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THE COTTON INDUSTRY IN AUSTRALIA: AN ANALYSIS

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ABSTRACT

This paper examines the cotton industry in Australia. A history of the industry is given and a brief overview of the industry. There is a section on cotton plant ecology, production cycle and use. There is discussion of regulatory impacts, environmental issues and research. The industry is examined in more detail with identity of production regions, farm characteristics, economies of scale, irrigation water and foreign ownership. Next there is information on Australian production, exports and world production. Finally there is a section on cotton farm economics and profit and some guidelines for valuation of a cotton farm.

KEYWORDS

Cotton, Irrigation, Australian Industry, Production, Economics, Valuation

INTRODUCTION

History of Australian Cotton

Cotton is a relatively new agricultural industry in Australia but has well embedded roots in Australian history. The first fleet in 1788 bought cottonseed to Australia and in 1830 three bags were exported. In 1857 small areas were planted to dryland cotton in Queensland. In 1926 the Queensland cotton marketing board was established to promote industry growth in central Queensland. By 1934 cotton production had reached 17,000 bales, but by 1954 the industry had faded. The history of Australian cotton has been severely affected by drought, lack of technical expertise and fluctuating world prices. The first two problems have been largely insulated against or conquered but fluctuating cotton prices will be forever.

The large boost to the industry came in New South Wales, starting with construction of the Keepit dam in 1958 on the Namoi river near Narrabri, where cotton production became entrenched at Wee Waa and Narrabri. Cotton production blossomed in the Macquarie valley at Warren with the construction of the Burrendong dam in 1966. Meanwhile at Emerald in north east Queensland the first exportable surplus was delivered. By 1971 Australian production had reached 87,000 bales and in 1975 it rose to 110,000 bales. (Bale = 227 kg or 500 US lb). In parallel came increased technical expertise.

Cotton was established in the Gwydir valley at Moree in 1976 with the construction of the Copeton dam. By 1977 cotton production capacity in southern Queensland was increased with the construction of the Pindari and Glenlyon dams.

By 1980 cotton production reached 435,000 bales and increased to 1.1 million bales in 1985 and in 1992, record yields gave a 2.2 million bale crop and in 2001, 3.4 million bales, however low prices prevailed. In the period 2002 to 2004 the worst drought in 100 years resulted in a 60 % drop in the crop. In 2005 Australia produced a world record crop of 2.9 million bales

In 1996 the first transgenic crop variety of Ingard was introduced and in 2003 the variety Bollard replaced Ingard.

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Graph 1.0 - Australian Industry an Overview



Note: A bale of cotton is 500lbsUS or 227kg.

The costs of production in Australia are amongst the worlds lowest. The industry has one of the highest average cotton yields of 1,600 kg/ha(7 bales) in the world, which is approximately 2.6 times the world average. Australia has some 800 cotton growers with 72 % based in New South Wales and 28% in Queensland. The total cotton growing area is normally around 536,000 ha. Most cotton is irrigated but there is some dryland cotton grown. In 2004/2005 a world record crop yielded an average of 2,038 kg/ha (9.2 bales). This figure was three times the world average. Reid (1990) says that in 1986 the average cotton yield was 2.4 tons/ha or 4.8 bales per ha. Some growers now exceed 11 bales/ha. Clearly, the industry has gone forward in terms of production and yield. Technical expertise and better efficiency has resulted in this higher yield.

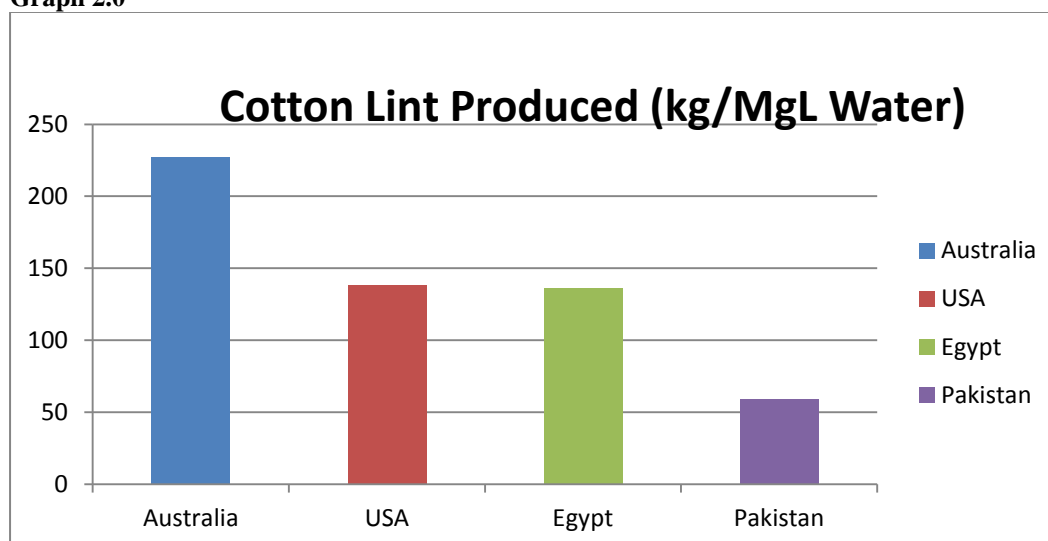
The Australian cotton industry is very efficient.

