AUSTRALIAN GRAIN

YEARBOOK 2006

INCORPORATING THE GRDC REPORT TO INDUSTRY

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GRAIN YEARBOOK 2006

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OVERVIEW

By Lloyd O'Connell
EDITOR, *AUSTRALIAN GRAIN*

Welcome to the 2006 issue of the *Grain Yearbook incorporating the GRDC Report to Industry*. The Yearbook provides an accurate, uncluttered presentation of up-to-date reference information on key aspects of Australian grain production, marketing and research.

The 2005–06 season in review

It took a long time coming but the sowing break to the 2005 winter crop was generally well worth the wait. Good general rains in late June and July were too late for many canola planting intentions, but this country was largely sown to extra cereal hectares, particularly barley – a crop renowned for its ability to handle late starts.

'Huey' didn't let us down either delivering a fantastic soft and wet spring to most areas. After dire predictions early in winter, total winter crop production came to an astounding 40 million tonnes plus – up 15 per cent on the previous year and our second biggest winter crop on record. Over 25 mt of wheat were delivered along with almost 10 mt of barley. Cereal and coarse grain yields were up on 2004 but oilseed production suffered because of the late break.

Pulses generally performed well in 2005 delivering 2.14 mt to the nation's grain coffers from 1.43 million hectares planted. Faba beans and lupins both performed reasonably, but the stand-out performer was lentils with a more than doubling of average yield on the 2004 season. It's a crop that can really fire when conditions are right.

The summer crop

The summer crop harvested in 2005 was just under 3.7 mt or 15 per cent below the five year average.

A very dry start to 2006 in the northern region has cooled expectations of any improved production levels for sorghum and cotton in the 2005–06 summer season. One bright spot is rice where production is expected to treble to over one million tonnes thanks to increased water allocations.

Crop management issues

Herbicide resistance in major weed populations is a very big issue for growers. Integrated weed management strategies are struggling to keep ahead of the resistance scourge and many hitherto minimum/no-till adherents, are seriously contemplating a limited and strategic return to mechanical weed control.

Diseases in cereals, oilseeds and pulses continue as challenging and costly problems for growers. New management strategies and resistant varieties are carefully researched each season – and rapidly and eagerly adopted by growers as they seek maximum yields and quality from their crops.

In the face of ongoing battles with costs and prices heading very often in opposite directions, farmers have to extract every last productive ounce from their crops to stay ahead of the game (see the Terms of Trade table next page). Fortunately, Australian farmers are the best in the world at doing just that – but they have to be.

The 2006–07 winter crop?

Grain prices are expected to trend slightly upward in 2006 adding some welcome optimism to winter crop plans. Cropped area should remain around 22 million hectares although some land maybe put aside as part of integrated weed control and nutrition strategies.

Australian area ('000 ha) and production ('000 tonnes) of major winter and summer crops planted during 2005 (principal source: ABARE)

	NSW		VIC		QLD		WA		SA		TAS		AUSTRALIAN TOTAL	
2005–06	Area	Prodn	Area	Prodn	Area	Prodn	Area	Prodn	Area	Prodn	Area	Prodn	AREA	PROD'N
Wheat	3145	7921	1276	2705	958	1385	5221	9478	2017	3578	8	23	12625	25090
Barley	1015	2245	937	2059	156	259	1303	2598	1317	2685	11	23	4739	9869
Oats*	348	492	155	252	9	4	255	521	85	129	7	10	859	1408
Triticale	113	286	112	219	112	2	26	33	92	127	2	8	457	675
Sorghum#	300	955	2	5	585	1344	2	4					889	2308
Maize#	26	189	1	7	47	189	2	6					76	391
Rice#	105	1001											105	1001
Canola	145	254	225	302	1	1	440	630	150	218	1	1	962	1406
Sunflowerseed#	73	96			16	16							89	112
Soybean#	14	33	0.3	0.8	7	16							21	50
Peanuts#	0.8	1.6			23	43							24	45
Cottonseed#	213	545			122	274							335	819
Lupins	26	44	20	25			650	926	57	80			753	1075
Field peas	40	75	55	95			65	88	120	180			280	438
Chickpeas	46	61	9	13	36	36	6	5	1	2			98	117
Faba beans	33	70	55	76			6	8	89	175			183	329
Mung beans#	18	20			26	28							44	48
Navy bean#					4	5								4
Lentils	2	3	55	90			1	2		55	90	0	0	113
Vetch**	10		100				30		100				240	10
TOTAL	5673	14292	3002	5849	2102	3602	8007	14299	4028	7229	119	65	22779	45307

#Estimate for summer crop to be harvested in 2006.
*Area harvested for grain. ** Vetch is generally not harvested with most being used as green manure or fodder. Some vetch is harvested for commercial or grower-retained seed.

Farmers' terms of trade from Australian grain production (base year is 1997–98)

	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07 (forecast)
PRICES RECEIVED							
Wheat	117.4	132.3	134.4	109.1	96.6	111.4	124.3
Barley	125.1	130.8	159.9	105.9	101.0	102.3	107.6
Canola	79.6	99.7	100.9	104.4	84.9	84.0	87.4
Lupins	104.9	127.7	149.0	120.4	103.2	103.2	101.1
Oats	96.5	128.2	160.3	101.1	92.7	122.8	122.5
Sorghum	85.1	102.2	120.9	93.8	88.7	99.5	102.7
Total grains	**108.7**	**123.7**	**134.0**	**105.2**	**95.1**	**104.9**	**113.3**
PRICES PAID							
Fuel	137.6	122.9	121.7	138.6	168.4	198.7	196.1
Fertiliser	106.4	104.3	104.5	103.6	103.6	106.2	108.8
Chemicals	103.3	105.6	108.0	110.0	111.9	114.5	116.6
Seed	105.2	112.9	118.3	104.9	95.4	90.6	95.4
Labour	110.1	113.3	117.9	121.6	125.7	129.5	132.7
Interest	111.2	104.2	110.7	118.1	123.7	130.3	133.6
Rates & taxes	112.4	115.5	119.1	121.9	124.8	128.6	131.8
Other overheads	108.7	111.9	115.4	118.1	121.0	124.6	127.7
Capital items	111.9	115.2	118.3	121.3	124.4	128.2	131.7
Total prices paid	**110.0**	**112.8**	**121.2**	**123.0**	**127.1**	**129.6**	**132.1**
TERMS OF TRADE	**98.6**	**108.6**	**101.2**	**94.8**	**90.5**	**90.9**	**88.4**

Note: Terms of trade is the ratio of the index of prices received and the index of prices paid. Sources: ABARE, ABS

Global and domestic grains outlook

By Leanne Lawrance, Amelia Duck and Sally Fletcher, ABARE

In the short term

World prices to rise moderately in 2006–07

As a result of continued strong demand for wheat in 2006–07 and a forecast reduction in world wheat supplies, the world wheat indicator price (US hard red winter, fob, Gulf ports) is forecast to increase by 2 per cent to average US$166 a tonne in 2006–07. But prices could go higher if the current dry conditions being experienced in the United States continue.

The world indicator price for coarse grains (US corn, fob Gulf) is also forecast to increase by around 2 per cent, to average US$105 a tonne in 2006–07. This reflects increased world demand and largely unchanged coarse grains supplies in 2006–07. In contrast, world barley prices are forecast to fall in 2006–07 as production in key exporting nations, such as the European Union and the Ukraine, increase.

The world oilseeds indicator price (soybeans, cif, Rotterdam) is forecast to increase by 3 per cent in 2006–07 to US$272 a tonne, as global demand for oilseeds products remains strong and global supplies remain largely unchanged.

World grain production and seasonal conditions

Seasonal conditions in the major grains and oilseeds producing areas are a major factor affecting production. Over the past two seasons in both north America and the EU, seasonal conditions have been favourable and yields have been well above average.

In the coming season it is assumed that seasonal conditions will be consistent with longer term averages and, accordingly, yields are expected to decline in some of the major producing countries. In some cases, 'average' yields are increasingly reflecting the adoption of new seed varieties (such as with corn in China) or the adoption of genetically modified seed varieties

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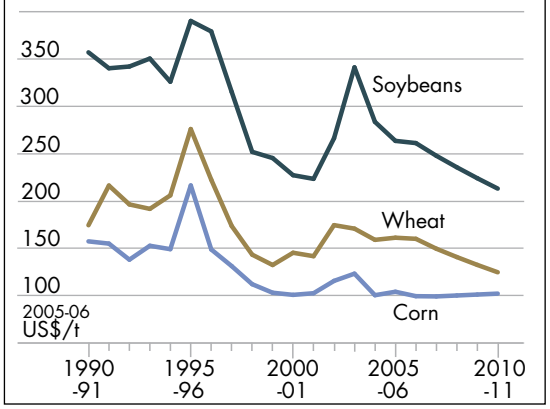
World grain prices



- A reduction in world supplies of grains and oilseeds, along with growing demand, is forecast to lift prices in 2006–07.
- Increased demand for feed grains is underpinning growth in coarse grains use in 2006–07.

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(as is the case with US corn and soybeans). This is particularly important in the context of the medium to longer term outlook for grains production.

World wheat supplies to fall

World wheat production is forecast to fall by 17 million tonnes to 599 mt in 2006–07, as the area sown to wheat declines and yields in some of the major producing countries return to average.

While world wheat production has been at record highs in the previous two seasons, relatively low stocks have meant that the total available wheat supply has still been lower than the records of 1999–00 and 2000–01. With stocks remaining historically low in 2006–07 (largely from a continued rundown in China's wheat stocks) and production forecast to ease, world wheat supplies are forecast to fall by 3 per cent in 2006–07.

Much of the decline in production is forecast to come from China, the Russian Federation and the Ukraine. Production in the latter two countries is forecast to fall by 18 per cent and 25 per cent in 2006–07 respectively. Little snow cover (snow insulates crops from cold temperatures) and cold temperatures in mid-January 2006 is likely to have resulted in crops being damaged by frosts and winter kill.

The area sown to wheat in China has been falling steadily since the mid-1990s as competition with other land uses has intensified. In 2004 the Chinese Government implemented polices to encourage grains production. In the 2005–06 season the area sown to wheat in China increased, reversing a seven year decline. In 2006–07 the area sown to wheat is forecast to again increase by around 1 per cent to 23 million hectares.

But this is still well below the average for the past 10 years (26.6 million hectares). In the previous two years, wheat yields in China were well above average (9 per cent above the five year

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The medium term outlook for grains will be influenced by:

- The increased importance of grains for industrial purposes, particularly in the ethanol and biodiesel industries
- Continued growth in China's grains and oilseeds use and the expansion of grains production in the Russian Federation and oilseeds production in Brazil

TABLE 1: World and Australia grains production, stocks and price forecasts

WHEAT	Unit	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
World wheat								
Production	Mt	625	616	599	620	623	627	632
Closing stocks	Mt	140	138	117	117	119	121	124
Price* (US Hard red winter)	US$/t	159	163	162	151	142	134	126
Australia wheat								
Production	kt	22,605	25,090	24,548	25,218	26,174	26,913	27,678
Price* (APW10 net pool)	A$/t	203	192	193	186	177	170	163
COARSE GRAINS								
World coarse grains								
Production	Mt	1008	958	967	987	1002	1017	1032
Closing stocks	Mt	172	165	157	163	174	176	168
Price* (US corn)	US$/t	100	103	102	102	103	104	105
Australia coarse grains								
Production	kt	12,140	14,651	13,553	13,912	14,263	14,588	14,924
Price*: Feed barley	A$/t	174	153	153	152	153	153	154
Malting barley	A$/t	204	178	177	177	177	178	179
Grain sorghum	A$/t	155	168	170	168	166	165	162
OILSEEDS								
World oilseeds								
Production	Mt	379	389	377	387	398	410	425
Closing stocks	Mt	34	43	40	35	31	30	30
Price* (Soybean, Rotterdam)	US$/t	283	263	265	253	241	231	221
World protein meals								
Production	Mt	205	213	211	217	223	230	238
Price* (Soybean meal)	US$/t	219	216	217	207	198	189	181
World vegetable oils								
Production	Mt	110	114	109	112	116	119	123
Price* (Soybean oil)	US$/t	563	526	532	508	485	464	443
Australia oilseeds								
Total production	Kt	2607	2468	2525	2706	2909	3096	3265
Canola	Kt	1496	1405	1391	1475	1565	1659	1726
Canola price (melbourne)	A4/t	348	335	340	321	304	288	272
Sunflowers	kt	62	112	113	118	122	127	132

Sources: Australian Bureau of Statistics; International Grains Council; US Department of Agriculture; ABARE. (* Real prices are used)

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REALISTIC PRICES


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SYN10 - IP65 & SYN10 INVERTERS


ACTIVE INVERTERS


LMD INTEGRATED INVERTERS


S SERIES HELICAL


A SERIES HELICAL-BEVEL

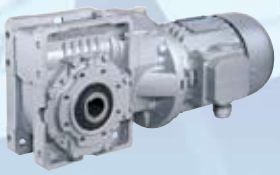

C1 SERIES IN-LINE HELICAL


F SERIES SHAFT MOUNTED HELICAL

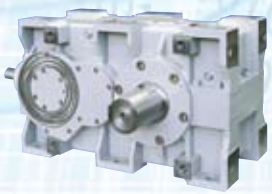

BRAKE MOTORS


W SERIES WORM REDUCERS


CLUTCH-BRAKE UNITS

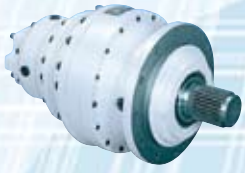

WR SERIES HELICAL WORM


RAN SERIES MITRE GEARS


BEVEL-HELICAL REDUCERS


TA - SHAT MOUNT REDUCERS


HEAVY DUTY PARALLEL REDUCERS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average) as seasonal conditions were favourable. Despite the increased area sown, production of wheat in China is forecast to fall by 4 per cent in 2006–07 as yields are assumed to fall, reflecting a return to average seasonal conditions.

With favourable returns for wheat in the US in 2005–06 and a positive outlook, the area planted to wheat is forecast to increase by around 1 per cent in 2006–07. But conditions in the southern and central plains regions of the US have not been favourable for the winter wheat crop (there are both winter and spring crops in the US). Continued dryness means that crops in these areas are currently suffering from moisture stress.

CHINA OUTLOOK

The growth in production of agricultural products in China is constrained by a number of factors, such as limits to the availability and quality of water and urban encroachment into areas of highly productive agricultural land, particularly in the coastal regions. For example, high yielding wheat varieties grown in China over the drier winter months are reliant on irrigation and, hence, wheat producers are increasingly competing with manufacturing industries and residential consumers for available water supplies. Similarly land is being increasingly diverted into intensive horticulture (vegetable and fruit production), oil crops and aquaculture as well as for urban development. As such, increased grains production in China over the medium term will rely heavily on productivity improvements rather than an increase in the area cultivated.

China is currently the world's third largest corn exporter. But corn exports from China have been declining. Expansion in China's livestock industries – to meet increased demand for meat and meat products – has resulted in a significant increase in the domestic consumption of corn. Historically, domestic corn production and stocks have been able to supply the increased demand. Over the medium term, China is expected to become a net importer of corn.

Oilseed demand also growing

Growing demand for oilseeds and oilseed products in China have contributed to oilseeds imports increasing from under one mt in the mid-1990s to around 29 mt in 2005–06. This has been driven by a rapid increase in vegetable oil consumption per person, doubling since the mid-1990s to 16 kilograms in 2005–06. However, this amount is still relatively low when compared with Chinese Taipei, where vegetable oil consumption per person is around 25 kilograms. It therefore seems that there is significant scope for China's vegetable oil consumption to increase in the medium term.

In the 10 years to 2005–06, China's oilseed meal consumption more than doubled to around 43 mt. Demand for meat, fish and dairy products is expected to continue to increase over the medium term and, with much of this demand being met by expansion of the domestic livestock and aquaculture sectors, the demand for oilseed meal will also increase.

According to the USDA, China's rural financial institutions are channeling large amounts of capital into the country's agricultural sector as part of a comprehensive policy aimed at boosting agricultural productivity and rural household incomes. Chinese agriculture remains dominated by small farms using little physical capital, but rising investment is helping the sector to diversify. The quality and standardisation of farm products are developing and farms are diversifying into new enterprises such as vegetable and fruit production and aquaculture.

As China is one of the world's largest producers and consumers of grains and oilseeds, changes in domestic consumption and production over the medium term will continue to have a significant impact on world markets.

As a result total US wheat production is forecast to decline by 2 per cent to around 56 million tonnes in 2006–07.

Marginal increase in coarse grains production

World coarse grains production in 2006–07 is forecast to be 967 million tonnes, marginally up on production in 2005–06. Corn production is forecast to increase in the US and China, reflecting continued yield improvements. In the US, yield improvements over the past decade have been in part attributed to the rapid adoption of genetically modified corn. It is estimated that the area sown to GM corn varieties in the US increased from 26 per cent in 2001 to 45 per cent in 2004.

In the case of China, improvements in corn yields have been linked to the adoption of improved (non-GM) seed varieties.

Production in Brazil is forecast to increase in 2006–07, as a result of increased area planted, with yields remaining similar to those achieved in 2005–06.

Barley production is expected to increase throughout the EU in 2006–07, largely reflecting CAP reforms and EU enlargement. The abolition of EU price support payments for rye will encourage more area to be allocated to barley production in the enlarged EU.

In the Russian Federation the 2006–07 crop has already been sown. The area harvested is expected to remain at around 9 million hectares. Assuming average yields, total production is forecast to reach 16 million tonnes in 2006–07.

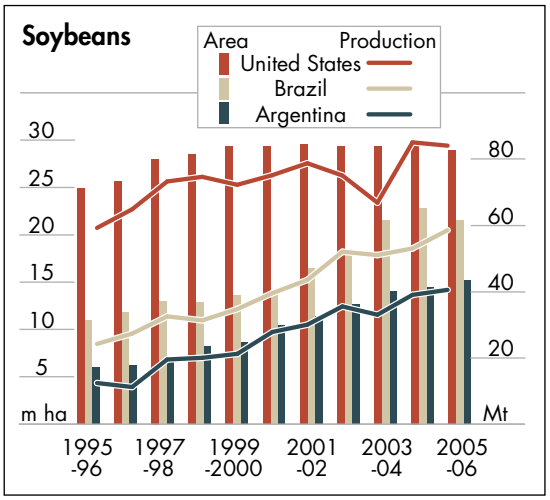
Oilseeds production lower

World oilseeds production is forecast to fall by 3 per cent to 377 mt in 2006–07 as yields are expected to ease (reflecting a return to average seasonal conditions).

The global oilseeds market is dominated by soybeans, which account for over half of world production of oilseeds. The US is the largest oilseeds producer and in the past two years has achieved record yields and production. In 2006–07 it is forecast that the area sown to soybeans in the US will increase by around 1 per cent. With yields assumed to return closer to historical averages, production is expected to decline.

There is still considerable uncertainly surrounding the size of the 2005–06 soybean crop in Brazil and Argentina, the other major soybean producers. Dry conditions in October–December 2005 have caused some damage to soybean crops in these countries. Nevertheless, soybean production in Brazil and Argentina is forecast to increase in 2005–06.

Over the past 10 years the harvested area of soybeans in Brazil has increased on average by 7 per cent a year. With a



forecast strengthening in world oilseeds prices, the area sown to soybeans in Brazil is forecast to increase again in 2006–07, although at a slower rate than over the past 10 years. This moderation in the growth in area sown to soybeans reflects increased competition from competing crops, particularly sugar.

With a return to average seasonal conditions in 2006–07, canola (or rapeseed) production, which accounts for around 12 per cent of world oilseeds production, is forecast to be lower in both the major producing countries of Canada and the EU. Canola yields in Canada increased to a record 1.8 tonnes per hectare in 2005–06, well above the 10 year average yield of 1.4 tonnes per hectare on the strength of excellent seasonal conditions.

Cottonseed accounts for around 11 per cent of world oilseeds production. Cottonseed availability has been at record highs for the previous two seasons as production in the largest cotton producing nations — China, India, Pakistan and the US — has been at record levels. In 2006–07 a forecast increase in the area sown to cotton is expected to lead to a further 4 per cent increase in cottonseed production.

Palm oil is the second largest vegetable oil produced worldwide, behind oil produced from soybeans. In the largest two producing countries — Malaysia and Indonesia — both the area sown to palms and yields have been increasing. Production of palm oil increased by 3 per cent in 2005–06 and is forecast to increase again in 2006–07. Although palm oil is considered to be less healthy than other vegetable oils, such as those produced from soybeans and canola, it is also relatively inexpensive. The largest consumers of palm oil are developing economies such as Indonesia and India.

World grain demand

Wheat consumption largely unchanged

World wheat consumption in 2006–07 is forecast to be around 619 mt, largely unchanged from the previous season.

The total volume of wheat used for human consumption has changed little in recent years, rising by less than 1 per cent a year. The worldwide average consumption of wheat (on a per person basis) has been declining relatively steadily since the late 1980s, reflecting the increased diversification of staples in

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Cottonseed accounts for 11 per cent of world oilseed production.

