsifiers, cosmetics, pharmaceuticals, rubber, paint, water-proofing and candles.
  - Cottonseed oil is cholesterol free, high in poly-unsaturated fats and contains high levels of anti-oxidants (vitamin E) that contribute to its long shelf life.

<sup>10</sup> [www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-cotton-properties-and-products](http://www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-cotton-properties-and-products)

## Freight movements<sup>11</sup>

Currently, three train services a week transport export lint to the Port of Brisbane, accounting for around a quarter of the export task for lint. In 2011/12, rail provided for the movement of an estimated 9,400 TEU of containerised lint to the Port of Brisbane.

An estimated 48,400 (96,800 return) heavy vehicle truck trips were required to transport cotton modules from Queensland farms to gins in 2011/12. A further 33,500 heavy vehicle movements (67,000 return) are estimated to move cotton products to warehouses for packing prior to export, and to feedlots and domestic processors.

Approximately 202,000 tonnes of bulk cottonseed and 30,000 TEU of lint were delivered to the Port of Brisbane by road in 2011/12. This required an estimated 6,700 (13,400 return) bulk heavy vehicle deliveries and 26,300 heavy vehicle trips (52,600 return) for containers, if undertaken by semi-trailer.

## Transport mode

The cotton supply chain in Australia is currently dominated by road transport. Only 5% of cotton bales and 3% of cotton seed was transported on rail to the Port of Brisbane in 2013<sup>12</sup>. Approximately 1 megatonne of product was transported on road<sup>13</sup>.

Transportation of cotton is mostly undertaken by long distance road hauliers, using articulated semi-trailer, B-Double or A-Double road vehicles. Road transport dominates the farm-to-gin stage of the process, with modules of cotton transported from the farm to the gin.

Cotton from the farm to the gin is delivered by long distance road hauliers using 14-18 tonne modules on flat top semi-trailers, chain-bed loaded module trucks or B- Double road vehicles.

B-Double, semi-trailer and road trains transport bales from gins to warehouses for sorting, consolidation and shipping.

Very few gins have direct access to rail sidings, and most of the gins do not have adequate storage capacity onsite except for the current production schedules (e.g. one or two weeks production capacity).

<sup>11</sup> Heavy Vehicle Action Plan Stage 2 – Route Identification Department of Transport and Main Roads June 2013

<sup>12</sup> [www.parliament.qld.gov.au/Documents/TableOffice/TabledPapers/2014/5414T5368.pdf](http://www.parliament.qld.gov.au/Documents/TableOffice/TabledPapers/2014/5414T5368.pdf)

<sup>13</sup> Industry sources



## ➤ Road transport of cotton

In 2010/11, a Cotton Module & Harvest Machinery Transport Survey ('Cotton Transport Survey') was conducted by Cotton Australia. This surveyed the experiences of cotton industry participants in moving cotton modules, bales, heavy vehicles and machinery on public roads during the 2010/11 harvest.

Results from the Cotton Transport Survey<sup>14</sup> highlighted some specific issues that need to be considered in deliberations and negotiations by Cotton Australia with and on behalf of industry, and between the road transport agencies. These relate to:

- over-dimension concessions (permits) for walking<sup>15</sup> of JD 7760 pickers
- greater tolerances for oversized loads
- over-dimension concessions (permits) for floating of JD 7760 pickers
- lobbying for permanent changes to maximum heavy vehicle load dimensions
- maintaining industry best practice guidelines for road transport regulation compliance
- a load restraint system for round modules without mandatory use of nets
- easier access for permits for movement of machinery and over-dimension loads over public holiday periods
- ability to operate over-sized road trains on New South Wales roads
- clear guidelines for vehicle/trailer registration and inspection/specification requirements.

<sup>14</sup><http://cottonaustralia.com.au/news/article/cotton-transport-survey-helps-target-key-issues-for-growers>

<sup>15</sup> Pickers can either be walked or floated

## ➤ Rail transport of cotton

A number of deficiencies have been identified relating to the rail-to-port infrastructure in both New South Wales and Queensland.

The issue with moving cotton by rail over the Toowoomba Range is that the tunnel heights are restricted – the preferred 9 foot 6 inch containers for transporting cotton are not able to fit through tunnels on the Western Line (height of 8 foot, 6 inches)<sup>16</sup>.

To address this issue, Queensland Rail is currently undertaking works to lower the Grandchester tunnel floor to allow high cube cotton containers to move on rail from up country. The Queensland Government is also constructing two passing loops that should result in an additional 20 services per week, increasing rail capacity.