In the past decade there has been a 126% increase in production but the area sown has only increased by 50%. Australian producers get 227 kg of cotton lint from each megalitre (MGL)of water compared to 138 at California, 136 for Egypt and 59 for Pakistan.

The water requirement for cotton is reasonable at 8 MGL per ha compared to rice 15, citrus 12, maize 10 and wine grapes at 7 MGL/ha. The cotton industry accounts for 12 % of total water use in agriculture, in Australia.(one mega litre of water is one million litres)

Source Cotton Australia./ Save water.com.au.

Graph 2.0



Australia exports approximately 3 million bales per year or 94% of the crop. Most exports are to Asian countries such as Japan, Thailand, Bangladesh, China and Indonesia. The Australian industry generates export revenue of approximately one billion dollars per year and the employment required for cotton growing supports vibrant rural communities in regional Australia.

Australian Bureau of Agricultural and Resource Economics (ABARE) June 2012 predicted the following scenario:

Australian cotton exports may increase by 11.5% in 2012/2013 to a record 1.1 million tonnes. If realised on the back of a bumper crop in 2011/2012 this would place Australia as the second largest world exporter behind the USA and passing India.

It is a significant Australian industry and exporter.

The ABARE December 2012 cotton forecast has been revised downwards as it now predicts a 26% fall in the area planted to cotton at 442,000 ha. Irrigated cotton areas have fallen by 7% to 419,000 ha and the area of dryland cotton has fallen by 85% to 23,000 ha. This fall in the area planted has been partly offset by increased yields of around 7%, due to the higher area of the total, planted to irrigated cotton.

The Cotton Plant/Ecology/ Production Cycle/Use

The cotton plant is a member of the *MALVACEACE* family, *Genus GOSSYPIUM*.

The plant has an annual growing cycle. It is a green shrub and a member of the Hibiscus family of plants.

The cotton plant once grown, resembles a rose bush, growing up to 1.2m in height. The leaves are broad and heart shaped, and the plant has one main stem and many branches. The plant as it matures, briefly has white and pink flowers. These are replaced by the fruit or cotton bolls. These bolls contain cotton and cotton seed. The plant is generally grown in dry tropics or sub tropical climates at temperatures between 11 and 25 degrees. Germination of the plant will not occur under 15 degrees. The plant prefers hot summers with low humidity and long hours of sunshine.

Cotton is a difficult crop to grow in an agronomic sense. The crop may require up to six waterings according to seasonal conditions. Good drainage is essential as the crop is susceptible to waterlogging. Weed control is important. It is achieved by sprays, and inter-row cultivation. Cotton is generally grown on very deep alluvial, dark, cracking, clay soils. These soils are now classified as Vertosols and can often be plus one metre deep. Some cotton is grown on deeper duplex soils (that is a different soil material in the subsoil). The main fertiliser requirements are phosphorous, on the cracking clay soils, nitrogen and zinc. The crop is very susceptible to insect attack and sprays control these. There are at least 30 types of insect that may attack the plant but the most common in the Australian cotton crop are the heliothis caterpillar, aphids, thrips, mirids and whitefly. The crop can be affected by a range of diseases including black root rot and fusarium wilt. Environmental factors can impinge on crop growth, including heat or cold shock and hail damage. To manage the growing process takes a high level of technical, agronomic expertise. Management of the above issues is necessary to ensure maximum yields.

Cotton is mostly grown on flatter land with laser levelled, furrow irrigation, where plants grow on a ridge between the furrows, at a rate of 60,000 to 100,000 plants per ha. Cotton is normally sown in the spring months of September and October, setting fruit in January and February. During March and April the fruit ripens. Picking lasts up to July, after the crop has been killed by spray to enhance harvest operations.