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consumers' diets. However, population growth as well as growth in wheat consumption in populous countries where it is not traditionally a staple, such as Indonesia, has led to an overall increase in wheat used for human consumption.

Nevertheless, much of the change in wheat consumption is being driven by demand for feed wheat in livestock rations which, in turn, reflects strong growth in the demand for meats such as pork and chicken.

By far the world's largest market for feed wheat is the EU, accounting for around half of the world's consumption. Total feed wheat consumption in the EU is estimated at 57 mt in 2005–06, with the pig industry being the largest consumer.

Increased coarse grains consumption

World consumption of coarse grains is forecast to increase slightly in 2006–07, to around 976 mt. World trade in coarse grains is forecast to increase to around 102 mt. Exports of corn from the US are expected to increase in 2006–07, while exports from China and Argentina are forecast to decrease.

Intensive livestock production is increasing across the globe. This will help underpin the demand for coarse grains.

BRAZIL OUTLOOK

There has been a boom in agricultural production and exports in Brazil over the past decade. Soybean area, production and exports have more than doubled over this time. This growth in production reflects an increase in the availability of agricultural land, particularly the area planted to soybeans and complementary crops (such as maize and cotton). Harvested area of soybeans in Brazil increased from around 10 million hectares in 1990 to over 22 million hectares in 2005.

The government of Brazil estimates that there is an additional 90 million hectares of potential cropland that could be used without encroaching on the Amazon rainforest. This potential cropland indicates that in the medium term there is potential for Brazil to expand its soybean industry considerably.

In the past the yields for major crops in Brazil were lower than in most other major exporting countries. However, both labour and land productivity have improved significantly, and Brazilian soybean yields exceeded those in the US for the first time in 2001.

Over the medium term, further expansion of the agricultural sector in Brazil may be affected by a lack of transport infrastructure and lack of access to credit facilities for producers.

Growth in coarse grains trade is strongly linked to increases in the production of intensive livestock, particularly in developing countries where incomes and per person consumption of meat are rising rapidly. Key growth markets include Mexico, north Africa, the Middle East and east and south east Asia.

Outlook for coarse grains

The US currently supplies more than half of all the world's exports of coarse grains and hence the harvest in the American midwest is crucial to world supplies. With South America becoming increasingly competitive in soybeans, US growers are expected to shift their focus from soybeans to corn, thus increasing production in this region.

Severe drought conditions in Texas are expected to increase the demand for feed grains, as the number of cattle on feed increases. Total US feed use is expected to increase in 2006–07, matching the previous record reached in 2004–05.

Another major factor expected to influence the use of corn in the US in 2006–07 is the demand for ethanol as a fuel extender or substitute for traditional oil based fuels. Ethanol remains the biggest growth sector in global grain use. Use of corn for ethanol production in the US is forecast to reach 40 mt in 2006, compared with around 12 mt in 1995.

In the EU, the higher availability and lower prices for feed wheat are expected to continue to displace some coarse grains in livestock feeds in 2006–07, thereby reducing coarse grains feed demand.

Continuing increases in China's demand for meat, fish and dairy products, driven by increasing incomes, will lead to a further expansion of the livestock and aquaculture sectors, increasing demand for feed grains. Coarse grains consumption in China is again forecast to exceed domestic production, leading to a further reduction in stocks and reduced corn exports.

China dominates growth in oilseeds use

World use of oilseeds is driven largely by the demand for vegetable oil and oilseed meal by the processed food sector and livestock industries. The demand for both oilseeds and oilseed meals has increased significantly over the past decade, with worldwide consumption of each rising by around 40 per cent. In 2006–07, oilseeds consumption is forecast to increase by 2 mt to 381 mt.

China is one of the world's largest consumers of oilseeds and oilseed products (vegetable oil and oilseed meal). Increasing incomes and changing dietary habits in China have led to a strong rise in the demand for vegetable oils and oilseed meals.

Despite an assumed slowdown in China's economic growth from 10.1 per cent in 2004 to 9.9 per cent and 8.7 per cent in 2005 and 2006 respectively, the demand for vegetable oils and oilseed meal in China is still forecast to continue to grow strongly.

Consumption of vegetable oil in China (on a per person basis) has doubled since the mid-1990s — rising from around eight kilograms to an estimated 16 kilograms per person in 2005–06. This compares with the US, where vegetable oil consumption has increased by 23 per cent from 30 kilograms to 37 kilograms per person over the same period.

Increased demand for meat and poultry products has also resulted in China's oilseed meal consumption, for use by domestic livestock industries, increasing by an average of 9 per cent a year over the previous 10 years. In 2006–07 it is forecast that the demand for oilseed meal from China's livestock indus-

tries will continue to increase, as the demand for meat and meat based products also continues to rise.

The rapid increase in the demand for oilseed products in China has outstripped rising domestic production and so China is now a significant importer of oilseeds. China's oilseeds imports have risen from under 1 mt in the mid-1990s to around 28 mt in 2005–06, with the major suppliers being the US, Brazil and Argentina.

China's differing tariff rates between oilseeds and oilseed products has also contributed to the rapid increase in the volume of oilseeds imported, particularly soybeans. Soybeans attract a tariff of 3 per cent, for vegetable oils and canola seed the tariff is 9 per cent, and for other unprocessed oilseeds it is 15 per cent.

Importing unprocessed soybeans allows the beans to be processed domestically, and both the oil and meal to be consumed on the domestic market. Investment in crushing capacity has grown rapidly, with the total annual crushing capacity in China increasing to 70 mt in 2005. With around 29 mt actually crushed in 2004, it is evident that significant excess capacity now exists in China.

World grain stocks

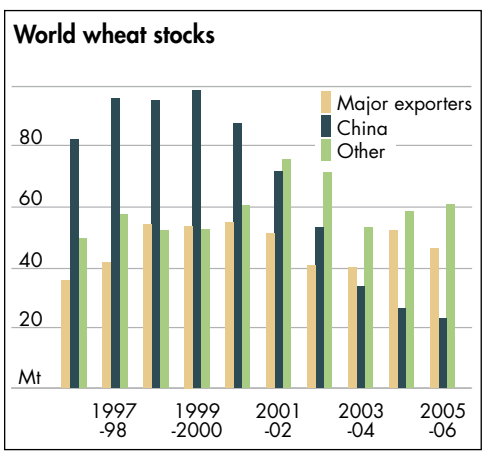
Further falls in worldwide wheat stocks

Worldwide end of season stocks of wheat have declined from around 205 mt in 1999–2000 to an estimated 138 mt in 2005–06. Much of this decline in wheat stocks has resulted from a rundown in stocks held by China. In the mid-1990s, China held approximately half of the world's wheat stocks. In 2005–06, China is estimated to hold less than 20 per cent of world stocks. The share of world stocks held by the major five exporters (Argentina, Australia, Canada, the EU and the US) has increased from 21 per cent in the mid-1990s to 36 per cent in 2005–06.

With China's domestic consumption currently exceeding production by around 15 mt, it is expected that China's wheat stocks, and hence world wheat stocks, will be further reduced in 2006–07.

Coarse grains stocks also reduced

World stocks of coarse grains are forecast to decline by around 5 per cent in 2006–07, adding further support to expectations of higher prices. A large proportion of this decline is expected to come from a fall in corn stocks in China and the US. Feed grain demand in China is forecast to continue to increase, reflecting strong growth in the intensive livestock sector.



China's domestic production of corn is expected to increase marginally in 2006–07, reflecting continued yield improvements. But this is not expected to meet domestic requirements and hence China's stocks are expected to be reduced.

In the US, feed grain demand is expected to remain at record levels in 2006–07. This, combined with increased demand for ethanol, is expected to result in a depletion of US corn stocks.

Australia

Near record harvest in 2005–06

Winter grains and oilseeds production in Australia is estimated to have increased by 15 per cent in 2005–06 to around 40.6 mt, the second largest winter harvest on record.

The 2005–06 winter grains harvest exceeded all expectations for the year. The beginning of the cropping season in the eastern states and South Australia was extremely dry and some

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crops were dry sown. However in mid to late June, season breaking rainfall was received. The late break to the season in these regions provided an opportunity for additional late plantings to occur, particularly for barley.

Barley is less vulnerable to severe changes in seasonal conditions and the optimal planting time for barley extends later in the season than for either canola or wheat. As a result, the area sown to barley is estimated to have increased by 3 per cent in 2005–06. While additional late planting occurred for barley as well as for wheat, there was expected to be some yield penalties associated with late sowing. But conditions at the end of the season were favourable and yields were generally above average.

In Western Australia the early break to the season and favourable growing conditions resulted in an estimated 14 mt harvested in that state, the second largest harvest on record.

In contrast to the outcomes for wheat and barley, the canola crop is estimated to have fallen by around 6 per cent in 2005–06 to 1.4 mt. The dry conditions at the start of the 2005–06 winter cropping season resulted in a significant reduction in the area sown to canola, with the season breaking rains simply coming too late in most areas. But with the improvement in seasonal conditions throughout the 2005–06 growing season, the yields for areas where a crop was established were generally above average.

Prospects for Australia's summer crop production in 2005–06 remain positive, with production forecast to increase by 21 per cent to around 5 mt. This increased production is a reflection of higher plantings and increased yields.

Crop area relatively unchanged in 2006–07

Despite forecast strengthening in Australian grains and oilseeds prices, the total area sown to grains is expected to remain largely unchanged in 2006–07 at around 22 million hectares.

The area of canola planted is likely to recover in 2006.

While the total area sown to grains is likely to remain roughly the same, the cropping mix is expected to change. With the late break to the season in 2005–06, an increased area was sown to barley in place of crops such as canola.

In 2006–07, the area sown to canola is likely to recover, with the areas sown to pulses and wheat also forecast to increase. For barley the area sown is forecast to fall by 2 per cent in 2006–07.

Overall, the production of wheat, barley, canola and pulses are all forecast to decline as yields are expected to return to a level more consistent with recent averages.

Exports and prices increase in 2006–07

Australia is the world's second largest wheat exporter and, with world trade forecast to increase in 2006–07, Australian exports are also forecast to increase. Australia's wheat exports are forecast to increase by 13 per cent in 2006–07 to total nearly 18 mt, the largest volume in the past 10 years.

Indonesia is Australia's largest market for wheat exports. In the past five years exports to Indonesia have accounted for 15 per cent of total Australian wheat exports. Australia supplies over half of Indonesia's total wheat imports, with the other major supplier being Canada.

In Indonesia, rice is the main staple in consumer diets, and bread and other wheat derived foods are considered supplementary or luxury goods. During the past two decades, the consumption of cereals has increased, partially displacing the consumption of root crops, such as cassava and sweet potato, in the national diet.

The tropical climate in Indonesia is not suited for wheat production and so any increase in consumption of wheat based products results in increased import demand. Indonesia's wheat imports have increased from 2 mt in the early 1990s to just below 5 mt in 2005–06. Import demand from Indonesia is expected to continue to grow steadily over the medium term.

World wheat prices are forecast to increase in 2006–07 and,

RUSSIAN FEDERATION OUTLOOK

During much of the 1990s the Russian Federation was a major importer of grains. But by early this century they had re-emerged as an exporter on world grain markets. In 2002–03 (when drought affected some of the major exporting countries) the Russian Federation was the world's third largest wheat exporter.

The Russian Government is committed to increasing grain production by improving access to credit, subsidising crop inputs and offering a machinery leasing fund. However, there are a number of constraints that still have the potential to effect the grains over the medium term. These include insufficient storage and transport infrastructure, the uncertainty of property rights and aging, unproductive farm structures.

Current port facility upgrades are expected to reduce costs and increase the competitiveness of Russian grains on world markets. A grain terminal with a capacity of 3.6 mt a year is under construction in the sea port of Novorossiysk, and is expected to be completed by the end of 2006.

An expansion of grain production in the Russian Federation has also led to increased competition for Australian grain exports into the Middle East. Although wheat quality is generally lower compared with Australian milling wheats, end users are now more willing to purchase lower cost, low quality wheat from a number of sources, rather than rely on one supplier. The grains from different sources are then blended to produce flour of acceptable quality.

In the medium term, growth in Russian wheat exports will depend on government policy decisions, productivity improvements, and increased growth in infrastructure investment.

with an assumed weakening of the Australian dollar, returns to Australian growers will increase further. The pool price for Australian premium white wheat is forecast to rise by 3 per cent to just under $200 a tonne in 2006–07.

Barley exports also increase

Australia's barley exports in 2006–07 are forecast to increase by 3700 tonnes to 5.9 mt. Barley exports include feed and malting barley as well as an estimate of the grain equivalent of malt exports.

Over the past five years, Australia's largest market for malting barley exports has been China, accounting for 65 per cent of shipments. Malting barley is a principal component in beer production and China is currently the world's largest producer and consumer of beer. Annual beer consumption in China increased from 10 litres per person in 1993 to 17 litres per person in 2003. Nevertheless the consumption of beer in China is still well below that of some developed economies.

A key market for Australian grain exports will be China.

For example, beer consumption (on a per person basis) averaged 31 litres in Japan, 82 litres in the US and 92 litres in Australia in 2003. This illustrates the significant potential for future growth in China as incomes continue to rise.

Although China has implemented policies to encourage barley production, these polices are likely to have little impact on import requirements in the short term.

Barley and canola prices increase

In response to a tightening world coarse grains and oilseeds supply–demand balance in 2006–07, Australian prices for these grains are forecast to increase. The Australia feed barley price is forecast to increase by 2 per cent in 2006–07 to $156 a tonne, while the Australian canola price is forecast to increase by 4 per cent to average $348 a tonne.

Medium term outlook

Price trends

World grains and oilseeds prices declined in real terms between 1994–95 and 2000–01, reflecting increasing production relative to demand. Between 2000–01 and 2002–03, prices rose (in real terms), particularly in the case of soybeans, as a result of consumption increases in major consuming and importing countries. Since that time prices have again eased as production worldwide has increased.

Over the medium term, the world supply and demand situation is expected to remain relatively tight across most of the

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grains. But with continued productivity improvements, increases in grains production is expected to more than keep pace with demand growth and hence the longer term declining trend in real prices is expected to continue. However, abrupt changes in production (such as from poor seasonal conditions), particularly among the world's large producers and exporters, are likely to be translated quickly into significant price fluctuations.

World demand

Global wheat consumption is projected to increase by around 2 per cent between 2005–06 and 2010–11. Average global wheat consumption (on a per person basis) peaked at around 108 kilograms in the late 1980s. By 2005–06 this is estimated to have declined to 95 kilograms. Over the medium term this trend is projected to continue, with wheat consumption projected to average around 92 kilograms per person in 2010–11.

Falling wheat consumption per person is not a trend that is consistent across all countries. While it is evident that wheat consumption is falling in most of the major developed country markets, such as the US and the EU, per person consumption of wheat in Indonesia and Brazil has been increasing.

Ethanol a key driver of grain demand

The use of corn in ethanol production will increasingly become an important driver of world corn prices. Biodiesel production in the EU is also becoming an increasingly important end use of oilseeds, such as canola.

Australian medium term outlook

The area sown to grains, oilseeds and pulses in Australia has increased from around 15 million hectares in the early 1990s to just below 22 million hectares in 2005–06. Over the medium term the area sown to grains, oilseeds and pulses is forecast to increase to 24.5 million hectares.

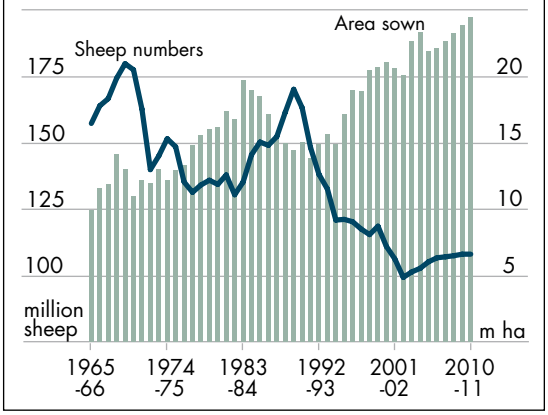
The cropping mix is forecast to remain largely the same over the medium term. Wheat, on average, accounts for 56 per cent of total area sown to crops, followed by coarse grains at 28 per cent, with oilseeds and pulses at six per cent and 10 per cent respectively. The agronomic practices required to obtain high oil content in oilseeds crops is more resource intensive than obtaining high quality cereal crops such as wheat and barley. However, the area sown to oilseeds is forecast to increase over the medium term because of the agronomic benefits of oilseeds in cropping rotations.

Competition for cropping land largely comes from the sheep industry, particularly in the wheat–sheep zone in Australia. Over the past fifteen years the number of sheep in Australia has fallen by 38 per cent from 170 million in the 1990–91 to an estimated 105 million in 2005–06. This decline in sheep numbers has corresponded with an increase in area sown to grains and oilseeds.

Over the medium term, sheep numbers in Australia are projected to increase to 108 million. However, this is still historically a low number. Combined with continued productivity improvements (particularly through innovations in machinery and grain variety), yields are projected to continue increasing over the medium term. Total grains and oilseeds production in Australia is projected to be just below 50 mt in 2010–11.

As world demand for grains and oilseeds continues to increase, Australian exports are forecast to rise. Australian wheat exports are forecast to increase to just under 23 mt in 2010–11, up from around 16 mt in 2005–06. Coarse grains exports are forecast to increase to around 7.5 mt in 2010–11 up from 5.1 mt in 2005–06. ■

Sheep numbers and area sown to crops



EUROPEAN UNION CAP REFORMS

The Common Agricultural Policy (CAP) covers most grain produced by and imported into the EU. As with other commodities, grain support mechanisms include a mixture of price supports and supply controls. CAP reforms have affected grain production mainly by requiring grain farmers to remove a percentage of their arable cropland from production in order to receive direct payments in compensation for reduced price supports.

According to the US Department of Agriculture, the latest reforms represent a degree of flexibility, with each member state having discretion over the timing (from 2005 to 2007) and method of implementation. The 2003 reforms allow for decoupled payments – payments that are not directly linked to production – that vary by commodity. Called single farm payments, these decoupled payments will be based on 2000–02 historical payments and replace the existing compensation payments.

The implementation of the 2003 CAP reform began in 2004 and the single payment scheme will replace most of the previous area payments between 2005 and 2007, depending on each country's implementation date. The gradual introduction of single payment schemes will further reduce production and trade distortions, although the decision about which commodity linked payments to include in the schemes differed widely between EU countries.

Producers adjust to lower support

These policy reforms are expected to affect the mix of grain production in the EU as producers adjust to lower price support. Rye intervention price support was eliminated as a result of the 2003 reforms. Without reform of rye support, accession to the EU of 10 new member states (EU expansion) would have brought large increases in rye output, particularly in Poland, where rye is an important crop. The change in the method of price support will still encourage production, but will reduce the policy based incentive to produce specific crops.

The effects of CAP reform on global markets will ultimately depend on the impacts that the reforms have on EU domestic production and consumption. Overall effects on EU production and consumption from CAP reform are likely to be minimal because support price cuts are limited to minor commodities. Rye will be affected the most, reflecting the removal of support prices. But other crops are also expected to be affected. For example, barley production is expected to increase as rye production becomes less profitable following the elimination of price support.

The effects of reforms on production will also depend on the amount of decoupling of support payments chosen by member states. At least 75 per cent of the arable crop payments will be decoupled.

Ethanol to rev up the grain industry

By Rob Drewitt, Agribusiness Market Development Manager, Suncorp

With southern Queensland's two approved and proceeding grain ethanol distilleries to go on line in the next 12 to 18 months, and distilleries planned for other areas of the national grain-belt, Australian farmers need to position themselves in order to grab a slice of what will be a challenging but profitable market.

Rob Drewitt.

The advent of grain ethanol distilleries will see both direct and indirect benefits to grain producers. Farmers in southern Queensland stand to benefit directly by supplying grain to the Rocky Point and Dalby distilleries or to traders accumulating for those facilities. Indirectly, farms across the eastern seaboard will also benefit from increased domestic sorghum consumption reducing the price fluctuations on feed wheat and barley in the southern markets.

Additionally, the production of distillers grains will provide a source of high protein stockfeed for end users as an alternative to cotton meal or imported soybean meal.

State of the Australian ethanol market

Currently, Australia produces approximately 150 million litres of ethanol per annum. Of this, 40 per cent is hydrous and not suitable for fuel production without further processing, leaving 90 million litres for fuel production. By July 2006 changes at CSR's Sarina-based sugar distillery will allow a further 30 million litres of anhydrous ethanol to enter the Australian market. This will mean that by the end of 2006, a total of 120 million litres will be produced each year, which is approximately 0.6 per cent of Australian petroleum use.

By mid 2007, the production volume from Dalby and the expansion of the Rocky Point distillery is expected to increase total production of fuel grade ethanol to 200 million litres per annum, lifting the ethanol percentage of total petroleum fuel to approximately one per cent (Table 1).

Grain use for ethanol up to 2009 and beyond

Due to the time taken to approve and construct new ethanol plants, it is unlikely that annual production would increase above 200 million litres (from all feedstock sources) before the end of 2009. Small increases in production could be possible if there was any expansion to existing facilities. After deducting the 120 million litres of ethanol produced from sugar and milling waste from the 200 million litres expected to be produced annually, this leaves 80 million litres to be produced from grain ethanol.