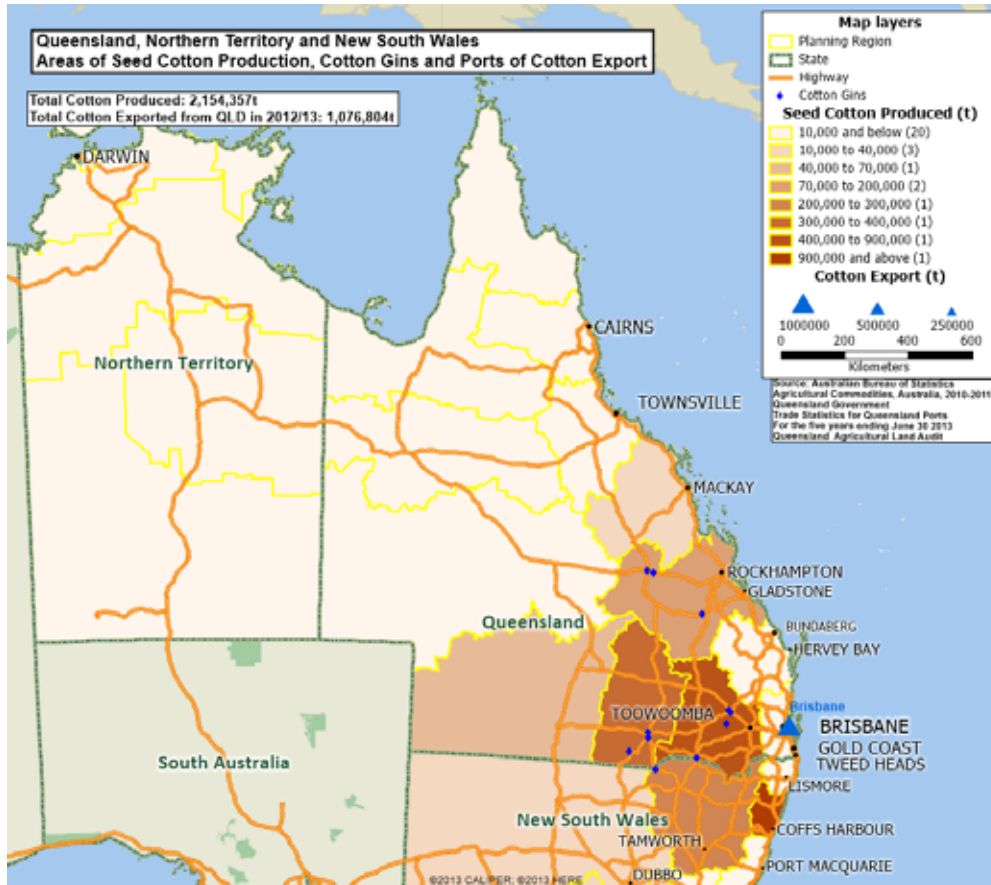
These improvements do not, however, address axle mass restrictions, which are also eroding the competitiveness of rail over road.

<sup>16</sup> [www.parliament.qld.gov.au/documents/committees/THLGC/2013/INQ-RAIL/submissions/009\\_QTLC.pdf](http://www.parliament.qld.gov.au/documents/committees/THLGC/2013/INQ-RAIL/submissions/009_QTLC.pdf), February 2014

# Main routes

The main routes used to transport cotton are shown in Figure 5.

**Figure 5: Transport routes**



Sources: Australian Bureau of Statistics, Agricultural Commodities, Australia 2010-2011, Trade Statistics for Queensland Ports for the five years ending June 2013, Queensland Department of Transport and Main Roads