The cotton lint is removed from the seed by a ginning process. The long cotton fibres are made into thread and are used for production of jeans, shirts, sheets and towels and the short fibres are used for padding in products. The seed is processed into cottonseed oil. This is used as cooking oil, in plastics, cosmetics, margarine and insecticides. Cottonseed meal for livestock nutrition is another product of the process. Approximately 55 % of the ginned cotton is cottonseed, with the cotton lint making up 35 %. The balance is waste. Once the cotton lint has been through the ginning process it is baled by compaction and transported to spinning mills to produce cotton, in Australia and overseas.

LITERATURE REVIEW

Investment/ Regulatory Atmosphere/ Research and Development

There has been little research undertaken into the financial performance of rural land, in a general sense. Proving very instructive is a series of papers by EVES (2000 – 2009).

In 2002 Eves found that rural land in New South Wales for the period 1990 to 2000 had achieved an annual average weighted return of 9.25%, higher than property at – 2.5%, bonds at 1.61%, or shares at 8.16%. Allowing for the annual income to be added, rural land achieved an overall return of 10.75%, property 5.12%, bonds 11.3% and shares at 12.72%. In a good season a cotton crop can achieve a return in excess of 10% just comparing the annual return, to the land value per ha.

Therefore investment by an absentee owner in rural land can be rewarding and profitable.

The basic drivers of rural land investment are different to most other forms of investment. Rural land production and income is primarily driven by the climatic conditions and overseas and domestic product prices. For instance, climatic conditions have no direct impact on the rent an investor could get for an industrial property. They may have some medium term indirect impact, for example decreased product demand for production at the industrial property, which may decrease rental demand, for example.

It appears from anecdotal evidence that land values will only increase in a rural industry where there has been a sustained high level or increase of operating profit or net income per ha. At least a 2 year period of sustained profits appear to be necessary to increase the demand and value for rural land. The cotton industry displays these general characteristics.

The regulatory or compulsory, atmosphere includes State and Federal law, and includes:

Work safety legislation, Occupational health, Pesticide and Insecticide registration and use, Taxation, Customs and Exports.

The voluntary regulation of the industry had its genesis when in 1991 the Australian Cotton Foundation undertook an audit of the industry. The key environmental issues, identified were, pesticide use, water use and land use. From this audit came a Best Practice Manual (BMP). The manual was developed by the Cotton Research and Development Corporation (CRDC), Land and Water Australia and the Murray Darling Basin Commission. Publications arising from this manual include Spraypak, Entopak, Soilpak Machinepak and Nutripak. General planks of the BMP are improved farm productivity and efficiency and protection of the environment and natural resources

Implementation of the BMP, that cost over \$5million AUS to produce, has yielded some impressive results. For example from 1995 to 2005 pesticide use dropped by 70%, through integrated pest management. To remain efficient and sustainable producers implement a range of actions that result in safe workplaces, healthy ecosystems and quality crops.

The industry is supported by a number of research bodies. These include:

Commonwealth Scientific Industrial Research Organisation (CSIRO)

Cotton Research and Development Corporation (CRDC)

The Australian Cotton Research Institute (ACRI)

Cotton Catchment Communities Co-operative Research Centre (COTTON CRC) These latter two organisations are based at Narrabri in northern New South Wales. Growers contribute to research with a compulsory levy of \$2.25 per produced bale. Key areas of research include integrated disease and weed management, irrigation and water efficiency, soil productivity, agronomic legume research and extension services.

The Australian cotton industry is very mindful that other rural land users share in resources of land and water.

Some of the current environmental issues in this area are:

health of inland waterways, irrigation practice, and floodplain dynamics.

The cotton industry is highly geared in terms of fertilisers, pesticides and water. The industry has in place a self regulatory systems to ensure the equitable distribution of resources with other users.

Two current and topical issues that impact on cotton growers are:

The impact of implementation of the Murray/Darling Basin Commission Plan.

The impact of coal seam gas exploration, which is being undertaken in many growing districts.

AUSTRALIAN INDUSTRY

Location

Cotton has been grown in the Ord River irrigation area of Western Australia, but production has ceased due to the prevalence of insect attack. The production areas in Australia are inland and southern Queensland and various areas of New South Wales. They are grouped into three categories.

The northern region is around Emerald and at Theodore and Biloela in eastern Queensland. 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 southern inland region includes the Macquarie valley (Warren), Darling river (Bourke) and southern New South Wales districts.