To meet this demand, 200,000 tonnes of mainly grain sorghum would need to be produced per annum (as indicated in Table 2).

It is fairly clear that any further expansion in ethanol production past 2009 will come from grain as the feedstock. Fundamental changes in the world sugar market, driven by ethanol moving sugar into an energy stock, will see little scope for Australian sugar mills to divert 'a' or 'b' grade cane juice to ethanol.

To crystal ball for a moment, market forces, and possibly continued high oil prices, could see a further 400 million litres per annum of ethanol coming on line by 2010. Breaking this down into feedstock requirements equates to the tonnages of grain estimated in Table 2.

If the above assumption is correct, this would see the grain ethanol industry consuming 1,315,000 tonnes of grain per annum by 2010. Based on this example, grain consumption for ethanol would be broken down into 600,000 tonnes of sorghum, 375,000 tonnes of wheat and 340,000 tonnes of barley. Taking into account current Australian production these amounts would be manageable. Using the 2005 crop as an example, ethanol would have accounted for approximately 30 per cent of Australia's sorghum crop and four and five per cent respectively of our wheat and barley production.

Pricing sorghum for ethanol – starch is king

To an ethanol distillery starch is king. The higher the grain's starch content, the higher the ethanol yield and the more efficient the production cost for the distillery. For this reason, ethanol distilleries will negotiate a starch-based contract with growers which will attract premiums for supplying grain above a carded rate. For example, a distillery would pay a bonus above the strike price for sorghum.

Australian sorghum consistently has starch levels four – and even eight – per cent higher than the 69 to 70 per cent that is the industry benchmark used by potential distillers to calculate their budgets. This could see distillers paying bonuses of up to $3.60 per tonne for every per cent of starch content above the base figure. Five, even 10 year, supply contracts should encourage growers to chase high starch content in dryland sorghum.

If a grower was delivering 74 per cent starch dryland sorghum, they could achieve a $13.20 per tonne starch bonus, and

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A new biofuels strategy has been launched by the EU with three main aims:

- **To promote biofuels in the EU and also in developing countries;**
- **To prepare for the large-scale use of biofuels by improving their cost-competitiveness and increase research; and,**
- **To support developing countries where biofuel production could stimulate sustainable economic growth.**

The EU produced about 2.4 million tonnes of biofuels in 2004. This was 25 per cent more than in the previous year.

Around 1.2 mt of cereals were used to produce the bioethanol, while 4.1 mt of rapeseed (canola) were used to make the biodiesel.

From International Grains Council

TABLE 1: Projected Australian fuel grade ethanol situation at the end of 2006

Feedstock	Production of anhydrous ethanol
Sugar milling bi-products	90 million litres per annum
Grain (mainly sorghum)	80 million litres per annum
Sugar	30 million litres per annum
Total ethanol production	**200 million litres**

TABLE 2: Grain tonnages required to produce an extra 400 million litres of ethanol

Feedstock	Proportionate grain use (%)	Ethanol produced from grain type (million litres)	Tonnes of grain
Sorghum	40	160	400,000
Barley	30	120	340,000
Wheat	30	120	375,000
	100%	**400**	**1,115,000**

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if they were delivering 78 per cent starch irrigated sorghum, a $26.40 bonus could be expected.

An ethanol distillery willing to pay a starch bonus adds a new dimension for both irrigated and dryland growers when working out gross margins and returns per megalitre of water.

Options for irrigated cotton growers

One of the best ways to overcome the grain supply concerns of the stockfeed grains sector is to expand the industry in a sustainable way. Expansion of the grains ethanol industry opens up an alternative for irrigated cotton growers. Cotton producers switching some of their production to grain would offer distilleries fixed tonnage contracts that would be able to underpin their core feedstock requirements and so mitigate the effects drought would have on grain supply.

The advantage to the cotton grower would also include a profitable break crop, an alternative option in times of low cotton prices and the ability to use sorghum where water availability may not guarantee a successful cotton crop.

Keeping ethanol distilleries viable

For dryland or irrigated grain growers to achieve economic benefit from providing grain to ethanol distilleries there needs to be a common understanding of the issues underpinning an economically viable distillery. These distilleries involve large amounts of capital to build, and construction time can be up to 18 months. In terms of being considered 'bankable', distillery owners need to provide banks with detailed risk management plans covering issues such as:

- Off-take of ethanol; Grain supply; Bi-product off-take; and, Logistic management.

In terms of information relevant to the grains ethanol industry, a bank would be looking for a number of key factors to be covered in respect to grain supply and bi-product removal.

Distillery issues – grain supply

Grain ethanol distilleries typically have limited onsite grain storage capacity and so require daily deliveries of grain rather than receiving larger seasonal volumes. It is important for the distillery to be able to prove to the bank that it has partnered with a grain supplier who has a strong track record. This supplier would also need to be able to demonstrate to the bank that they can source and store grain over a wide geographic area to lower basis risk.

The distillery would need to show that it has a clear and workable strategy which allows risk management tools to be used to reduce price risk. This may be developed internally or provided as part of a package by the grain accumulator.

One strategy may be the use of a starch-based contract system to reward growers willing to commit to fixed tonnage arrangements. Such a strategy maybe a mix of options and or futures based on both the Chicago exchange and on the domestic ASX grain futures market.

The distillery would also need to show that it has a modern and integrated grain receival and quality control system. This would need to be a robust monitoring system that could track all incoming loads. The system could be outsourced to the grain partner or to a third party.

Distillery issues – bi-product off-take

Off-take or sale of the bi-product would preferably be linked to the grain partner, with the wet or dry distillers grains being sold to that partner so they can manage the logistics.

Logistic management is a key factor with a 100 million litre distillery producing wet distillers grain requiring 34 b-double truck movements per day seven days a week.

Having 100 per cent take or pay contracts in place for the sale of bi-products, either direct with an end user or the grain partner, is essential with appropriate penalties in place for non-performance. With wet distillers grains the product may only have a three or four day shelf life in summer. So it must be moved and processed promptly to prevent spoilage and health risks to livestock.

Proving to the financier that the distillery has a price mechanism for the off-take of distillers grains that is linked to the price being paid for feedstock grain, is also desirable. This pricing link allows for up to a 40 per cent natural hedge on grain price. If grain prices rise this link will increase the income received from distillers grains.

The way forward

With Australia's grain ethanol industry close to establishment, it won't be long before we can start using Australian examples instead of adapting and adjusting information from the American corn-based ethanol industry. It is important that the ethanol, grains, lot feeders and intensive animal industries work together to achieve the best outcome for all.

Collaboration on research and development solutions will be required by all industries involved to ensure that the distilleries receive the best possible grain and that the bi-products can be maximised as a valuable feed source. ■

ETHANOL UNDERPINS GRAIN DEMAND

According to the USDA *Corn Market Outlook*, ethanol production in the US is forecast to double by 2011.

The growing demand for ethanol as both a fuel extender and fuel octane enhancer is underpinning strong demand for corn in the US. The International Grains Council, in its January 2006 *Grain Market Report*, indicates that in the 2005–06 marketing year, 40 million tonnes of corn will be processed into ethanol in the US. This will produce over 16 billion litres of ethanol compared with just over 5 billion litres in 1995.

The US Energy Act of 2005 contains a renewable fuels standard requiring increased production of fuel from renewable sources. Eight ethanol plants were built in the US in 2005, bringing the total number to 90. In 2006, 30 more new plants or expansions are currently planned or proposed.

Ethanol production in the US has also increased rapidly since methyl tertiary butyl ether (MTBE), an octane enhancer produced from methyl alcohol, was banned in many states in the US. A federal tax credit for blending, currently 51 cents per US gallon (US13.5 cents a litre), which also encourages the use of ethanol in the US, is expected to be continued over the medium term.

Co-products from the production of ethanol such as feed, meal, oil and distillers grains are also of high value and underpin the profitability of ethanol production. In the process of converting corn to ethanol, starch is removed from the grain. As a result the levels of minerals, vitamins, fat and fibre left in the residual product are higher than for unprocessed corn. These by-products are of value to livestock industries as a feed ration.

All these factors combined are expected to result in ethanol production in the US reaching 28 billion litres by 2012, using around 65 mt of corn. Worldwide, ethanol production using corn is expected to increasingly become a key driver of the corn industry outlook.

Source: ABARE 2006 Grains Outlook

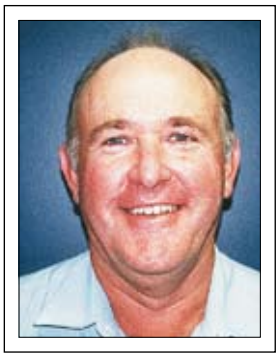
Yankees go home on ethanol

The following is a report from Wayne Newton, a farmer from southern Queensland, detailing a recent study tour looking at US ethanol production and opportunities for Australia's fledgling industry.

In mid-2005 Wayne Newton travelled to the US with fellow AgForce Qld members to study the US ethanol industry.

Bill Elliott from Dalby Bio-refinery helped organise the tour which was also supported by AgForce Grains, Grains Council of Australia and the Grain Research Foundation (Qld).

Bruce Stockman, Executive Officer of the Minnesota Corn Growers Association, was instrumental in introducing the group to all facets of the US industry.



Wayne Newton.

After a highly informative tour, our small group agreed there were some standout messages we could take away from our many meetings with farmers and industry personnel about ethanol in the US:

- The sheer size of the US industry;
- The current (and accelerating) speed of growth in the US;
- The benefit to regional communities;
- The benefits to growers owning ethanol plants;
- The greater supply of feed products to the livestock industries; and,
- The very interesting and encouraging fact that the current annual consumption of feed grain (mainly corn and sorghum) for ethanol in the US (around 40 million tonnes) has already lifted the world price by the equivalent of US$10–20 per tonne.

The other strong message was that a mandate was necessary in many parts of the US to get the ethanol industry off the ground. This was largely about market access. As in Australia, the fuel market is dominated by the big four multinational oil companies. Independent retailers readily took up ethanol blends, but it took mandates of various types to force the large resellers to start making ethanol blends available.

The biggest growth area now is the sale of E85, or 85 per cent ethanol. The US motor industry now produces over 400,000 flex fuel vehicles (FFVs) a year, and these are capable of running on any ethanol–fuel ratio between zero and 85 per cent. E85 sales are booming, especially through the independents.

In mid-2005, E85 was retailing for 45–50 US cents per (US) gallon or 13.5 cents (AUD) per litre less than unleaded petrol.

With the recent rapid rise in fuel prices, these differences are increasing — so much so that people are filling their normal fuel cars with E85 to save money.

In Australia, due to the very effective scare campaign that ran in the fuel market several years ago, the federal government has mandated a maximum of only 10 per cent ethanol in any fuel in Australia.

This means Australians currently cannot benefit from this E85 technology, although some of the same car models that are FFV, are sold here.

What entices US farmers into ethanol?

The biggest driver for US farmers to become directly involved in the fuel ethanol industry is to improve their on-farm returns. Just like in Australia, US grain producers are struggling to battle the on-going cost–price squeeze. On-farm returns are continuing to diminish, and in the mid west of the US in particular, farmers identified a need to become involved in value adding through vertical integration in their industry.

Producers explored many options — pork production, chicken and turkey farming and lot-feeding were all undertaken. But grain-based fuel ethanol has evolved to become by far the most successful and profitable farmer-owned business.

Growers have thought carefully about the structures they operate within, and the way they receive the returns to their farming operations from ethanol plant ownership. Seventy per cent of US production comes from plants owned by farmers. There is a mix of farmer co-operatives and farmer owned LLCs (Limited Liability Companies).

Generally, they pay their grower members a dividend, and buy the grain for the plants at near to market prices. They may have long term contracts with growers, but most plants are moving to use hedging programs to cover most of their inputs and production.

Grower shareholders generally have an obligation to deliver grain, linked to the size of their share holding, but this does vary from plant to plant.

The reason is simple. They don't wish to suddenly get a price that is a lot higher, directly from the grain. Although

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when you add the dividend return value to the grain price, it will often more than double the grain price. If the direct grain prices were to rise, land prices would rise, and more importantly, land rents would rise. Often, over half of the land US growers farm is rented, and high direct grain prices would force up farming rents very quickly.

As ethanol plants succeed, farmers have then looked at more off-farm investment.

Firstly they pour more money back into their ethanol plants, doubling and quadrupling production capacity. Many growers have also now invested in more plants, with several we spoke to having investments in up to seven plants. They typically then start looking at other businesses, such as wind powered electricity generation, soybean crushing plants and bio-diesel plants — a very new technology in the US.

High profitability

Currently, ethanol plant profitability is very high, with many plants paid for in five years. But this was not the case in the 1990s when the industry struck a period of drought affected production, causing grain prices to soar and ethanol prices were in the doldrums. A number of plants did fail. But the ones that succeeded had grower shareholders tied to delivery contracts — and these growers had such significant investment in the plants that it was in their interests to have the plants survive.

Times are ever-changing, and the recent high crude oil prices and flow-on to petrol prices, coupled with low coarse grain prices, has caused an increased demand for fuel ethanol. There is now a flood of major new ethanol plants under construction as US state and federal governments increasingly recognise the importance bio-fuels will play in the future of their communities.

Currently in Australia, there are a number of ethanol plants planned. But for ultimate success – as in the US experience – access to ethanol markets is paramount. Governments must introduce real forms of mandate to force oil companies to take up ethanol blends. ■

Grain-based ethanol plants have become the most profitable investment for mid west US farmers.

The world food balance: Doomsday or payday?

Implications for farmers and agricultural R&D

By Mick Keogh Executive Director, Australian Farm Institute

For wealthy urban consumers living in the major cities of developed countries, the ready availability of cheap, high quality, globally sourced food and fibre products is something that is taken for granted. No matter what the season or time of day, a wide variety of fresh or processed food is easily procured, and clothing made from farm-produced fibre becomes less and less expensive every year.

Mick Keogh.

However, for many of the 80 per cent of the world human population that lives in developing countries, access to food and fibre is somewhat more problematical, and according to the Food and Agriculture Organisation (FAO) of the United Nations, one person in every six in developing countries is undernourished, having a daily dietary intake of less than 2100 calories.

This contrast between developed and developing populations creates a dilemma for farmers and scientists, who both have a vital interest in understanding the state of supply and demand for food and fibre, and most importantly, what direction that future supply and demand might take. The issue is also one of broad interest to the wider community and at its heart addresses the future sustainability of the human race.

Current global food and agriculture assessments

At a very broad aggregate level, FAO statistics reveal that since 1970, global agricultural output per capita has increased by 26 per cent, with the most significant increases occurring in those countries classified as 'developing'.

More specifically, FAO statistics also reveal that world food production per capita (as distinct from 'agricultural production' which includes fibre and livestock feed output) has increased by 27 per cent since 1970.

These statistics highlight reduced or static per capita output for two regions, Africa and Eastern Europe, and the substantial growth in per capita output in Asia and South America since 1970 (Table 1). Also noteworthy is that these are per capita statistics, meaning that gross agricultural output has increased at a much faster rate than is implied by the data, which also incorporates the substantial growth in world population that has occurred since 1970.

While providing a useful stocktake of the current situation, the statistics provide little real information about likely future trends. Of critical importance in making future projections are the likely trajectories of agricultural output and human population growth, both of which have been the subject of considerable research.

There are a number of authoritative projections of the future demand and supply of food that have been carried out by major international research institutions.

FAO projections

Perhaps the most comprehensive research to project the likely future state of food and agriculture has been carried out by the FAO.

World agriculture: Towards 2015–30, provides a comprehensive overview of the state of global food and agriculture, including fisheries and forestry, and provides projections of the likely situation over the next 20 to 30 years.

The FAO explains that the assumptions underlying their projections are considered to be the most likely future outcomes, rather than the most desirable. It also explains that the projections are not necessarily trend extrapolations, but in some cases represent significant deviations from current trends. The main findings of the FAO analysis are summarised in Tables 2 and 3.

- The first point to note is the projected decline in future world human population growth rates. The slowing of world human population growth rates is a trend that has been recorded since peak population growth rates were experienced in the 1960s, although it is rarely mentioned.
- There is an anticipated decline in the rate of growth in demand for agricultural products. By 2015, it is projected that global annual demand growth will have declined to 1.5 per cent per annum – markedly lower than the 2.2 per cent annual growth rates experienced over the last 30 years of the twentieth century.

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PROJECTION FOR WORLD FOOD DEMAND AND SUPPLY

Advances in agricultural research and development (R&D) over the past half century have provided the human race with a significantly enhanced ability to produce food and fibre. Global per capita availability of food is higher at the present time than it has been for many decades, and is projected to further increase. The global rate of growth in food and fibre production is outstripping the rate of growth in demand, and the consequence is a continuation of the historical decline in the real unit value of farm commodities.

Despite the apparent oversupply of food, it is projected that the world's current population of 6.5 billion people will have increased to 9.3 billion by 2050, creating enormous additional demands for food. Whether this means that Australian and international farmers face a world of growing agricultural surpluses or shortages is a vital question, especially in the development of future agricultural R&D programs.

To assist in resolving this quandary, a number of international organisations have developed projections or future scenarios of world food and fibre production and demand. A review of these projections and scenarios provides interesting insights into potential future global developments in agriculture, and at the same time gives some indication of the likely future direction for agricultural R&D.

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- The FAO also projects that there will be a progressive decline in both the proportion, and absolute number of the world's population that will be undernourished. In absolute terms, it is projected that approximately half the number of people will be undernourished in 2030 than is the case at the present time, despite the expected growth in global population.

Why these trends?

A number of significant developments underlie these projections. The first is the observed shift in diets that is occurring as per capita Gross Domestic Product increases, especially in developing countries. As wealth increases, a progressive increase occurs in the proportion of people's daily calorie intake from different sources, including meat, fish, dairy and oilseed products. This has resulted in a lower rate of growth in global demand for cereals, whereas, demand for oilseed crop products has expanded significant significantly over the same period.

Future significant increases in the importance of livestock products in world food supplies are a notable feature of the FAO projections. The analysis highlights that over the last four decades of the twentieth century, per capita meat consumption in developing countries rose by 150 per cent, and per capita consumption of milk and dairy products increased by 60 per cent.

The FAO projects that per capita consumption of livestock products could grow by a further 44 per cent by 2030, with the fastest growth being in poultry consumption.

Developing countries are anticipated to experience a growing deficit in livestock production, which will need to be met by developed country exports.

One final issue considered by the FAO in its projections is the potential impact of global climate change. While there have been some suggestions that climate change will adversely impact on agricultural output, FAO projections indicate that the aggregate global impact, based on current understanding, will be an increase in world crop production potential.

This is because it is suggested the impact of global warming will be increased temperatures in more northern latitudes, allowing an expansion of northern hemisphere cropping areas into regions currently considered too cold.

This projection is in agreement with earlier research by the United States Department of Agriculture (USDA).

USDA projections

The USDA *Food Security Assessment* has a somewhat different approach, in that while it involves projections of future global food availability, the focus is on the nutritional situation of people in the 70 lowest-income nations, in which the bulk of the world's undernourished people live.

The USDA estimates that in 2004 there were just over one billion people worldwide who received less than the recommended level of nutrition – an increase from 830 million people in 2003.

The main factor identified leading to the increase in undernourishment was lower agricultural production in 2004, caused by weather-related factors.

Over the medium term, the USDA noted a significant increase in food availability in some Asian and South American economies, but no clearly discernable trend in the case of the poorer countries of Africa.

These projections differ from FAO projections because they include both food aid and food imports, and rely on assumptions about the future ability of the nations involved to be able to pay for food imports.

The USDA report highlights that for Sub-Saharan Africa, and for most of the other nations included in the analysis, there is more than adequate resource capacity to produce sufficient food now and in the future.

But deficiencies arise due to political instability which disturbs production or distribution of food, and also disrupts economic activity that generates income with which to import food. The increasing incidence of HIV/AIDS is also having a significant impact on food production ability in the region.

The USDA reports that grain yields in Sub-Saharan Africa are the lowest in the world, averaging approximately one third of global averages. This highlights the potential food production capacity that exists in this region, given appropriate infrastructure, education, research and input use.

The report projects that by 2014, the number of people consuming below the threshold nutritional requirement of 2100 calories per day will be 27 per cent less than at present and will number approximately 800 million – despite projected population growth over that period. The biggest reductions in undernourishment are projected to occur in the Asian and Latin American regions.