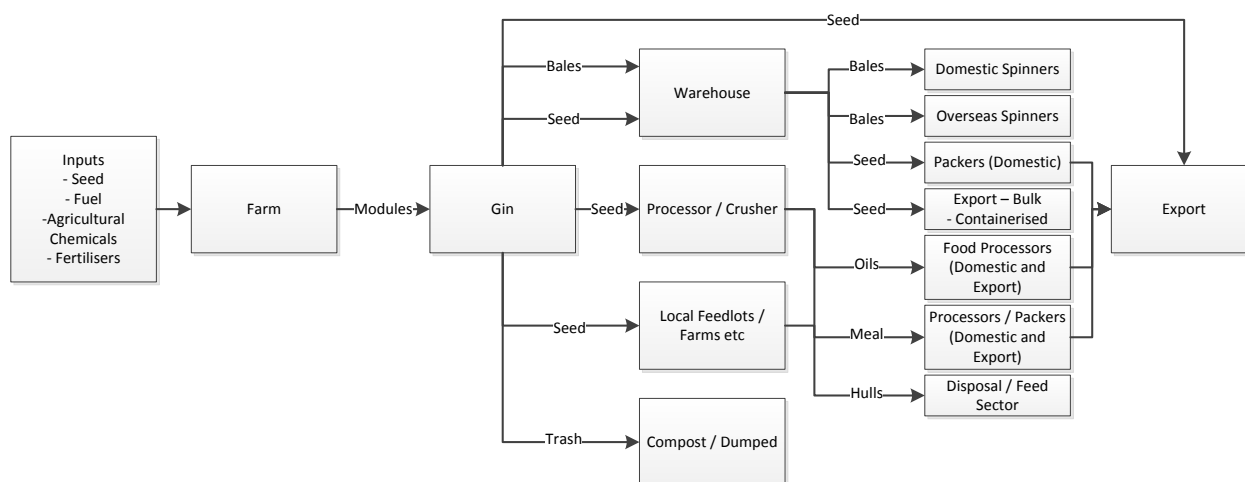
## Key nodal infrastructure

The cotton supply chain consists of three major stages:

- farm to gin
- gin to warehouse/processor/export/feedlot
- warehouse/processor to domestic and export manufacturers and spinners.

Figure 7 displays a typical bulk cotton supply chain.

**Figure 7: Cotton industry logistics supply chain**



Source: AUSTROADS, *Cotton Industry: Freight Logistics Case Study, 2001*

Once picked, cotton is pressed on farm into large rectangular truck-sized blocks called modules, or into large round bales<sup>17</sup>. Cotton round bales or modules are then transported to a cotton gin for the first stage of processing.

Ginning is the process of separating the raw cotton fibres (lint) from the seeds. The white fluffy lint is then pressed into cotton bales using a bale press, and covered with bale covers made from cotton to minimise contamination.

Once the cotton bales are ginned and pressed, they are loaded to trucks and trains and sent to port for shipping, mostly to overseas markets. The cotton bales are warehoused, and once they are sold and ready to be shipped, are loaded into large shipping containers.

<sup>17</sup> [www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-processing-exporting-and-marketing](http://www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-processing-exporting-and-marketing)





## ➔ Ports

The main ports for Australian cotton are in Brisbane and Sydney<sup>18</sup>, from which 80 %<sup>19</sup> of cotton and 93% of cottonseed are exported. All exports are in 40 foot containers.

Tables 1 and 2 display cotton and cottonseed exports by region, relative to their production regions and competing ports.

**Table 1: Containerised cotton exports by port (TEU)**

Production zone	TEU	%	Brisbane		Sydney		Melbourne	
			TEU	%	TEU	%	TEU	%
Central Queensland	3,018	4%	3,018	100%	-	-	-	-
Darling Downs	5,589	7%	5,589	100%	-	-	-	-
St George/Dirranbandi	7,054	9%	7,054	100%	-	-	-	-
Border Rivers	8,554	11%	8,554	100%	-	-	-	-
Gwydir Valley	25,018	31%	10,000	40%	15,018	60%	-	-
Namoi Valley	11,911	15%	-	-	7,061	59%	4,850	41%
Macquarie Valley	10,107	13%	-	-	6,107	60%	4,000	40%
Riverina	6,161	8%	-	-	-	-	6,161	100%
Bourke/Tandou	3,018	4%	-	-	-	-	3,018	100%
<b>Total TEU</b>	<b>80,429</b>	<b>100%</b>	<b>34,214</b>		<b>28,186</b>		<b>18,029</b>	
			<b>43%</b>		<b>35%</b>		<b>22%</b>	

Source: Arthur Spellson, *Cotton's Export Freight Task*, 2013

**Table 2: Containerised cottonseed exports by port (TEU)**

Containerised cottonseed exports by port	2012/13	%
Sydney	15,074	37%
Brisbane	23,379	57%
Melbourne	2,786	7%
Total	41,239	

Source: Arthur Spellson, *Cotton's Export Freight Task*, 2013

<sup>18</sup> [www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-processing-exporting-and-marketing](http://www.cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-processing-exporting-and-marketing)

<sup>19</sup> [www.farmonline.com.au/news/agriculture/cropping/cotton/cottoning-on-to-inland-rail/2702454.aspx](http://www.farmonline.com.au/news/agriculture/cropping/cotton/cottoning-on-to-inland-rail/2702454.aspx)