The contribution of each region to Australian production is illustrated in the table below;

AUSTRALIAN COTTON REGIONS

<u>REGION</u>	<u>AREA HA</u>	<u>% OF AUSTRALIAN COTTON AREA</u>
Northern	34,900	6.5
Central Border	424,000	79.2
Southern Inland	76,500	14.3
Australia	535,400	100

Source: Australian National Resources Atlas

Cotton Farms

Australian cotton farms are generally owned by wealthy family units or corporate agribusiness. The holdings are large. There is a large investment in land, land infrastructure irrigation, channels and dams, expensive equipment and a highly skilled and varied work force particularly in the agronomic sphere.

A typical farm would have the following rural land break up:

Irrigated land

Dryland

Water storage areas

Other land. Tracks, water channels, creeks and conservation areas.

Other crops generally grown on dryland parts of a cotton farm include wheat, canola, chick peas and other legume crops.

Water rights for cotton growing in Australia fall into several categories. In New South Wales for example the premium water right is one of General Security. This right receives a % allocation each year according to water availability. Then there are Supplementary water rights if seasonal flows in creeks and rivers are very high. Water supply may also come from underground or bore supply. It is now possible to sell or purchase water rights, where until recent times the land and water rights were sold as a single unit.

Water is generally pumped from creeks and rivers in winter time into main supply channels. The water is then pumped into ground level or turkeys nest storage dams, where it is held for spring and summer irrigation of the cotton crop. It is then transferred to the supply channels and to feeder channels. The water is then syphoned from these feeder channels to the furrows in the row cotton crop. At the end of the laser levelled furrow is another channel that collects excess water which is recycled into the the channels or the main holding dams. This is called flood irrigation. Automated spray irrigation is also used.

The typical farm is 500 to 2,000 ha but there are some large enterprises.

To illustrate the economies of scale and the characteristics of large cotton farms the following three examples are illustrative:

Cubbie station of 93,000 ha is located at Dirrinbandi in southern central Queensland.

22,000 ha is laid out to irrigation, complimented by a water right of 460,000 MGL and storage capacity of 500,000 MGL. The station was sold in October 2012 for a reported price range of \$230 to \$250 million AUS.

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The purchaser was the Chinese textile giant Shandong Ru yi Scientific and technological group and a 20% share to an Australian wool merchant Lempriere. Late in 2011 the receivers McGrath Nichol reported that the 249,000 bale crop in 2010/2011 was worth more than \$150 million Aus.

Clyde Agriculture (Australia) owned by the British based John Swire and Sons, has three cotton farm properties at Bourke. They have been for sale at a reported price tag of \$60 million AUS. The farms have a total area of just under 32,000 ha, approximately 8,000 ha for irrigation and a water right of 33,000 MGL. In addition they own Rumleigh at Brewarrina east of Bourke where 1257 ha is developed for flood irrigation. The main crop is cotton. The water licence is 6,000 MGL based on the Barwon river.

Auscott Cotton farms Australia, owned by J.G. Boswell USA, have large cotton farms and cotton gins at Moree, Narrabri and Warren. Their total area is 35,220 ha with 21,063 ha irrigated and water rights of 143,000 MGL. Dams for water storage cover 2,082 ha.

The large scale of these foreign owned properties is evidence of the large capital outlays of the owners and the sound commitment to the cotton industry in Australia, contribution to export income and regional employment. There is a strong argument for this overseas investment. There has been some concern in the rural press about foreign ownership of rural land in Australia. The sale of Cubbie station has led to some rural leaders to call for a sale to Australian owned families or corporations. I do not subscribe to the view that sales to foreign owned entities should be restricted or controlled but should come under closer scrutiny by Australian Government. At present, only sales exceeding \$248 million Aus come under scrutiny of the Foreign investment Review Board (FIRB) (Federal Government). I think that any sale over \$10 million dollars, should be scrutinised on at least the following basis:

The experience in agriculture, and the aims and objectives of the new owner.

The bona fides of the owner.

The issue of food security.. Australian use versus exports.

An audit of activity every 5 years.

Of even more concern is the situation where an overseas corporation purchases rural land from a State or Federal Government. In this case there is no scrutiny from the FIRB as the \$248 million limit does not apply. There is no restriction. Chinese buyers are examining potential land sales exceeding \$248 million at the Ord river irrigation area in Northern Western Australia. Any resulting sale from the state Government of Western Australia, will not receive any Federal Government scrutiny.

The cotton industry is generally a very young rural industry, compared to the more traditional and long established grazing industries for example. This, coupled with corporate ownership with the availability of large capital amounts has seen the adoption of many technological improvements in cotton production. A good recent example has been the improvement in harvesting equipment, where the cotton picking machine now produces a weatherproof round bale which can then be transported to the ginning mill for processing. Previously three pieces of equipment were needed to create a rectangular cotton module for in field transport.