TABLE 1: World per capita agriculture and food production indices: 2003 (1970=100)

Region	Crops	Livestock	Agriculture	Food
World	123	122.1	126	127.7
Africa	88.5	91.1	89	91.9
Asia	153.4	286.3	178	181.2
Developed countries	115.1	104.6	113	114.2
Developing countries	140.5	214.4	158	161.1
Eastern Europe	102.0	99.7	107	109.2
North America	146.7	109.3	133	134.8
South America	147.7	148.4	151	157.5
Western Europe	121.3	119.2	121	120.7

Source: FAOSTAT 2005

TABLE 2: Future world food supplies – projections and assumptions

	1979-81	1997-99	2015	2030	2050
Population (billion)	4.430	5.900	7.207	8.270	9.322
Population Growth (%)	1.6%	1.5%	1.2%	0.9%	0.6%
	1969-99	**1979-99**	**1989-99**	**1997–2015**	**2015–30**
Demand for farm products: % growth per annum	2.2%	2.1%	2.0%	1.6%	1.4%
Farm production: % growth per annum	2.2%	2.1%	2.0%	1.6%	1.3%

Source: FAO 2005

TABLE 3: Projected GDP growth and undernourishment in developing countries

	1997-99 to 2015 (total)	2015–2030 (total)	1997-99 to 2015 (per capita)	2015–2030 (per capita)
GDP growth (% per annum)	3.5%	3.8%	2.3%	2.9%
	1990-92	**1997-99**	**2015**	**2030**
Undernourishment in developing countries (millions of people)	816	777	610	443

Source: FAO 2005

The general conclusion reached by the USDA is that while food production in these regions will progressively increase, it probably will not occur fast enough to offset increased food demand, and the net food deficit will persist in most regions.

The analysis also highlights that it is not food availability *per se* that is the limiting factor, but poverty which makes food unaffordable for many in these regions.

Implications for farmers and researchers in developed countries

The consensus arising from all these projections is that there is no reason to believe that the world is 'overpopulated' in relation to global potential to produce food and fibre.

Nor does it seem, barring catastrophes, that this is likely to be the case in the foreseeable future – if ever.

Developing nation undernutrition is largely a function of food affordability and access, rather than availability. At the same time, low rates of return for farmers in developed countries are a consequence of high levels of global food supply and food supply potential.

The results of these projections highlight a significant dilemma for farmers in developed countries.

Increased agricultural productivity, new agricultural technologies and freer agricultural trade are likely to result in a continuation of the 100-year decline in the real price of farm products such as grain. But at the same time this will undoubtedly assist in alleviating poverty and hunger amongst developing nation populations.

While farmers in Europe and North America sidestep this dilemma by having large domestic markets to which international access is limited – and by being paid not to produce – this option is not available to export-oriented farm sectors in countries such as Australia where domestic markets are relatively small in comparison with agricultural output.

These projections highlight that despite the remarkable progress that has been made, feeding the world over the next 50 years will still require that global agricultural production grows by an average of 1.5 per cent per annum. And this is a target that will only be achieved through increased global investment in agricultural research and development – we cannot be complacent.

Different R&D needs

What these projections also highlight is the diverging agricultural R&D requirements of farmers in developed and developing countries.

For both the crop and livestock sectors in developing countries, the future R&D emphasis appears likely to be on maximising the quantity of output from minimal inputs, rather than a focus on quality of outputs. Also important will be a need to develop simplified production systems – such as the development of genetically modified (GM) crop varieties that significantly reduce the need for pesticides, and simplify pest management.

A slightly different imperative applies for farmers in developed countries.

While a continuing concentration on maximising output efficiency will be necessary, the focus of R&D will increasingly shift towards the development of crop and livestock products that have unique characteristics, which target the specific desires of wealthier consumers, and for which those consumers are prepared to pay a higher price. The emphasis has already, and will increasingly shift to the quality of produce, rather than quantity.

This is not to suggest that there will no longer be a need for farmers in developed countries to continually strive to maximise efficiency of output. This will be just as necessary as it has been in the past, especially if these farmers are to remain competitive with farmers in developing countries – which are already highly competitive in world markets.

But if all that agricultural R&D delivers is ever-increasing volumes of undifferentiated produce into oversupplied markets, then each increment in production will bring with it a decrease in price, leaving individual farmers in developed countries little better off.

Target consumers who can pay

What it does suggest is that developed country agricultural R&D will need to be increasingly targeted at delivering some additional value or some specific trait, such as a health benefit, that will be valued by developed country and wealthy developing country consumers.

The key market for these products will be those consumers who have sufficient resources to be fussy about the particular food or fibre that they buy, and will be prepared to pay a premium for that particular characteristic.

Public Vs private R&D

This raises the issue of the balance between public and private agricultural R&D investment. Where the development of specific, marketable traits occurs in conjunction with appropriate intellectual property protection systems, it is likely that an increasing proportion of the agricultural R&D investment will be taken up by private, rather than public interests.

This has already happened to a considerable degree in the case of GM crop varieties, and also in the horticultural sector. The role for public sector researchers in these situations has been to work on some of the more fundamental aspects of technologies, and on areas of public-good such as effluent and emission reduction.

This is increasingly likely to be the case in the future, although this is not to suggest there is an opportunity to reduce the overall intensity of agricultural R&D investment in developed countries. The increasing competition posed by agricultural progress in developing countries suggests that agricultural R&D intensity in developed countries will need to increase in order for those farmers to remain competitive and profitable.

Production of animal protein appears likely to be relatively more important in the future for farmers in developed countries. Rising incomes in developing countries (where 80 per cent of the world's population live) will lead to demand for more diversified diets, and an increasing per capita demand for animal protein that will need to be met through imports from developed countries.

Evidence over recent years indicates this new demand is much more likely to be for pork, poultry and aquaculture products rather than beef or sheepmeats.

And the supply is also likely to be from intensive production enterprises rather than broadacre farms.

Farmers in developed nations have available both the technology and the technical support that will enable these products to be produced in higher-input, more complex farming systems.

The ability to segregate and validate the characteristics of this produce will become increasingly important, as will the

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need to integrate farm production systems with downstream marketing and processing organisations.

Specific rather than generic

In many respects, farming systems within developed countries will need to become more closely focussed on the desires of specific markets, rather than on the efficient production of bulk commodities destined for undifferentiated markets.

This implies that the agricultural R&D providers for these farmers will also need to be much more integrated into marketing and processing systems to ensure that they are able to meet these changing needs.

Over-supply is the concern

The doomsday scenarios concerning the sustainability of the human population – that have been regularly proposed since the times of Thomas Malthus – seem even more incorrect at the present time, when agricultural over-production is a much bigger problem for governments of developed nations than undernourishment.

Despite this, future world population growth will necessitate further increases in global agricultural output, and agricultural R&D will continue to be a key element in ensuring this can occur.

In an era of over-supply for farmers in developed countries, the ability to supply products that cater to the more specialised market needs of wealthy consumers will become an important element in future farm profitability.

This will require developed country agricultural R&D providers to become more closely enmeshed with marketing chains to better understand the desires of consumers.

This is likely to result in publicly-funded R&D becoming more focussed on fundamental research, while the private sector pursues developments which, through the application of intellectual property rights protection, will generate a return on investment.

Mick Keogh has worked as a farm manager and agricultural management consultant and for 10 years was a senior policy manager with the NSW Farmers' Association. Mick was appointed as the Executive Director of the Australian Farm Institute in December 2003.

For more information on agricultural R&D policy direction, see the *Farm Policy Journal* published by the Australian Farm Institute. Ph: 02 96901388; Web: www.farminstitute.org.au ■

Private grain R&D model in public eye

By Bruce Piper, Chair of the Council of Grain Grower Organisations

Australia's $9 billion grain industry might never be this strong again, according to alarming predictions about dwindling productivity. After returning from Brazil, I can confirm recent reports that South America's developing agricultural sector is one of many that could overtake Australia.

Agricultural think-tank, Australian Farm Institute (AFI), has suggested that agricultural R&D investment in China and Brazil was outstripping Australia and it seems there could be lean times for productivity unless Australian growers take more initiative and privately fund some R&D (see previous article).

AFI noted that agricultural corporations are investing most of their R&D money in big developing economies such as China and Brazil, rather than Australia. With that avenue gone, we're relying too heavily on public research, but the AFI report notes this investment has stayed steady for 15 years, due to the changing face of R&D.

COGGO Chairman, Bruce Piper pictured on his Bindi Bindi farm, WA.

Intellectual property

The plateau in public investment is not just an Australian phenomenon, but a global trend caused, in part, by the complex issues surrounding intellectual property. For example, New Zealand research institutes have recognised diminishing public funds and are angling for more corporate funds through structural change.

According to the AFI there is more invested in agricultural R&D among the world's developing nations than among developed economies.

An outstanding history of agricultural R&D means Australian productivity is in good shape for now, but the impact of investment downturn will be felt in five to 10 years.

With R&D outcomes generally following the initial investment by about eight years, damage is slow to manifest. Growers can't afford to be complacent or wait for external solutions.

Public investment, via the Grains Research and Development Corporation, has underpinned a crucial three per cent per annum increase in grain productivity, but state and federal monies rightly target broader, rather than regional, research needs.

Can't wait for the R&D sugar-daddy

Commercial companies won't invest heavily in Australia until big soybean and maize markets in developing economies are exhausted – meaning we can't wait on a multinational 'sugar-daddy'.

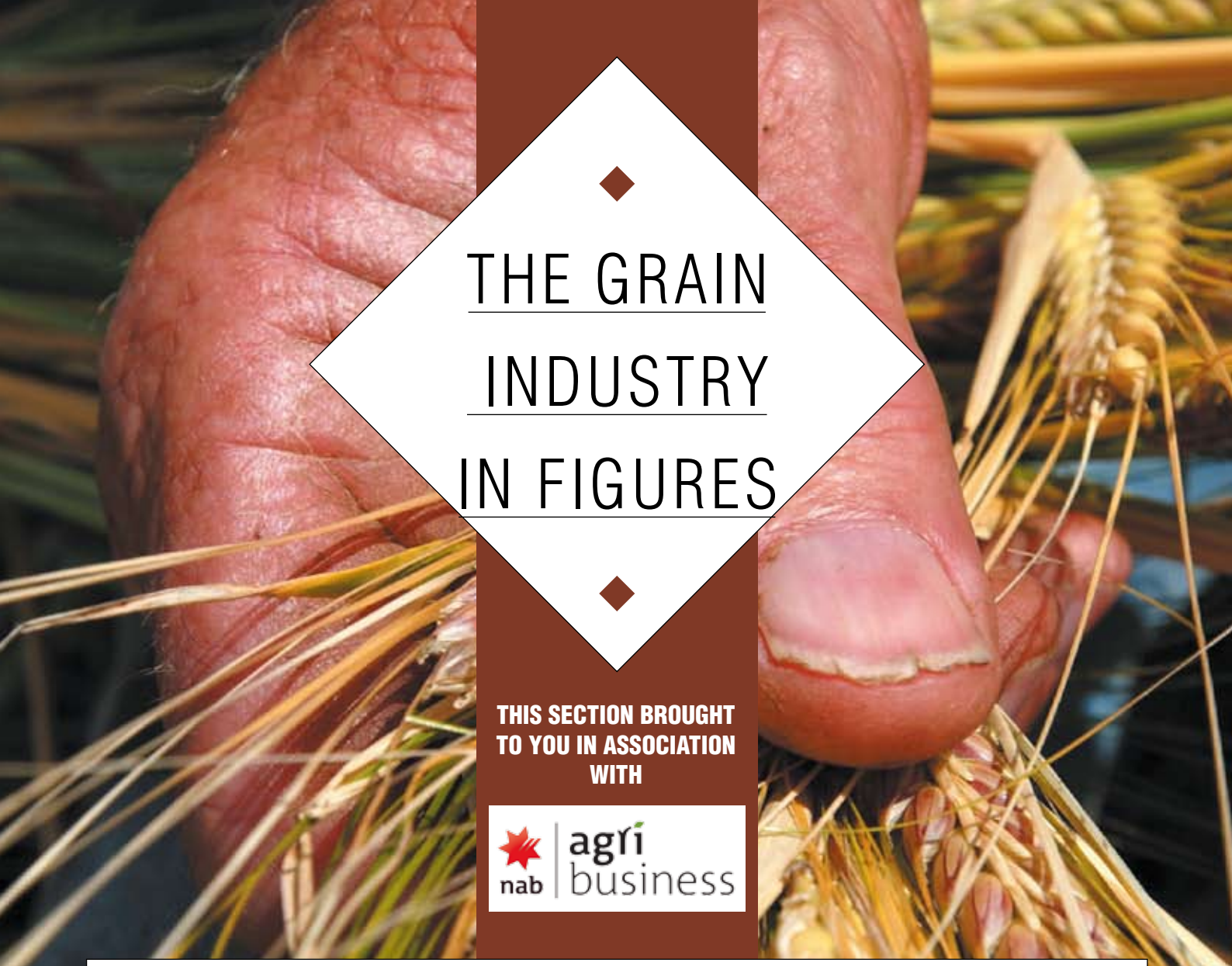
In WA, about half the state's grain growers already contribute a voluntary levy to R&D through COGGO, but that means a couple of thousand aren't pro-actively choosing to invest.

COGGO is a company, which means besides our own input, it can also form commercial research partnerships with Government to leverage extra public monies. And those public monies accessed through commercial partnerships can be developed into valuable intellectual property that can deliver a dividend to grower shareholders through royalties on new varieties.

But more importantly, COGGO invests local money into local challenges to build new industries, fortify existing industries and resurrect old ones with unfulfilled potential.

For example, COGGO commercialised an ascochyta blight resistant kabuli chickpea in 2005 that is expected to see the $700 per tonne WA crop spread across 30,000 hectares. Meanwhile, COGGO-affiliated companies have developed one of the WA south coast's most prolific wheat varieties, *GBA Sapphire*, and during the past two years, released four new canola varieties, with more in the pipeline.

Growers wanting to know more about COGGO and its private investment program should contact COGGO CEO, Geoff Smith Ph: 08 9363 3400 or see: www.coggo.net.au ■



THE GRAIN INDUSTRY IN FIGURES

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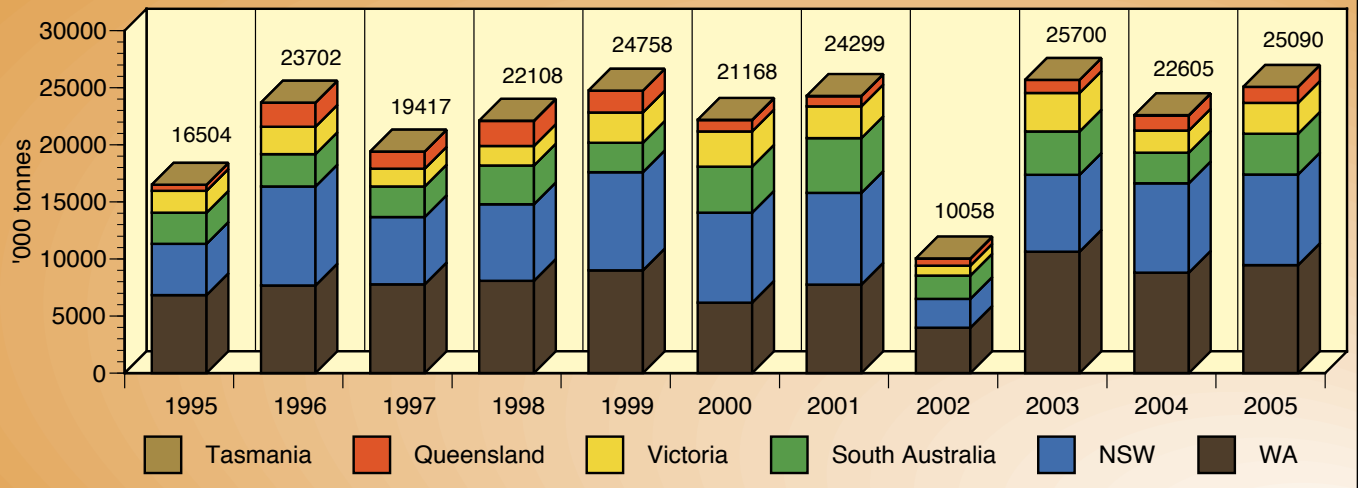
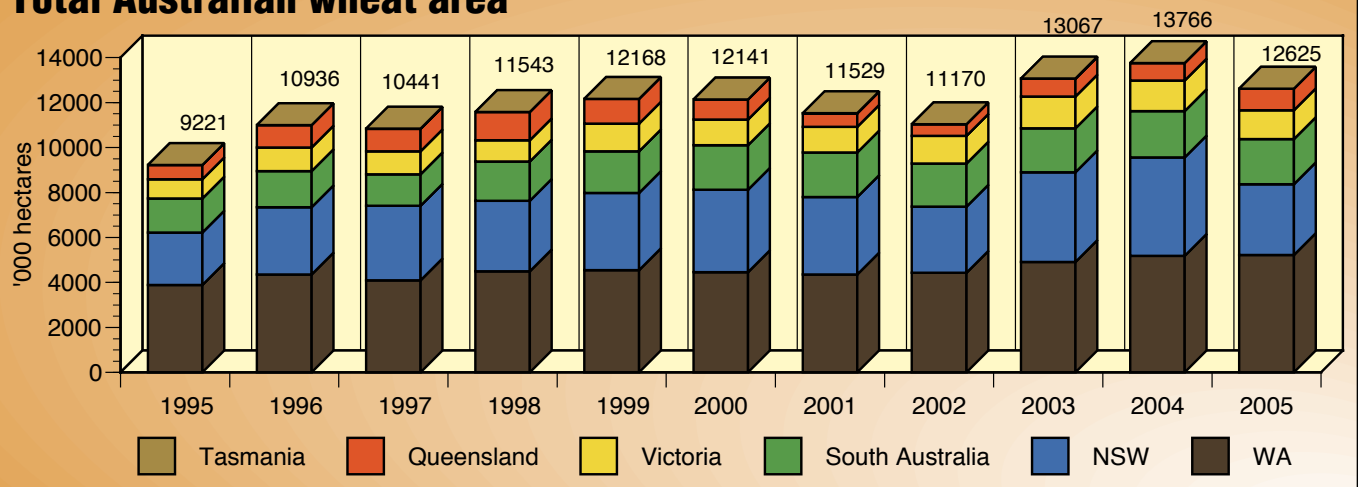
CONTENTS

All figures and tables presented in this Yearbook have been derived from a combination of ABARE, ABS, International Grains Council, AWB and USDA sources. The crop year listed in figures and tables is the year in which the crop was planted.
2005 Australian summer crop figures are therefore forecasts for the harvest during 2006. (Mt = 1,000,000 tonnes) (Kt = 1000 tonnes)

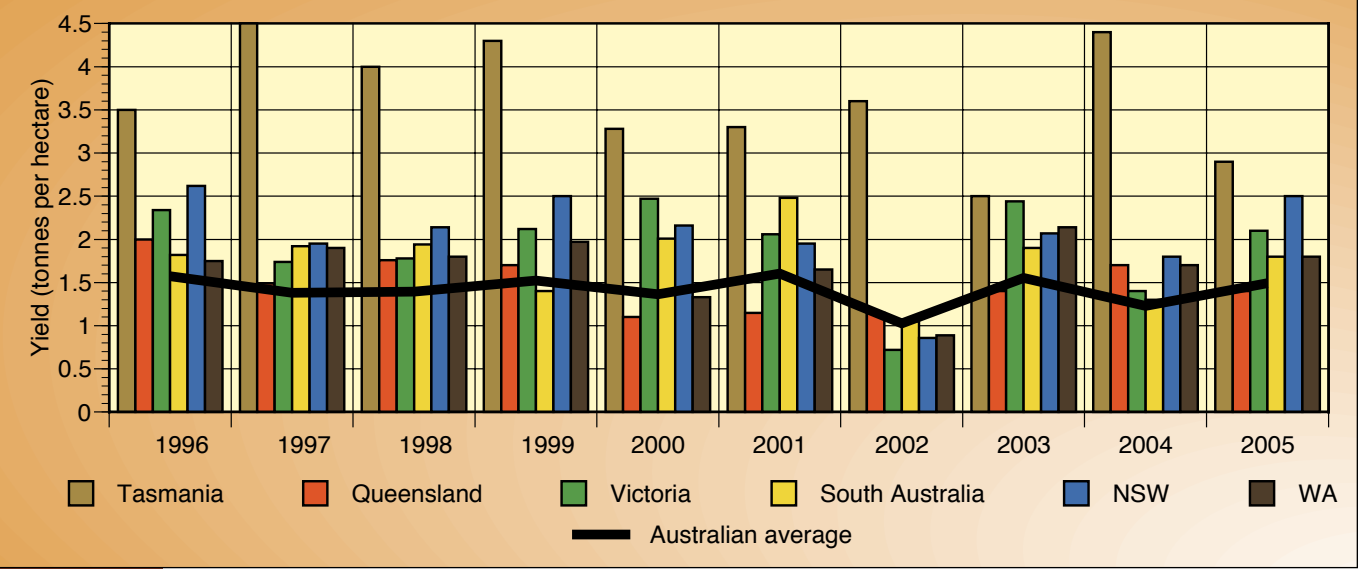
Australian wheat production



Total Australian wheat area



Average Australian wheat yields by state



Australian wheat production, domestic disposal and exports [kt]