In regard to foreign ownership generally, I agree with the sentiments of Killen.. American speculation in 1962 determined that cotton prospects at Wee Waa (near Narrabri) were worth a gamble. Before this the industry was almost non-existent in this country and our entire cotton requirements were imported. .. The Americans discovered cotton potential and have a great stake in the industry...

Without overseas investment the cotton story could have been different. These investors were the cotton pioneers and were prepared to take large risks which have borne fruit.

AUSTRALIAN PRODUCTION AND PRICES

The following production statistics, since 2005, display the large changes in production of cotton and the area sown in response to changing world prices, seasonal conditions, and the profitability of other crops. The years of 2006 to 2009 are generally reflective of general drought persisting in the main growing cotton areas.

Interestingly the yields in that period were quite high.

Over the past 20 years the cotton yield has increased by 38%.

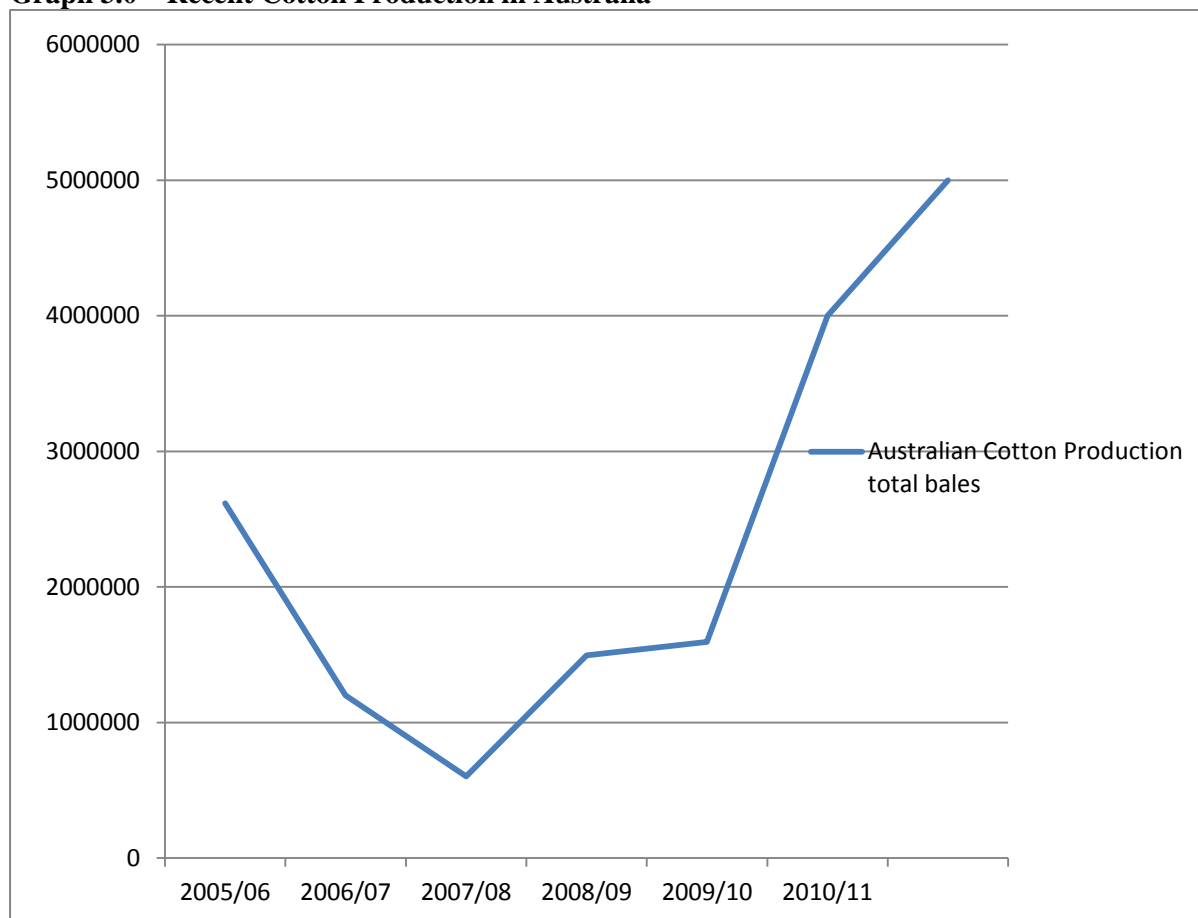
The total value of the Australian crop in 2011/2012 was \$3 billion AUS.