	2001	2002	2003	2004	2005
Opening stocks	4483	7501	2860	6049	6518
Production	24299	10132	26132	22605	25090
Availability	28712	17633	28992	28654	31608
Domestic use	4894	5666	5076	7461	6465
Food/Industrial	2291	2378	2351	2361	2375
Feed	2100	2700	2185	2338	2548
Seed	503	588	540	514	519
EXPORTS					
Wheat (unprep.)	16317	9107	17867	14675	16100
MAJOR DESTINATIONS					
China	na	46	387	1893	na
Japan	1195	1134	1250	1171	na
Korea, Rep. of	953	1014	1065	1213	na
Malaysia	682	370	737	888	na
Thail and	285	291	422	478	na
Indonesia	2097	1686	2647	2720	na
Egypt	1680	602	2534	752	na
Iran	2420	1064	0	0	na
Iraq	2245	1037	1111	1550	na
United Arab Emirates	226	142	196	241	na
Yemen	450	412	198	314	na
Kuwait	230	175	259	305	na
Pakistan	0	9	140	653	na
Oceania (NZ, Fiji, PNG)	415	558	535	607	na
CLOSING STOCKS	7501	2860	6049	6518	9043

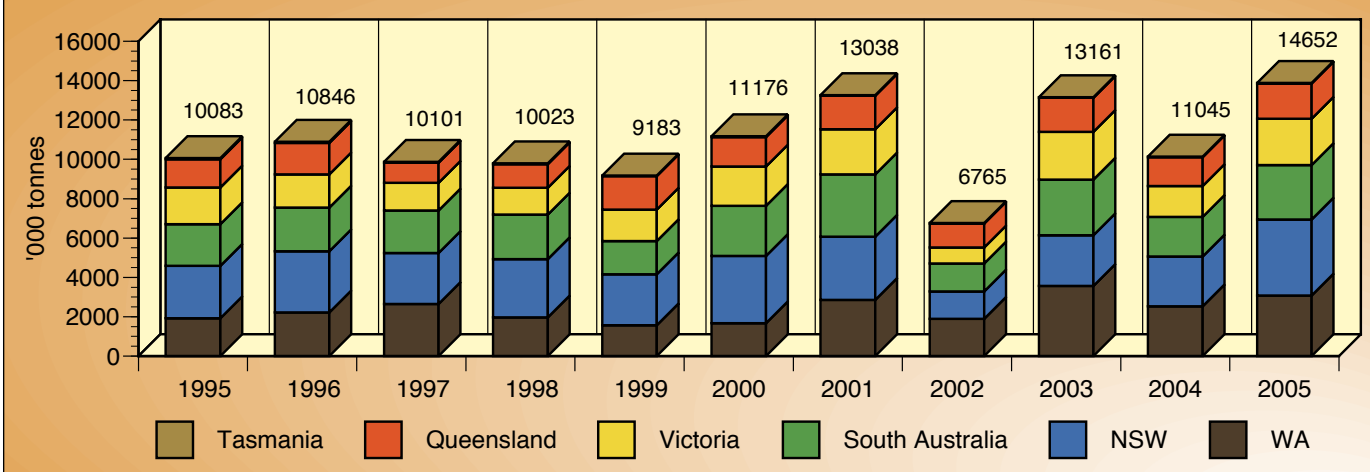
Wheat production & area by state

		2001	2002	2003	2004	2005
NSW:	Prod. (Kt)	8043	2497	6730	7835	7921
	Area ('000 ha)	3446	2996	3250	4370	3145
Vic:	Prod. (Kt)	2791	890	3350	1943	2705
	Area ('000 ha)	1136	1239	1370	1355	1276
Qld:	Prod. (Kt)	901	601	1150	1308	1385
	Area ('000 ha)	604	514	805	777	958
WA:	Prod. (Kt)	7760	4047	10650	8797	9478
	Area ('000 ha)	4350	4458	4970	5188	5221
SA:	Prod. (Kt)	4778	2072	3800	2688	3578
	Area ('000 ha)	1987	1957	1998	2067	2017
Tas:	Prod. (Kt)	25	25	20	31	23
	Area ('000 ha)	6	7	8	7	8

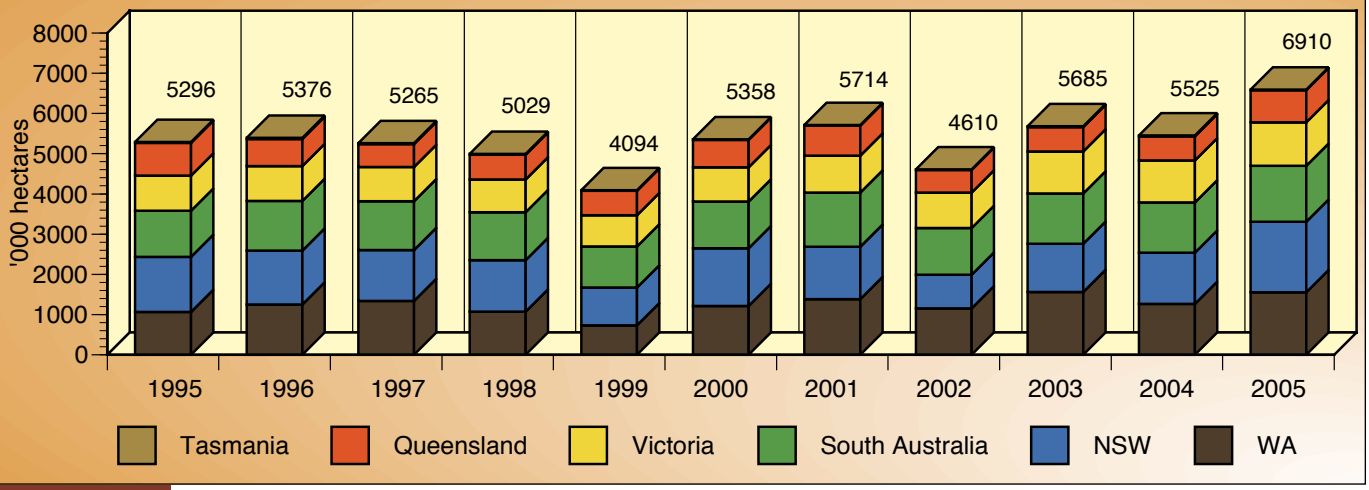
Barley production & area by state

		2001	2002	2003	2004	2005
NSW:	Prod. (Kt)	1389	428	1243	1711	2245
	Area ('000 ha)	659	636	610	1000	1015
Vic:	Prod. (Kt)	1692	478	1750	1275	2059
	Area ('000 ha)	707	778	740	907	937
Qld:	Prod. (Kt)	184	148	215	195	259
	Area ('000 ha)	96	108	127	107	156
WA:	Prod. (Kt)	2243	1349	2950	2478	2598
	Area ('000 ha)	1074	1140	1240	1289	1303
SA:	Prod. (Kt)	2891	1440	2550	2018	2685
	Area ('000 ha)	1181	1194	1070	1304	1317
Tas:	Prod. (Kt)	25	21	20	30	23
	Area ('000 ha)	7	8	13	8	11

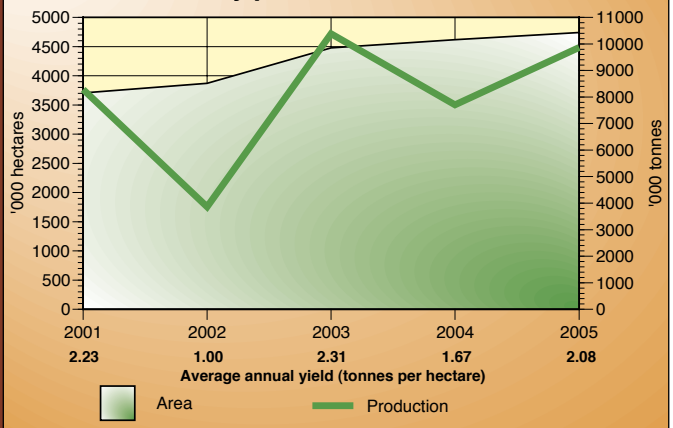
Australian coarse grain production



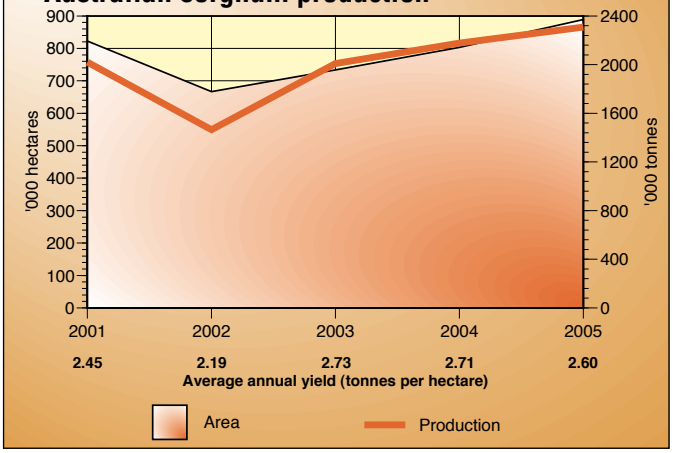
Total Australian coarse grains area



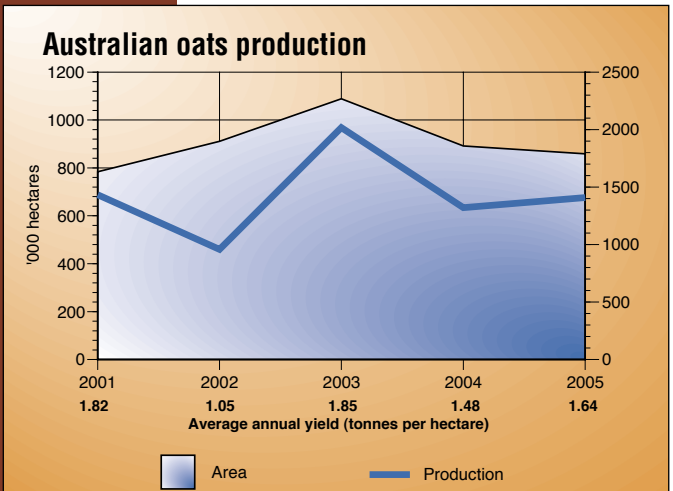
Australian barley production



Australian sorghum production



Australian oats production



SECTION 2

THE GRAIN INDUSTRY IN FIGURES

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Supply and disposal of Australian coarse grains [Kt]

	2001	2002	2003	2004	2005
BARLEY					
Production	8280	3865	10382	7708	9869
Domestic use	2535	2016	2476	2685	2690
Exports	5274	2608	6996	4862	5881
OATS					
Production	1434	957	2018	1321	1408
Domestic use	1244	836	1808	918	1009
Exports	190	121	210	138	211
SORGHUM					
Production	2021	1465	2009	2177	2308
Domestic use	1646	1401	1386	1436	1598
Exports	375	64	623	308	405
MAIZE					
Production	454	310	395	312	391
Domestic use	440	294	385	302	388
Exports	63	16	10	18	10
TRITICALE					
Production	860	327	826	615	676
Domestic use	860	327	826	615	675
TOTAL (production)	13049	6924	15630	12133	14652

Are you serious about agribusiness?

We are

Same service. Different logo

You may have noticed we now have a different look. But that's the only thing that's changed about NAB Agribusiness. Our commitment to rural Australia remains the same.

Your own Agribusiness Manager

Every one of our customers is assigned a dedicated Agribusiness Manager whose job it is to help develop a financial plan to suit your specific needs.

Loans approved on the spot

All of our Agribusiness Managers have the authority to approve loans on the spot.[1]

Agricultural-specific products

We have a range of agricultural-specific products, which allows us to offer our customers choice and flexibility.

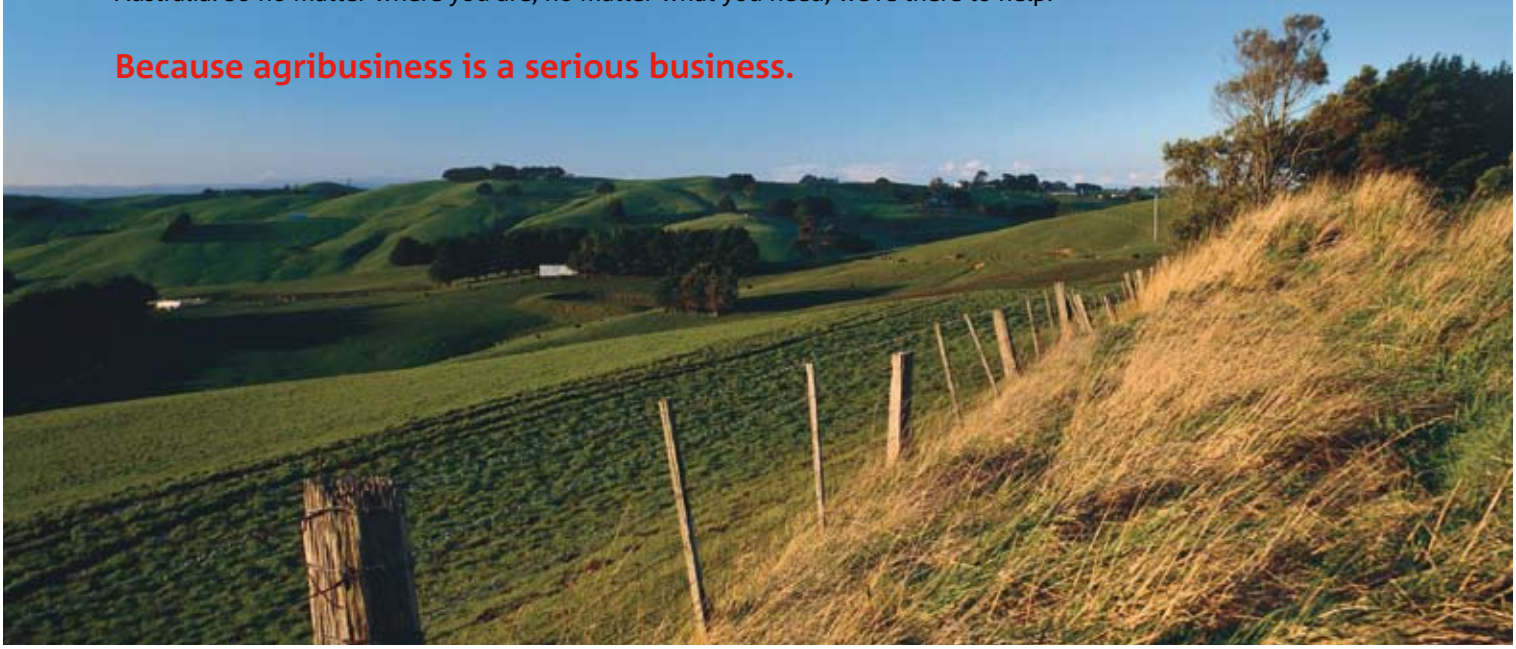
Trade, Risk Management and Wealth Management specialists too

The NAB Agribusiness team also includes specialists to help you with your trade requirements, risk management and wealth management plans.

We're there to help

We employ more agribusiness specialists in more locations than any other bank in Australia. So no matter where you are, no matter what you need, we're there to help.

Because agribusiness is a serious business.



1 The NAB's credit assessment criteria apply. Approval may be subject to our standard checks.

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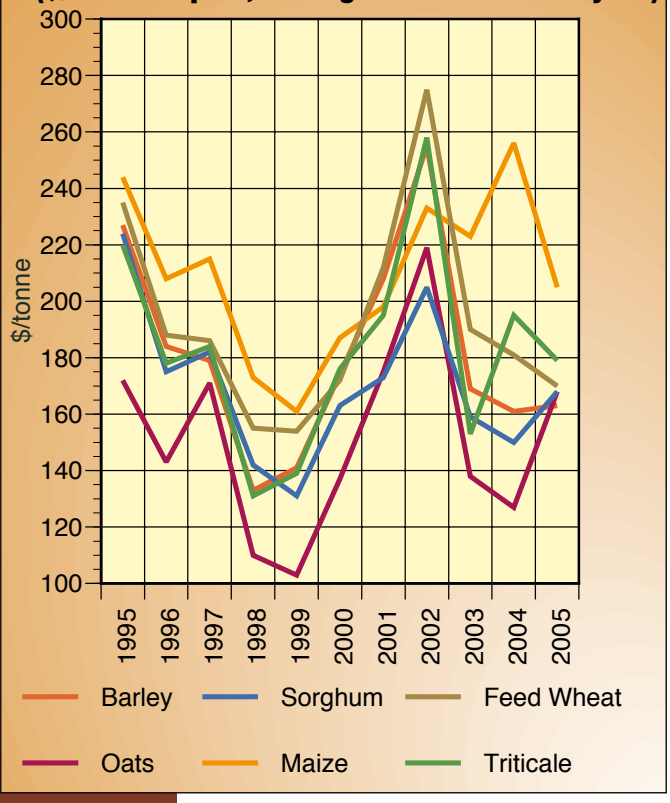
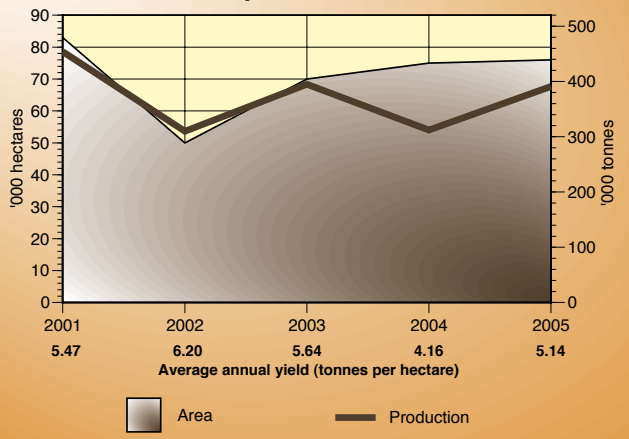
Australian coarse grains domestic feed prices ($/tonne at port, averaged over financial year)



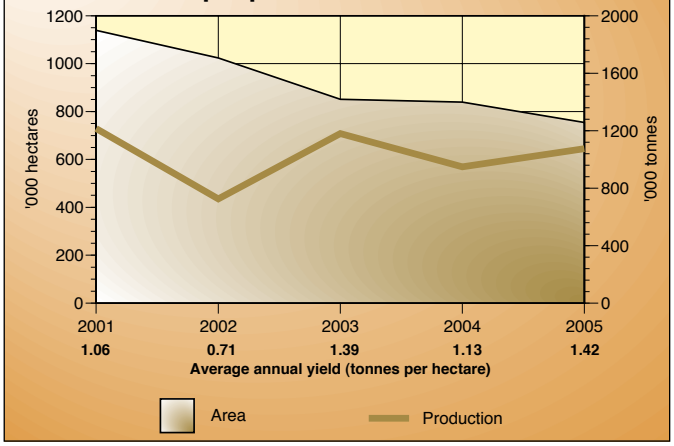
Supply and disposal of Australian pulses (Kt)

	2001	2002	2003	2004	2005
LUPINS					
Production	1215	726	1180	948	1057
Domestic use	599	750	468	591	601
Exports	416	175	712	293	411
FIELD PEAS					
Production	512	178	487	321	438
Domestic use	87	85	89	115	136
Exports	428	96	221	115	235
CHICKPEAS					
Production	258	136	178	116	116
Domestic use	13	13	9	9	12
Exports	272	113	190	152	123

Australian maize production

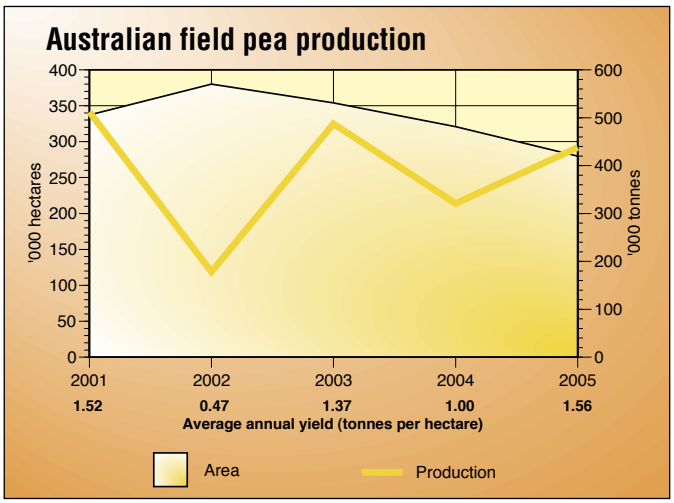


Australian lupin production



Australian triticale production

Australian field pea production



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THE GRAIN INDUSTRY IN FIGURES

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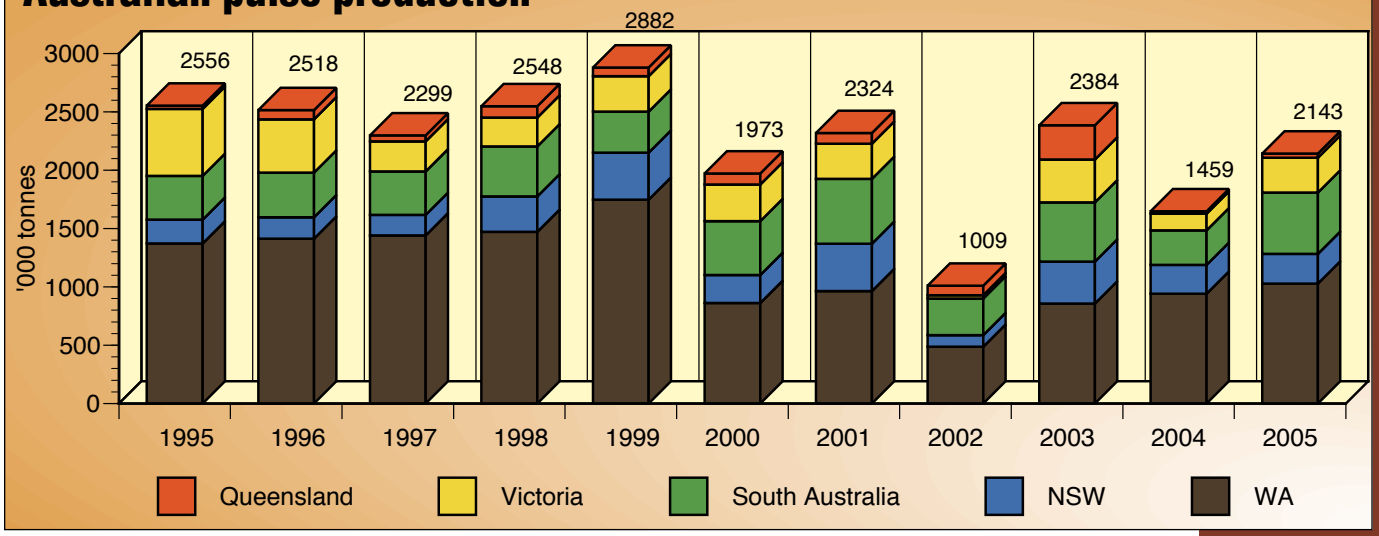
Australian pulse production



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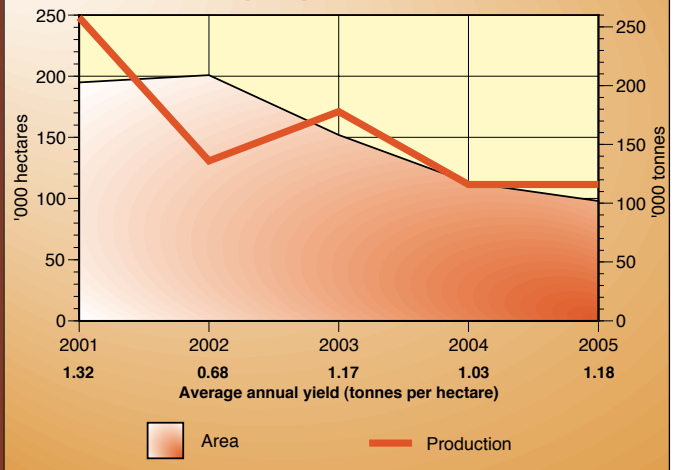
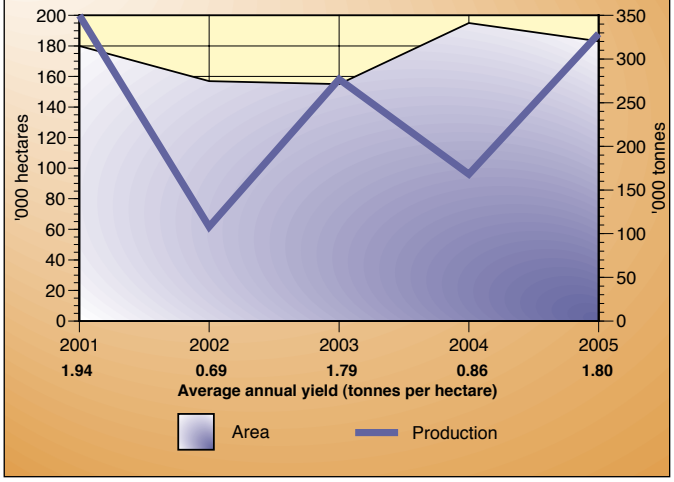
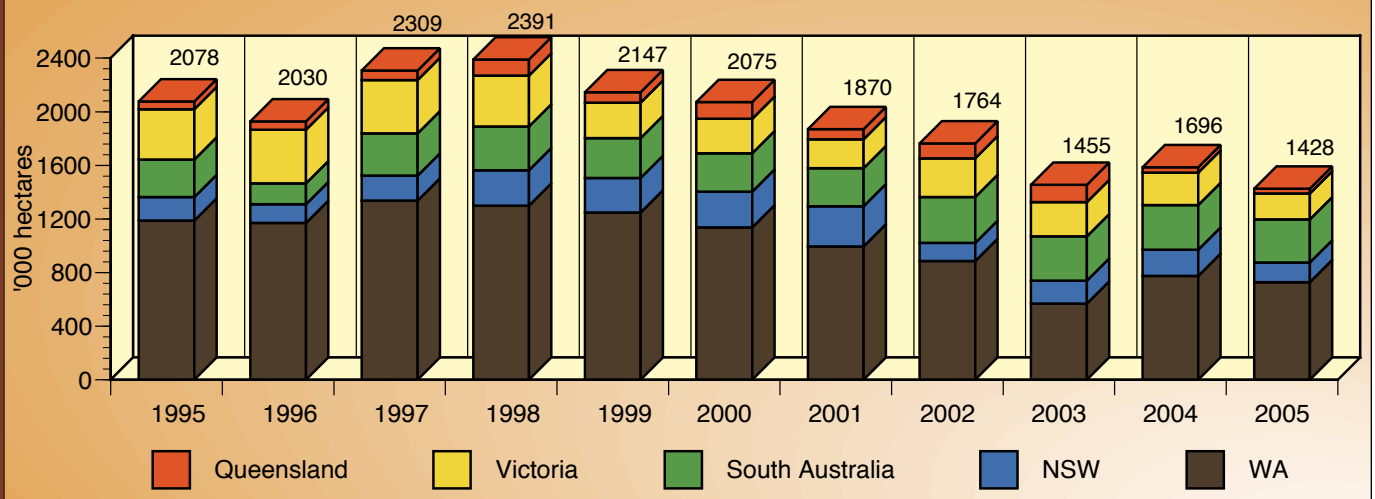
Australian chickpea production



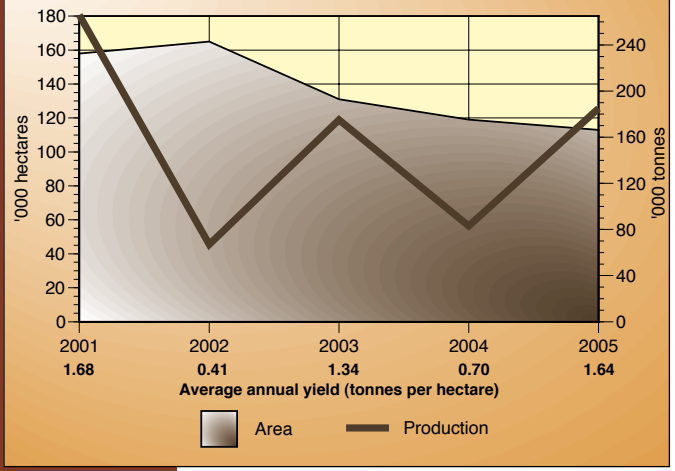
Australian faba bean production



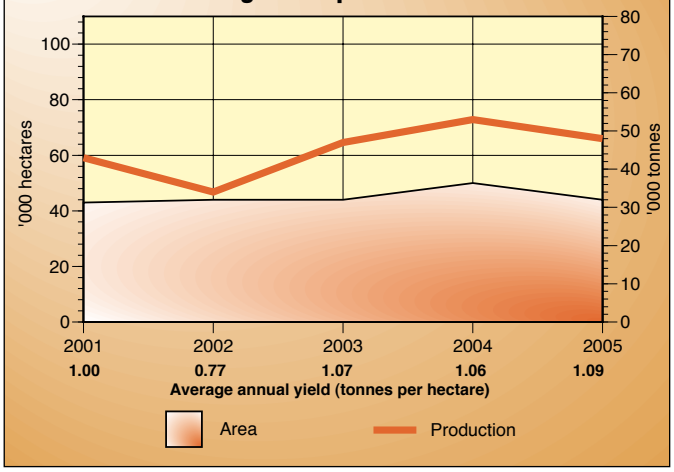
Total Australian pulse area



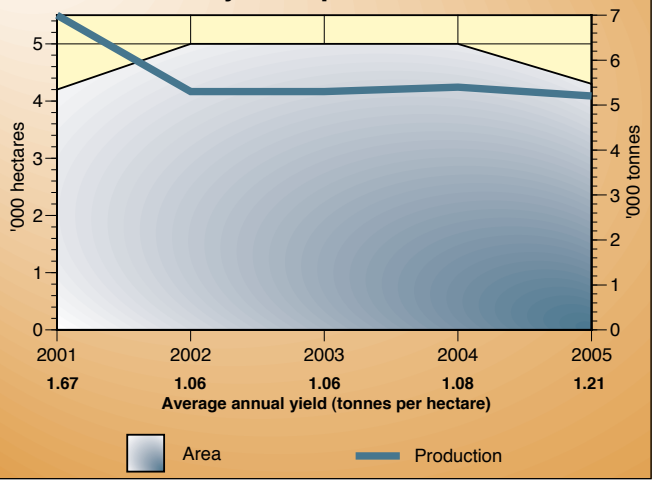
Australian lentil production



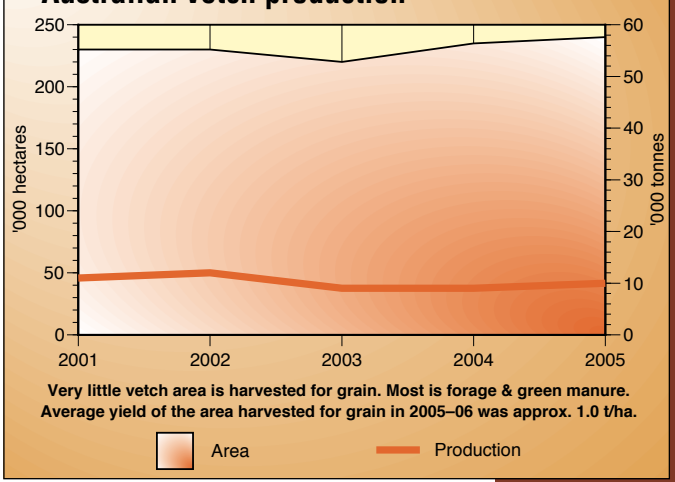
Australian mung bean production



Australian navy bean production

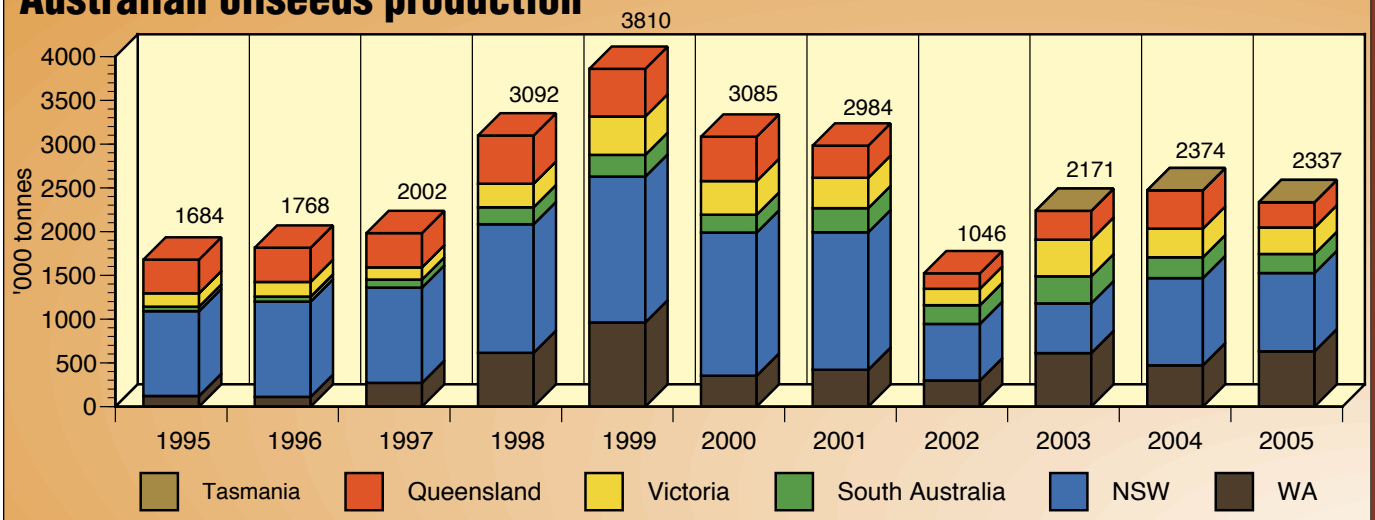


Australian vetch production

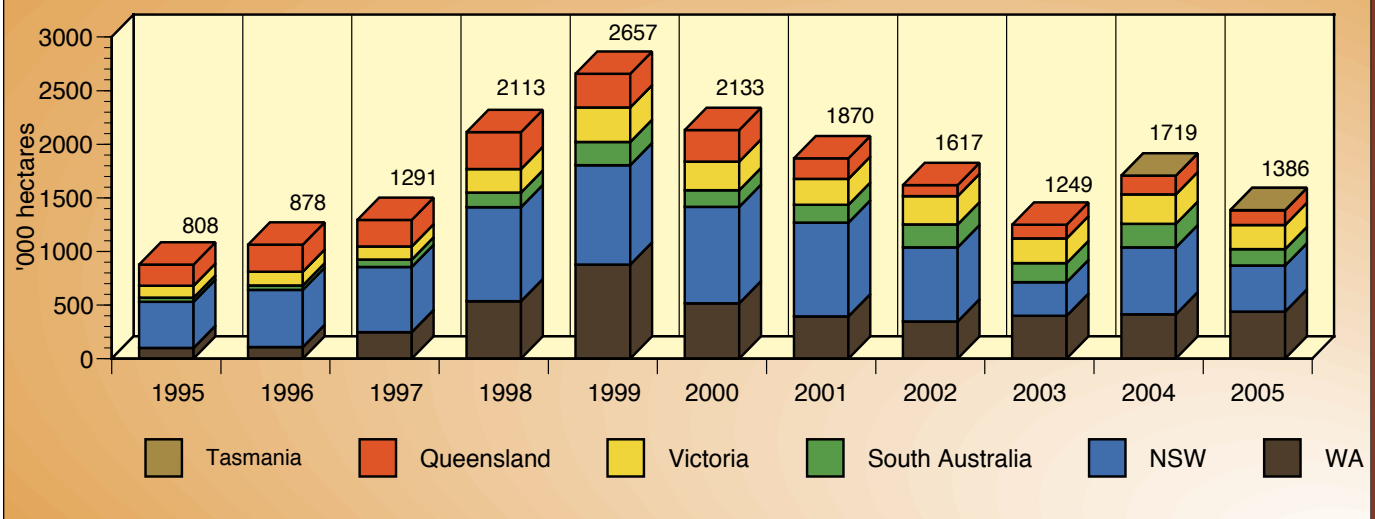


Very little vetch area is harvested for grain. Most is forage & green manure. Average yield of the area harvested for grain in 2005–06 was approx. 1.0 t/ha.

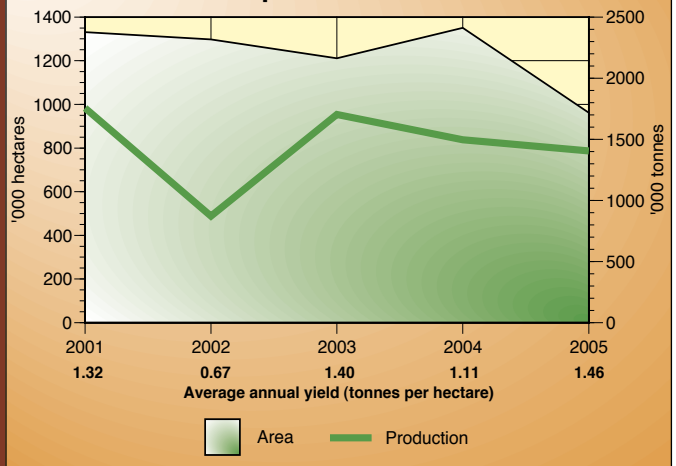
Australian oilseeds production



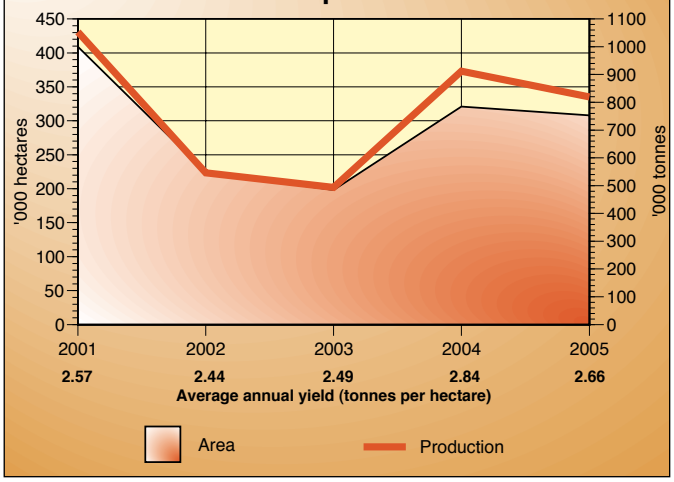
Total Australian oilseeds area



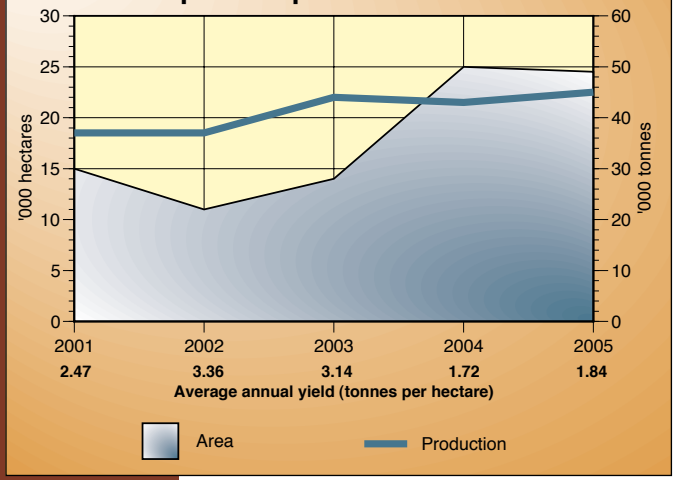
Australian canola production



Australian cottonseed production



Australian peanuts production

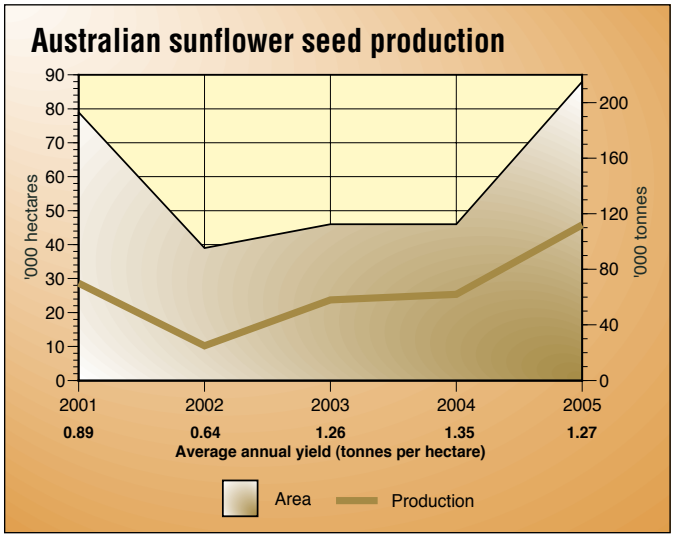


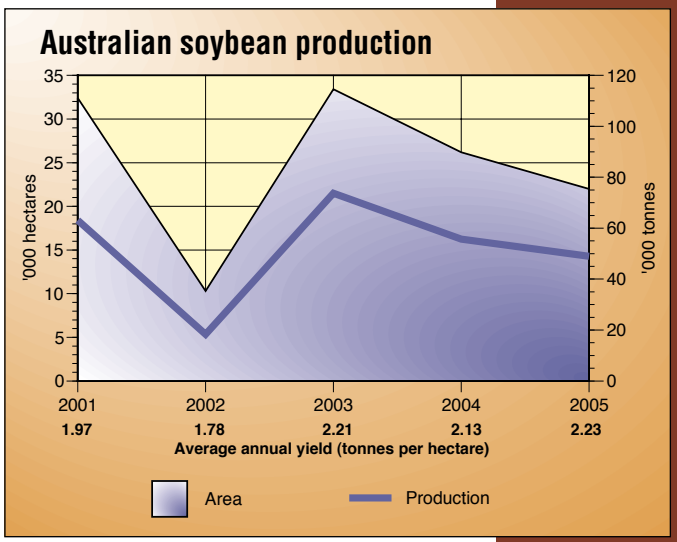
Australian canola production, domestic use, seed and oil exports (Kt)