Table 1.0 AUSTRALIAN COTTON PRODUCTION

YEAR	TOTAL BALES	HA SOWN	BALES PER HA
2011/2012	5,000,000	583,000	8.6
2010/2011	3,999,600	599,630	6.67
2009/2010	1,594,850	182,000	8.76
2008/2009	1,494,300	160,390	9.26
2007/2008	601,810	68,585	8.77
2006/2007	1,199,700	134,290	8.93
2005/2006	2,618,000	333,385	7.85

Source: Cotton Australia

Graph 3.0 – Recent Cotton Production in Australia



The price of cotton is set by the world market. The following factors may impinge on the price, seasonal conditions and production levels, agricultural policy, fashion trends and the price of competitive synthetic fibre in the market place. In recent time the price has been around \$1,000 bale AUS, but is now around 80cents/lb or in the region of \$350 to \$400 per bale \$AUS.

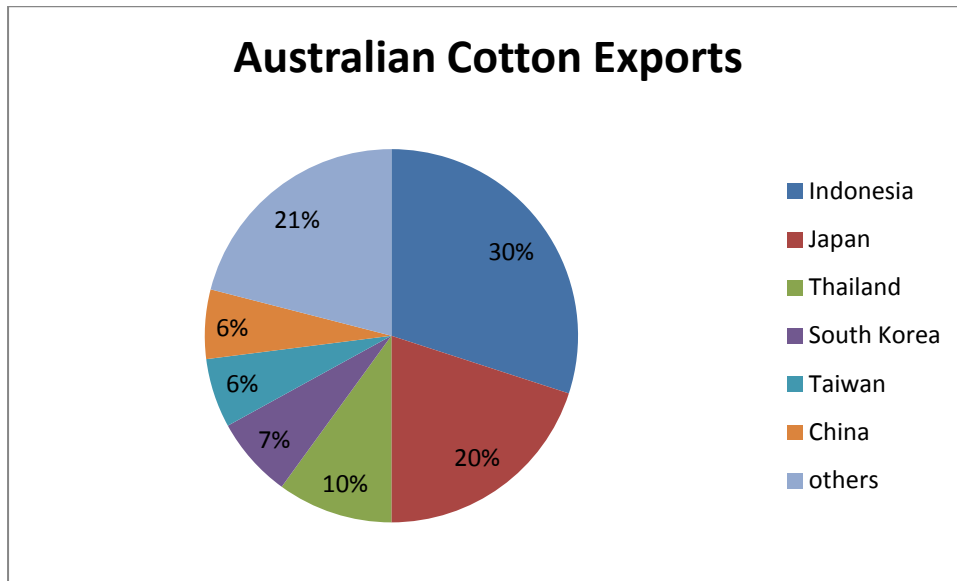
AUSTRALIAN COTTON EXPORTS

Australia is the fourth largest world exporter of cotton ranking behind the USA, India and Uzbekistan. Our largest export market is Indonesia accounting for 30% of the crop, followed by Japan, who take 20%. Thailand, South Korea and Taiwan account for nearly 25% of exports. The balance being just over 25% of our exports goes to China with 6% of exports, whilst other countries we export to all have a market share below 5% of our exports. These countries include, Italy, India, Bangladesh, Turkey, Spain and Malaysia. In 2010 cotton was the third largest agricultural crop and the fifth largest rural export earner.

Source: Australian Natural Resources Atlas (ANRA)

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Graph 4.0 – Australian Cotton Exports