	2001	2002	2003	2004	2005
Seed production	1756	871	1622	1496	1405
DOMESTIC USE	399	354	501	422	404
Crushers	393	349	495	418	399
Seed	6	5	6	5	5
EXPORTS					
Seed	1303	612	1049	1019	861
Oil	28	31	47	47	na

Australian exports of oilseeds, vegetable oils and meals, by type [Kt]

		2000	2001	2002	2003	2004	2005
OILSEEDS	**Canola**	1392.00	1303.00	612.00	1049.00	1019.00	861.00
	Cottonseed	657.00	594.00	259.00	167.00	214.00	293.00
	Linseed	0.01	0.03	0.03	0.02	0.21	na
	Peanuts	2.81	5.10	3.53	10.18	12.27	na
	Safflowerseed	13.62	10.36	2.77	3.62	5.63	na
	Soybeans	11.26	5.42	7.22	3.55	6.88	na
	Sunflowerseed	24.81	1.98	2.25	1.37	3.13	na
	Total	**2189.43**	**1919.62**	**886.67**	**1234.08**	**1261.04**	**1185.00**
OILS	**Canola**	28.05	31.31	31.38	46.91	47.19	na
	Cottonseed	0.64	2.49	2.05	1.98	2.19	na
	Linseed	0.00	0.30	0.01	0.02	0.01	na
	Peanut	0.16	0.59	0.12	0.52	0.25	na
	Safflowerseed	0.07	0.13	0.00	0.00	0.02	na
	Soybeans	3.15	2.21	1.43	1.74	0.16	na
	Sunflowerseed	6.34	4.73	4.26	1.06	3.52	na
	Olive	0.33	0.31	0.14	0.30	0.63	na
	Total	**41.82**	**49.55**	**51.36**	**62.43**	**62.91**	**na**
OILSEED MEALS	**Canola**	1.73	0.00	0.00	0.00	0.00	na
	Cottonseed & Sunflowerseed	59.71	31.92	9.15	10.15	6.42	na
	Soybeans	2.47	1.78	1.54	2.82	7.90	na
	Other	8.32	1.80	1.38	1.17	5.61	na
	Total	**72.22**	**36.24**	**12.27**	**14.13**	**19.95**	**na**





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Australian grain prices ($A/tonne delivered principal market/port; averaged across all grades, averaged over calendar year)

	1998	1999	2000	2001	2002	2003	2004	2005
Wheat	178	187	232	262	266	216	191	220
Barley	133	141	199	208	255	169	161	163
Oats	110	103	132	175	219	138	127	168
Triticale	131	139	150	195	258	153	195	179
Maize	173	161	188	198	233	223	256	205
Sorghum	142	131	144	173	205	159	150	168
Rice (Rice Marketing Board)	213	233	213	274	348	325	297	332
Lupins	156	145	205	250	292	236	202	190
Field peas	290	297	205	288	344	232	212	202
Chickpeas (export)	384	357	380	540	518	455	450	451
Sunflowerseed (at crusher)	260	334	360	390	400	349	341	328
Soybeans (at crusher)	331	370	377	353	384	365	283	272
Cottonseed	200	219	190	230	240	260	230	195
Canola	351	288	307	384	389	403	327	324

Gross value of Australian grain production ($A million)

	1998	1999	2000	2001	2002	2003	2004	2005
Wheat	3935	4831	5130	6356	2692	5636	4320	5525
Barley	836	865	1344	1725	984	1750	1240	1607
Oats	157	118	138	251	210	279	167	236
Triticale	85	96	126	168	84	126	120	121
Maize	61	62	65	90	72	88	80	80
Sorghum	282	260	279	349	300	319	328	389
Rice	296	289	350	327	153	180	96	333
Lupins	265	286	217	304	212	278	191	204
Field peas	86	106	100	147	61	113	68	88
Chickpeas	64	78	75	130	65	58	36	40
Canola	593	699	545	675	339	686	490	455
Sunflowerseed	54	49	28	27	10	20	21	37
Soybeans	36	41	18	22	7	27	16	13
Cottonseed	204	215	205	225	102	76	149	160
Peanuts, linseed, safflower seed	57	46	33	23	39	44	49	49
TOTAL	**7011**	**8041**	**8653**	**10819**	**5330**	**9680**	**7371**	**9337**

Value of major Australian grain exports ($A million, fob)

	1998	1999	2000	2001	2002	2003	2004	2005
Wheat (incl. flour)	3467	3481	4197	4612	3109	3475	3488	3483
Barley (incl. malt)	877	822	1101	1278	954	1239	1274	1023
Oats	38	27	22	37	66	66	36	33
Sorghum	46	81	122	109	17	61	96	51
Rice	417	386	369	354	371	145	171	163
Lupins	171	240	166	109	57	148	89	56
Field peas + Cow peas	63	90	112	157	43	56	33	69
Chickpeas	50	101	113	167	52	71	65	77
Cottonseed	91	122	137	148	82	62	55	71
Canola	558	638	544	572	289	453	397	309
Other oilseeds	24	29	28	20	21	25	33	28
TOTAL	**5800**	**6018**	**6901**	**7563**	**5062**	**5800**	**5737**	**5364**

Summary of world statistics for wheat

	Area million ha	Production (Mt)	Use (Mt)	CLOSING STOCKS		Stocks to use ratio (%)	Trade Mt	Price US$ (real)
				World (Mt)	Major exporters (Mt)			
1997	228	610	581	196	41	34	99	142
1998	225	590	584	198	53	34	99	119
1999	215	585	582	201	51	34	109	113
2000	219	582	583	200	52	34	101	128
2001	215	582	586	201	26	34	108	128
2002	214	566	600	165	41	27	106	160
2003	207	555	593	127	40	21	102	171
2004	215	625	614	138	54	22	109	159
2005	213	615	618	136	52	22	108	163

World wheat production, by country (Mt)

	EU–25	Ukraine	Russia	Kazak-hstan	Other CIS	Tur-key	Canada	US	Argen-tina	Middle East	China	India	Paki-stan	Africa	Aust.	TOTAL WORLD
1998	103.1	14.9	27.0	8.4	8.0	18.5	24.1	69.3	11.5	16.9	109.7	66.4	18.7	18.8	21.5	585.9
1999	96.4	13.6	31.0	14.9	8.9	16.5	26.9	62.6	15.7	12.4	113.9	70.8	17.9	16.4	24.8	584.7
2000	104.7	10.2	34.5	12.7	9.4	17.5	26.8	60.8	16.5	11.5	99.6	76.4	21.1	15.8	22.1	582.3
2001	91.2	21.3	46.9	15.9	10.1	15.5	20.6	53.3	15.5	14.2	93.9	69.7	19.0	18.7	24.3	581.7
2002	124.4	20.0	50.6	12.8	12.4	17.3	16.2	43.7	12.3	20.4	90.3	71.8	18.2	17.4	10.1	566.4
2003	106.2	3.6	34.1	11.5	12.4	18.5	23.6	63.8	14.5	20.4	86.5	65.1	19.2	21.4	26.1	554.6
2004	136.1	16.5	45.3	10.0	13.4	18.0	25.9	58.7	16.0	22.5	91.0	72.1	19.0	21.7	22.6	624.8
2005	122.4	18.7	47.6	12.9	13.4	17.5	26.8	57.3	12.0	21.2	96.2	72.0	21.0	18.6	25.1	615.0

World wheat trade, by region (Mt)

	2001	2002	2003	2004	2005
IMPORTS					
Europe	12.9	14.7	10.1	8.9	9.4
CIS & Baltics	3.7	3.9	7.4	4.0	3.5
N & C America	8.8	8.0	8.3	9.3	9.3
South America	12.4	11.3	11.4	10.9	12.0
Near East Asia	15.9	11.6	8.6	10.2	11.8
Far East Asia	26.0	25.3	29.8	34.3	30.0
Africa	27.2	29.1	25.8	30.2	31.2
Oceania & Misc.	1.8	3.6	3.5	2.7	2.8
EXPORTS					
Argentina	11.4	6.1	7.4	13.1	7.1
Australia	16.6	10.8	15.1	15.8	15.8
Canada	16.1	9.2	15.6	15.5	16.0
EU–25	10.8	15.5	10.3	13.6	14.5
US	26.8	23.2	32.2	27.9	27.0
Russia	4.6	13.0	4.0	7.9	10.5
Ukraine	5.5	6.7	0.1	4.4	5.5
Others	14.9	21.4	17.6	10.7	11.9
Total	**106.7**	**105.9**	**102.3**	**108.9**	**108.3**

SECTION 2

THE GRAIN INDUSTRY IN FIGURES

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World durum wheat production and trade

	2001	2002	2003	2004	2005
PRODUCTION (Mt)					
EU–25	6.9	8.9	8.2	11.4	7.5
Kazakhstan	2.5	2.6	2.6	2.2	2.4
Canada	3.0	3.9	4.3	5.0	5.0
Mexico	1.1	1.1	0.9	1.1	1.1
US	2.3	2.2	2.6	2.5	2.8
Argentina	0.2	0.2	0.2	0.2	0.2
Syria	2.8	2.8	3.0	2.5	2.5
Turkey	3.0	3.0	3.2	3.2	3.2
India	1.8	2.1	0.8	1.2	1.2
Australia	0.5	0.3	0.6	0.5	0.5
Other	7.7	7.5	10.4	10.7	9.8
WORLD TOTAL (Mt)	**31.8**	**34.6**	**36.8**	**40.5**	**36.2**
MAJOR IMPORTERS (Kt)					
EU–25	1657	848	2103	1800	2000
US	589	350	234	450	400
Venezuela	345	271	462	450	400
Japan	189	202	224	230	200
Morocco	540	483	629	620	700
Algeria	1841	2150	1692	1900	2200
Other	1916	2058	1438	1741	1200
MAJOR EXPORTERS (Kt)					
Canada	3608	2912	3376	3408	3700
EU–25	591	1304	907	1400	700
US	1251	977	1220	738	1000
Syria	345	450	600	400	600
Mexico	495	466	357	600	400
Turkey	204	33	61	170	200
Australia	583	220	261	475	500
WORLD TOTAL TRADE (Mt)	**7.35**	**6.76**	**7.08**	**7.30**	**7.60**

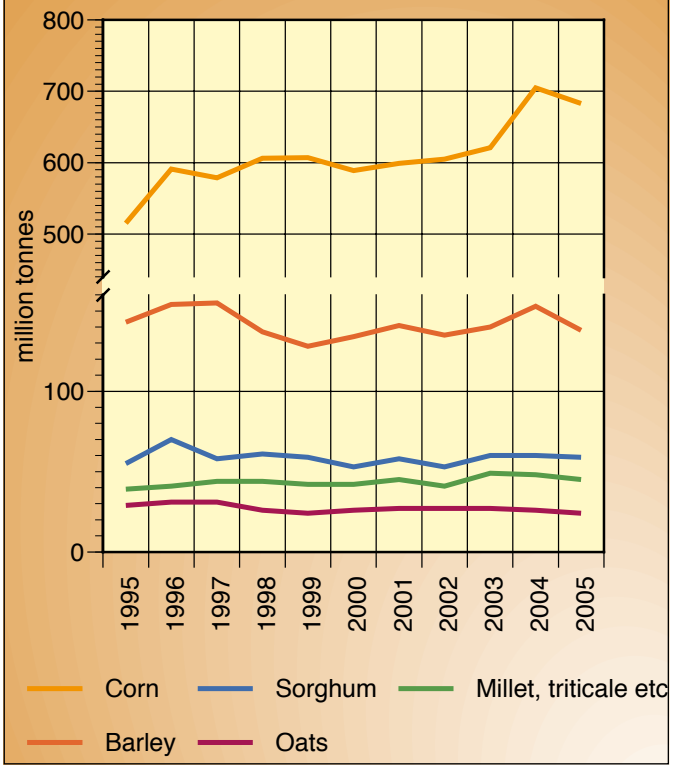
Summary of world statistics for coarse grains

	2001	2002	2003	2004	2005
Area (million ha)	301	293	307	302	300
Production (Mt)	891	872	914	1008	958
Total use (Mt)	903	901	942	972	971
Closing stocks (Mt)	195	166	135	172	165
Closing stocks: US (Mt)	45	31	29	57	65
S.T.U.R. (%)	19	18	14	18	17
Trade (Mt)	104	104	103	101	100
Price (US $/t)	90	106	116	97	103

World coarse grains production by region and country [Mt]

	2001	2002	2003	2004	2005
EU–25	107.7	106.8	123.4	150.5	133.6
Other Europe	56.8	53.8	18.2	28.9	27.2
CIS & Baltics	83.4	90.1	76.8	93.1	86.4
Canada	22.6	19.9	26.3	26.4	26.0
Mexico	27.2	25.8	28.6	29.7	27.4
United States	261.9	243.8	275.7	319.6	298.7
Argentina	19.1	19.0	16.0	24.8	18.3
Brazil	36.7	49.6	44.8	37.8	46.1
Iran	2.2	3.8	3.6	2.7	2.9
Turkey	9.6	10.6	9.9	10.6	11.3
China	123.3	131.8	125.9	139.7	141.2
India	29.9	25.7	37.3	32.0	31.5
Thailand	4.9	4.4	4.2	4.3	4.0
North Africa	10.1	9.4	12.1	11.9	9.9
Sub-Sahara	71.3	67.5	74.4	74.8	73.7
Australia	13.0	6.8	13.1	10.2	14.7
Other	21.6	13.6	21.6	14.3	13.1
TOTAL	**901.3**	**882.4**	**911.9**	**1011.3**	**966.0**

World coarse grain production [Mt]



World coarse grains trade by region and country [Mt]

	2001	2002	2003	2004	2005
IMPORTS					
Europe	6.5	6.0	9.5	3.9	3.8
CIS & Baltics	1.3	1.0	1.4	1.1	1.1
Mexico	10.1	8.4	8.0	9.2	9.8
United States	2.4	2.4	2.3	2.0	2.1
South America	6.3	6.2	6.3	6.4	6.4
Near East Asia	16.5	16.1	17.2	18.2	17.6
Japan	19.5	20.0	19.4	19.4	19.3
Korea (S)	8.3	8.8	10.1	7.9	8.5
Chinese Taipei	5.0	5.1	5.1	4.7	5.1
China	2.2	1.9	1.2	2.2	2.3
Malaysia	2.2	2.7	2.6	2.3	2.2
Africa	14.4	13.9	11.9	14.1	14.9
Others	10.9	12.6	10.2	10.1	9.4
TOTAL IMPORTS	**105.6**	**105.1**	**105.2**	**101.5**	**102.5**
EXPORTS					
Argentina	9.6	12.2	10.3	12.9	13.6
Australia	5.9	2.8	7.8	5.3	6.5
Canada	2.5	1.6	3.4	2.7	3.6
China	6.4	15.0	11.5	5.6	6.0
EU–25	5.0	6.5	4.2	4.1	4.6
South Africa	1.4	1.1	1.1	1.1	1.8
United States	56.5	47.8	51.5	52.3	53.7
Others	18.3	18.1	15.4	17.5	12.7
TOTAL EXPORTS	**105.6**	**105.1**	**105.2**	**101.5**	**102.5**

World barley trade by region [Mt]

	2001	2002	2003	2004	2005
IMPORTS					
Europe	1.5	1.3	0.9	0.7	0.7
CIS & Baltics	0.5	0.5	0.6	0.4	0.5
N & C America	0.7	0.7	0.4	0.4	0.4
South America	0.6	0.7	0.5	0.6	0.6
Near East Asia	8.3	8.8	8.7	9.4	9.5
China	2.1	1.9	1.2	2.1	2.2
Chinese Taipei	0.1	0.1	0.1	0.1	0.1
Japan	1.3	1.3	1.3	1.6	1.5
Africa	2.2	1.5	0.3	1.5	1.6
Others	0.3	0.3	0.9	0.2	0.2
EXPORTS					
Australia	5.3	2.6	7.0	4.9	5.9
Canada	1.1	0.4	1.7	1.1	1.9
EU–25	3.6	4.8	2.6	2.9	3.7
United States	0.6	0.6	0.4	0.5	0.5
Ukraine	2.8	2.9	1.5	4.3	3.7
Russia	2.8	3.1	3.1	1.1	1.3
Turkey	0.6	0.5	0.1	0.1	0.4
Others	1.8	2.1	1.2	1.2	0.9
TOTAL EXPORTS	**17.6**	**17.3**	**15.2**	**17.0**	**17.4**

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THE GRAIN INDUSTRY IN FIGURES
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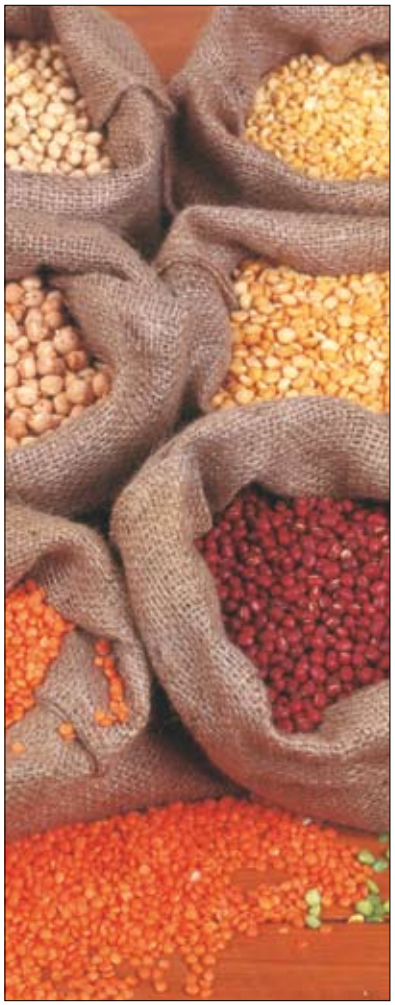


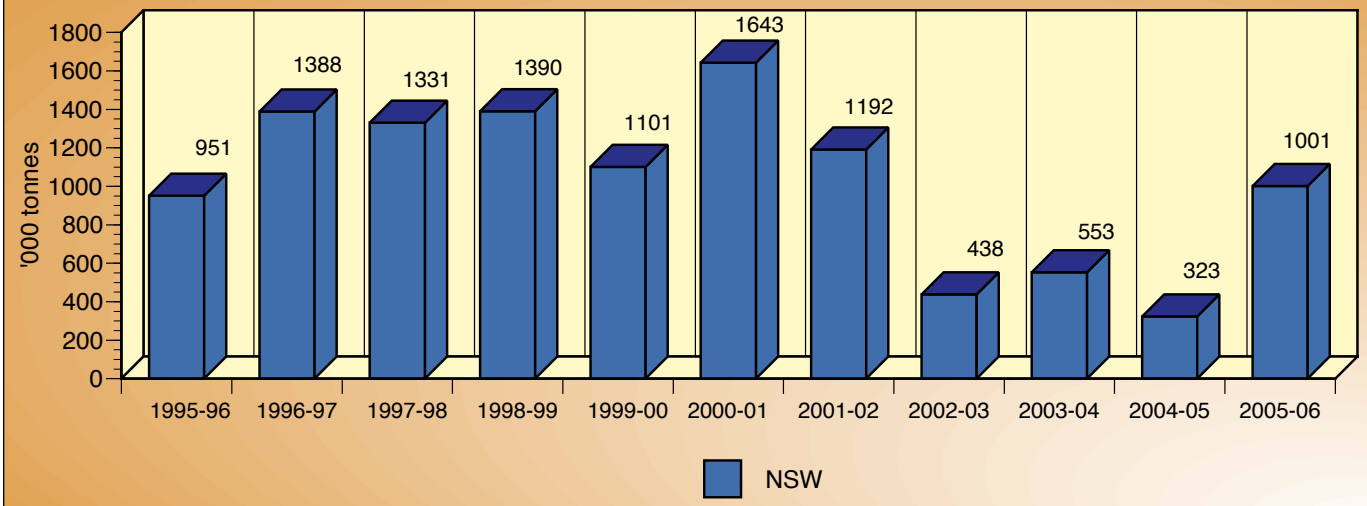
World pulse production by region and country [Mt]

	2001	2002	2003	2004	2005
Australia	2324	1009	2384	1648	2143
Brazil	2466	3082	3328	3018	3087
Canada	3366	2292	3065	4580	4753
China	5122	5915	5891	4929	5490
Egypt	516	492	491	487	484
Ethiopia	1160	1088	869	1044	1050
France	1877	2035	1945	2083	1753
India	11221	13117	11680	14500	14600
Mexico	1495	1893	1752	1752	1752
Myanmar	2044	2344	2411	2448	2447
Nigeria	2222	2224	2278	2367	2367
Pakistan	770	763	1073	953	1242
Russian Federation	1796	1797	1601	1684	1938
Turkey	1455	1640	1558	1638	1558
Ukraine	827	810	571	739	753
United Kingdom	957	924	934	968	860
United States	1224	1700	1406	1568	2097
Other	13355	13859	13511	14047	13356
Total	**54197**	**56984**	**56748**	**60453**	**61730**