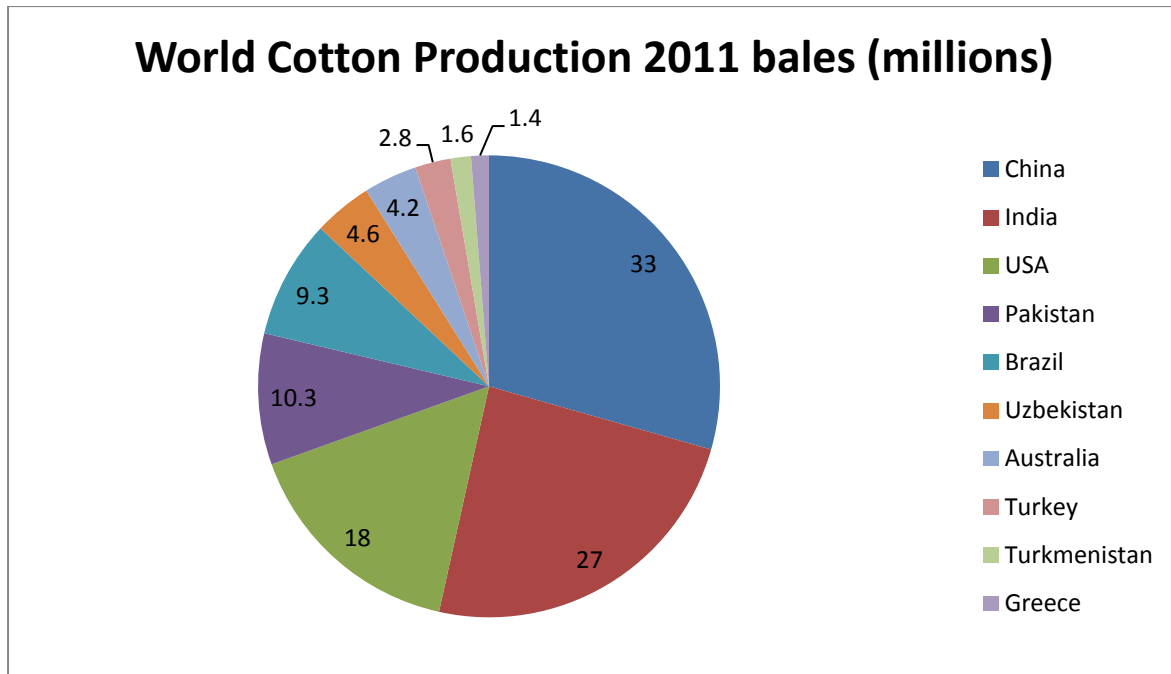


AUSTRALIAN AND WORLD COTTON PRODUCTION

Australian production in 2011 ranked the country as the seventh largest producer in the world. China and India produce just in excess of 50% of the worlds cotton.

For the year 2011, the worlds top ten producers were:

Graph 5.0 - WORLD COTTON PRODUCTION/2011



Source: Cotton Australia

COTTON ECONOMICS AND PROFIT

The most comprehensive economic analysis of the Australian cotton industry has been conducted by BOYCE Chartered Accountants and the Cotton Research and Development Corporation.(CRDC). The publication is Australian Cotton Comparative Analysis: 2011 crop.

Data for the 2011 crop includes the following:

ECONOMIC RETURNS : MAJOR GROWING AREAS:2011 CROP

Measure	Valleys			
	GWYDIR	MCINTYRE	MACQUARIE	NAMOI
1.Gross Income \$ ha	\$6,214	\$5,855	\$5,800	\$4,327
2.Operating Costs \$ ha	\$3,476	\$3,588	\$3,230	\$2,813
3. Operating profit \$ha (Net Income)	\$1,489	\$2,270	\$2569	\$1,511
Yield per ha Bales	11.45	11.41	10.98	7.53
4. Operating Profit \$ per Bale	\$130	\$199	\$234	\$193

Source: Boyce and CRDC 2011 Australian Cotton Comparative Analysis/ 2012

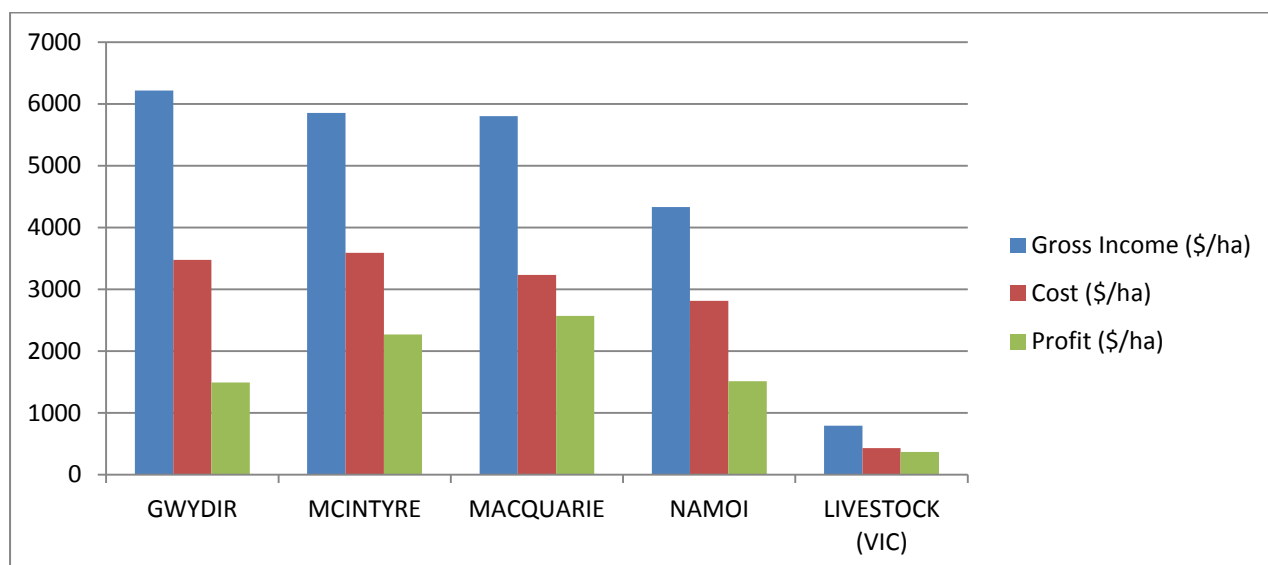
The Livestock Farm Monitor Project for Victoria, assesses the economic performance of 110 livestock operations across Victoria. I have chosen the south west area as it is the most productive district in Victoria. You should note that Operating Costs in the above cotton example are equivalent to the addition of Enterprise costs, Overhead Costs and owner operator allowance, in the livestock example below:

**LIVESTOCK FARM MONITOR PROJECT 2010/2011 SOUTH WEST VICTORIA
AVERAGE FARM FINANCIAL PERFORMANCE PER HA**

Gross Income	\$793
Enterprise Costs	\$214
Gross Margin	\$579
Overhead costs	\$137
Net Income	\$442
Owner/Operator Allowance	\$ 76
Operating Profit	\$366

Source: Department of Primary Industries/ Victoria/2011

Graph 6.0 – Cotton Profitability compared to Livestock Profitability in Australia



Compare the following for the two industries, gross Income and operating profit.

There is a great difference. Of even more distinction is the fact that land values in South Western Victoria would be above \$ 4,000 ha and below that for most irrigated cotton land. We should also note the following. The 2011 cotton crop was a large one and therefore produced good economic results, with healthy profits. Therefore in comparison to the livestock industry, with an average year, the difference is extreme. As already noted, production and yields in the cotton industry are volatile, especially considering the availability and scarcity of water and a fluctuating end price for cotton. In some years of low production the operating profit per total available irrigated ha may be small or at a loss. By contrast the livestock industry in south west Victoria has a very reliable rainfall. Profits in the livestock industry are more stable. In addition the cotton industry has high capital requirements for machinery and technical expertise. With cotton growing there is a lot more risk to production and yields. If those risks can be managed and there is a reasonable water availability the returns can be very high.

COTTON FARM VALUATION

Cotton farming in Australia needs good natural resources, including the right soil type and characteristics, flat land, good irrigation infrastructure, water availability, and the right climate parameters. These factors should be investigated thoroughly, for the subject property. In addition, one needs to ask and evaluate answers to some critical questions.

What is the location and access situation?

Is the property in a district of proven cotton production?

If a newer area what is the production and yield history?

Are the buildings sufficient for cotton farm operations? Are any redundant?

Is the irrigation and other farm infrastructure sufficient for efficient farm operations?

What is the standard of management?

How does this farm compare to others in the local district?

Are there any climatic factors that could impinge on production. Is there a history of hail damage or excessive summer heat?

There are many matters to investigate.

As with most rural land, valuation is achieved by the analysis and examination of comparable sales in the local district and beyond, if necessary.

The sale price needs to be audited by determination of the existence of any chattels or machinery and if so, deducted from the sale price. The sale price needs to be adjusted for any non commercial terms of finance in the contract.

The sale price normally includes water, so the added value of the various categories requires determination for the district where you are. Water brokers and real estate agents are good sources of information. The New South

Wales Government has a current public register of water sales. In addition there are corporate bodies specialising in the sale and purchase of water. Waterfind based in Adelaide contains useful information. Once the water is deducted the added value of buildings is subtracted from the sale price. The resultant sum gives the overall and per ha value of the land. This needs to be split between the various land categories. Sales need to be examined in at least three categories. Firstly, the irrigated land will have the highest value and is best obtained from the sale of comparable, mostly irrigated land. Secondly dryland values come from dryland cropping sales. Thirdly, sales of similar land to the subject with several major land categories can be compared to the subject and analysed further using the sales in the first two categories. It is important to examine and use sales close to the subject. Even sales 60 km away may be quite different, as the production and climate maybe dissimilar.

The process appears simple but in reality there is much research and field work to be done.

CONCLUSION

The cotton industry in Australia has been an important contributor to export income and regional employment. The industry is very efficient. It is at the forefront in terms of research and the whole industry is very aware of the responsibility in environmental and sustainability terms. The industry is a good example of Australian owners of cotton farmland working with overseas owners. The importance of overseas owners as pioneers in the industry has been significant.

This is the end of my report.

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