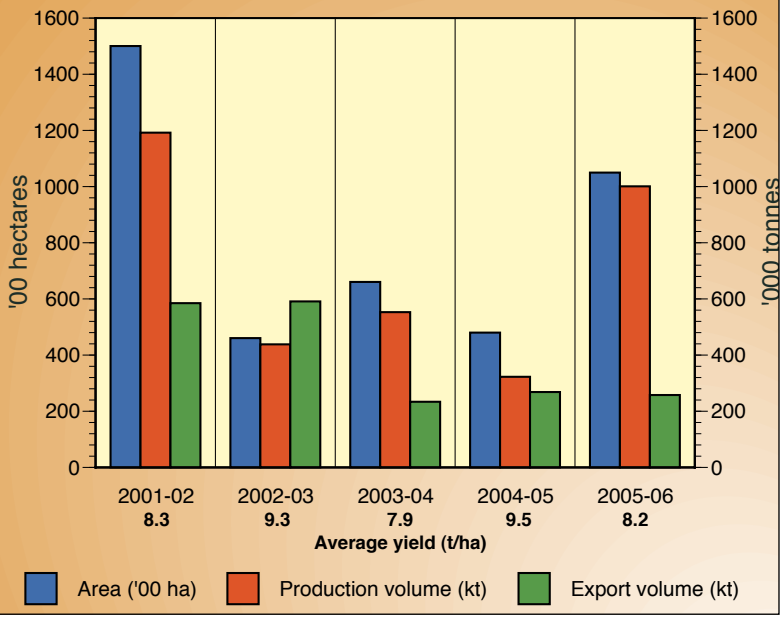
Major world oilseeds trade and production (Mt)

	1999	2000	2001	2002	2003	2004	2005
IMPORTS: Canola	8.17	7.02	4.98	4.53	5.06	4.88	5.94
Japan	2.23	2.18	2.08	2.11	2.28	2.20	2.25
Soybeans	45.89	53.16	54.45	62.92	54.25	64.68	65.30
Sunflowerseed	3.67	2.24	1.22	1.71	2.58	1.52	1.69
Total world oilseeds imports	**60.61**	**66.31**	**64.66**	**72.05**	**65.26**	**74.82**	**75.82**
EXPORTS: Canola	8.21	7.17	4.92	4.11	5.48	5.17	6.18
Australia	2.03	1.39	1.30	0.61	1.05	1.02	0.86
Canada	3.90	4.84	2.67	2.40	3.76	3.45	3.95
Soybeans	45.52	53.74	53.40	61.18	55.86	64.27	66.07
Brazil	11.10	15.47	15.00	19.73	19.82	20.39	26.07
United States	26.54	27.10	28.95	28.42	24.13	29.80	24.49
Sunflowerseed	2.72	2.60	1.32	1.82	2.74	1.71	2.02
Total world oilseeds exports	**59.75**	**66.78**	**62.75**	**69.94**	**67.02**	**74.25**	**77.41**
PRODUCTION: Canola	42.48	37.41	36.03	32.90	39.34	46.52	45.33
Australia	2.46	1.77	1.76	0.87	1.62	1.50	1.40
Canada	8.80	7.20	5.01	5.01	6.77	7.01	8.5
Soybean	160.67	175.88	185.10	197.03	186.26	215.33	224.12
Brazil	30.99	32.73	37.88	42.12	51.48	53.20	58.50
US	72.22	75.05	78.67	78.24	66.77	85.74	84.00
Sunflowerseed	27.26	23.18	21.37	23.96	26.68	25.77	30.67
Total world oilseeds production	**304.74**	**314.28**	**325.48**	**330.55**	**334.54**	**380.07**	**392.99**

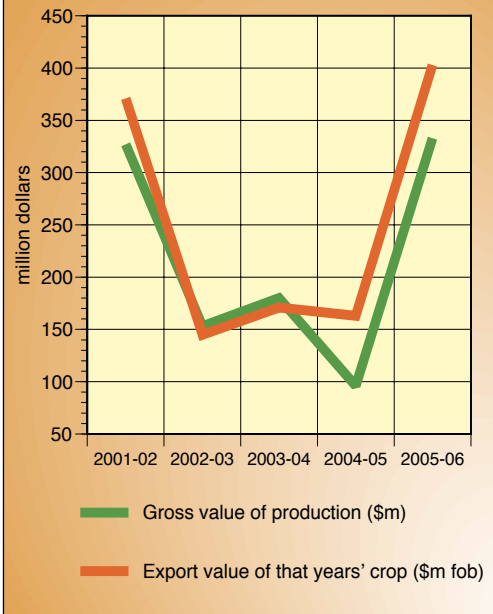
Australian rice production (milled)



Summary of Australian rice statistics (milled) by area and volume

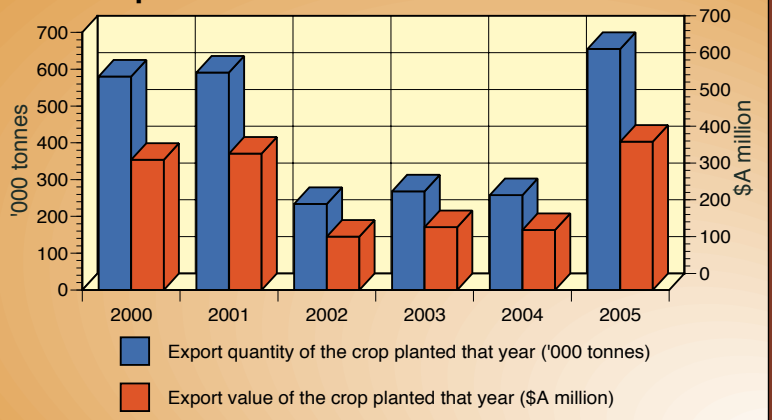


Australian rice export value and gross value of production



In this section the rice crop is the year of planting. (The 2005–06 figure is therefore a forecast of the Australian rice harvest in March–April 2006.)

Quantity and value of Australian rice exports



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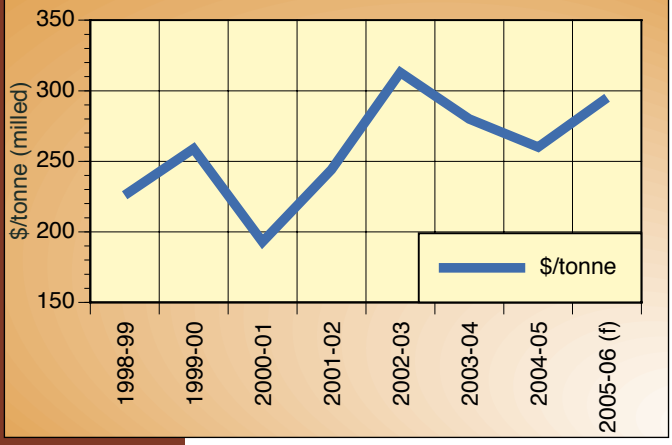
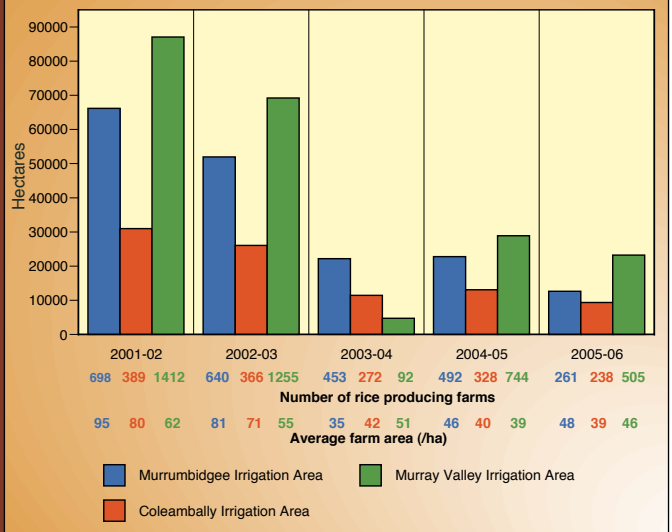
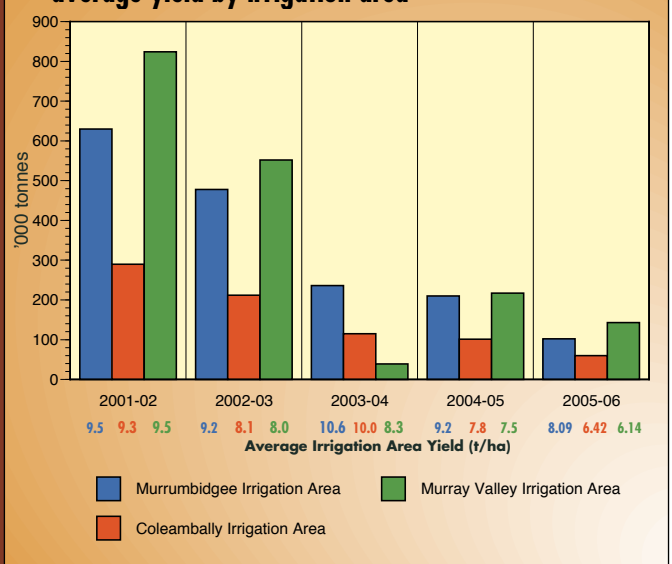
Average pool return to Australian rice growers



Australian rice area, number of rice farms and average farm area by irrigation district



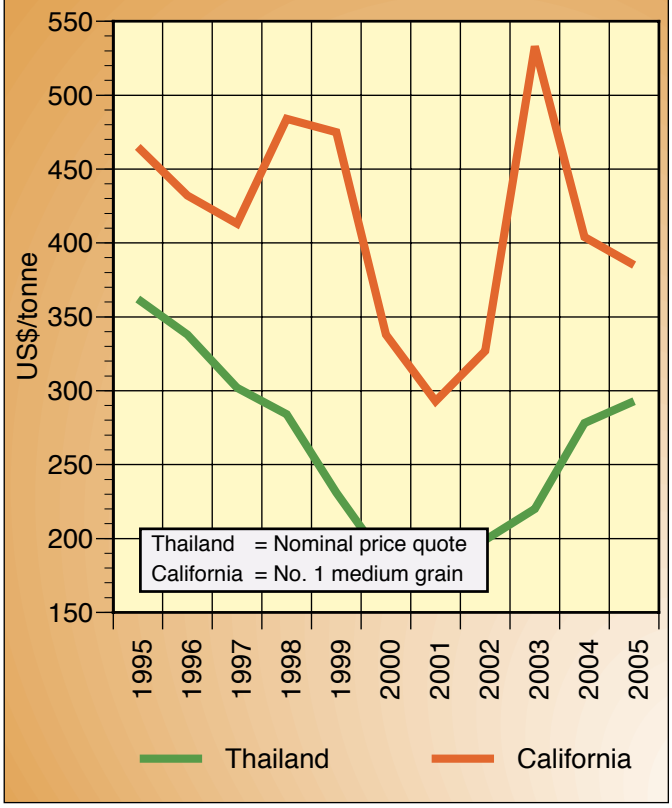
Australian rice production (milled) and average yield by irrigation area



Major world rice traders [Mt]

	2001	2002	2003	2004	2005
IMPORTS					
Bangladesh	0.40	0.50	1.20	1.10	1.00
Brazil	0.60	1.21	0.81	0.55	0.70
China	0.31	0.26	1.12	0.61	0.60
EU–25	0.80	1.20	1.02	1.00	0.98
Indonesia	2.75	2.75	0.65	0.50	1.00
Iran, Iraq, Saudi Arabia	—	—	2.99	3.25	3.40
Japan	0.65	0.63	0.70	0.78	0.70
Nigeria	1.50	1.90	1.45	1.37	1.80
Philippines	0.65	1.50	1.29	1.50	1.90
EXPORTS					
Australia	0.59	0.26	0.17	0.21	0.29
China	1.50	2.58	0.88	0.66	0.70
EU–25	0.35	0.25	0.23	0.18	0.18
India	4.00	5.44	3.10	4.50	3.50
Myanmar	1.00	0.39	0.13	0.19	0.15
Pakistan	1.25	1.99	1.95	2.45	2.83
Thailand	7.25	7.55	10.14	7.27	7.00
United States	2.80	3.86	3.31	3.54	3.75
Vietnam	3.25	3.80	4.30	5.17	5.00
TOTAL WORLD TRADE	**24.47**	**28.62**	**27.41**	**27.72**	**26.79**

Rice export price quotations (US$/t)



Summary of world statistics for rice

	Area million ha	Production (Mt, milled)	Use (Mt)	Closing stocks (Mt)	Stocks to use ratio (%)	Trade Mt	Average price US$ (Thai 100%)
1997–98	151	387	383	126	33	27	302
1998–99	152	394	389	133	34	24	284
1999–00	155	409	399	143	36	25	231
2000–01	152	398	392	151	38	24	184
2001–02	150	398	409	139	34	27	192
2002–03	146	378	405	110	27	29	199
2003–04	150	391	415	86	21	27	220
2004–05	151	402	414	74	18	28	278
2005–06	152	410	418	66	16	27	296

World rice production, by country (Mt, milled equivalent)

	Aust.	B-desh	Brazil	China	EU–25	India	Indo-nesia	Japan	Myan-mar	Paki-stan	Philip-pines	Thai-land	US	Viet-nam	TOTAL
1998–99	1.4	23.5	11.6	133.7	2.7	86.8	33.9	7.5	12.8	4.7	6.9	15.9	5.7	20.5	**394.0**
1999–00	1.1	15.8	11.4	133.5	2.7	90.3	35.6	7.7	14.5	5.2	8.1	16.8	6.3	21.3	**408.7**
2000–01	1.6	25.6	10.2	126.4	2.5	87.1	34.0	8.0	14.5	4.8	8.4	17.2	5.9	20.9	**397.6**
2001–02	1.2	24.9	10.4	121.1	2.6	90.8	34.5	7.6	14.9	3.8	8.9	16.8	6.5	21.1	**397.4**
2002–03	0.4	25.7	7.1	122.2	1.7	72.7	33.4	8.1	14.8	4.5	8.4	17.2	6.5	21.5	**377.9**
2003–04	0.5	26.6	7.0	110.4	1.7	88.7	35.4	6.6	15.7	4.9	9.2	18.3	6.1	23.5	**391.4**
2004–05	0.3	27.0	9.0	122.6	1.9	87.0	36.8	7.4	15.0	5.0	9.9	16.2	7.1	24.4	**402.5**
2005–06	1.0	27.2	8.9	125.3	1.8	87.7	36.7	7.5	15.0	5.0	10.1	18.4	6.8	24.7	**410.0**

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Forecast for the 2005–06 rice season

Australia
(Source – ABARE)

Area	**105,000 ha**
Production	**1.0 – 1.1 Mt**
Average yield	**9.5 – 10.5 t/ha**
Price outlook (average pool return)	**$310 – $340/t**
Gross value of production	**A$330m**
Volume of rice exports (05–06 crop)	**655 Kt**
Value of rice exports (05–06 crop)	**A$400m**

World
(milled equivalent — source USDA)

Area		**152 mha**
Total world production		**410 mt**
Major exporters:	India	87.7 mt
	Thailand	18.4 mt
	Vietnam	24.7 mt
	Pakistan	5.0 mt
	US	6.8 mt
Consumption		**418 mt**
Closing stocks		**66 mt**
Trade		**27 mt**

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DISTRICT REPORTS

Reviews of the 2005–06 season
& plans for 2006–07

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Western Australia

Northern

The 2005 season had yields above expectations in most crops and exceptional quality. Total grain tonnage received by CBH was 2.58 million tonnes for the Geraldton Port Zone with around 70 per cent being wheat.

A mild and wet September and October gave ideal grain fill conditions and crops finished well but cool, damp conditions slowed the progress of harvest.

Frost affected some growers with prone areas again being subject to damage. A dry July also knocked many crops around and reduced yields particularly on sand soils.

Wheat

Yields were well above average and grain quality was spectacular. Wheat grain weights were as high as 86 kg per hectolitre.

Field mould in one eastern area was the exception with some wheat being downgraded.

Protein levels were varied with some usually high yielding paddocks producing lower yields due to low nitrogen applications.

Fortunately, stripe rust did not have any impact on yields in 2005.

Barley

Yields and quality were excellent in 2005. Malt growers were particularly happy with almost all malt barley hitting the top grades. Barley grain weights were as high as 75 kilograms per hectolitre.

Canola

Performance has boosted the prospects for this crop in our region. Yields in 2005 were spectacular and quality well above average. Oil content for the zone averaged 44 per cent making it the highest on record. This was a great surprise given that many canola crops were near death when rain finally arrived in mid-August after six very dry weeks. Now we just need the prices to kick upward.

Diamond back moth did not pose a problem in 2005.

Trends for 2006

The canola performance in 2005 has boosted the prospects for this crop in our region.

A change in the landscape has been a major wind farm project on the south eastern outskirts of Geraldton.

Many growers are looking at producing their own biodiesel within the next few years. Canola will be used as the oil source and local crushing will see this 'green' fuel take off.

Property values

Land prices are spiralling upward in this region, particularly in higher rainfall zones. Strong growth in land prices is underpinned by a resources boom in the Geraldton hinterland.

Peter Norris,
Agronomy For Profit, Geraldton

South East

The district received one of the softest finishes ever in 2005 with excellent rainfall in August, September and October. The very dry July period pruned some crop potential but the excellent start and sensational finish to the season should have ensured an above average year for most growers.

Barley yields were between 2.0–3.5 tonnes per hectare and a lot of crops had some frost damage in them. Most of the varieties are feed cultivars.

Canola hovered around the 1.0 to 1.3 tonnes per hectare mark for TT varieties. Non-TT varieties were in the range of 1.4 to 1.8 tonnes per hectare with the odd crop nudging two tonnes. Oil percentages were very good due to the soft finish the district received. Surpass 501TT still leads the way with oil content with the better crops reaching 48 per cent oil.

Frost damage

Some growers were once again affected by frost with damage to about 50 per cent of the crop – but most were able to get away with a minimal frost impact in 2005. The dates of greatest frost damage were very widespread: August 19 and 29 caused damage to later-sown crops and another significant frost event on October 10 touched up a lot of very promising looking pea crops.

Farming around such a broad frost window is near impossible in this region. Early sown crops once again, were not necessarily the worst affected. But overall the damage would have been less than 10 per cent.

The first summer weeds began emerging in some crops in the last week of October 2005. Widespread rainfall across the state saw most farmers very busy spraying for melons, mintweed, volunteer cereals and some grasses during January and February 2006. Bu the summer period has been very mild and spraying conditions have been excellent. These conditions, combined with rapid adoption of GPS spraying systems, have resulted in very few summer spraying failures.

Trends for 2006

As soil temperatures decreased in March, more weeds germinated which will require another spraying before seeding. This will put more pressure on already tight budgets.

An increase in the amount of organic nitrogen available in the soil, due to an extended period of moisture early in 2006, will also enable growers to play with lower amounts of N applied at seeding. This is especially applicable to frosted cereals paddocks from 2005 that are going back into cereal in 2006.

Wheat variety selection is a very difficult topic with regard to frost tolerance. It is undecided and unproven if there is any great frost tolerance between varieties. Frost management is a key focus so there will be a bit more interest in export hay and also a small swing towards barley as opposed to wheat.

Nutrition may well be the main input cost focus for the year

but chemical regimes will still be of paramount importance.

One positive upside is that the price of wheat is also looking a bit healthier in 2006.

A weaker canola price has seen some reluctance in growing this crop in 2006.

Craig Brown
CBC Hyden

South Coast

The 2005–06 season was relatively good year on the South Coast with a very dry summer and then the perfect break during early April.

This break allowed for the early sowing of canola and some of the longer season barley varieties.

Most wheat sowing was completed by May 25 with seeding all finished by June 10 when the last of the fieldpeas were sown.

June 2005 was one of the wettest on record. Many crops suffered badly from waterlogging which made growers very nervous. Thankfully July was one of the driest on record and this allowed crops to recover from the waterlogging. In some of the inland areas the dry caused many barley crops to go shades of yellow, orange and black due to boron toxicity.

August and the remainder of the spring were perfect with good finishing rains and very mild conditions. The only downside to spring was some late frosts which reduced cereal yields by five to 25 per cent. This was the main reason why the Esperance Port Zone did not break the 2003 record for grain deliveries.

Harvest conditions were ideal. Most growers were well and truly finished by Christmas and grain quality was also excellent. The only major problem was with barley where there was some level of cleaving and environmental skinning.

Many growers were happy with the yield results for 2005, however, they were disappointed with the financial results as the low grain prices have not created the big cash surpluses that growers may have been hoping for – consequently budgets are tight leading into 2006.

Wheat

The only negative to the 2005 harvest was some unexpected frost damage in areas that rarely get frosted. The faster-maturing wheat varieties such as H45, H46 and Wyalkatchem were frost affected, reducing yields by up to 25 per cent. Wheat yields ranged from 1.5 tonnes per hectare up to five tonnes. These were generally better than the five-year average for most growers. Crops with yields lower than the five-year average were either frosted or waterlogged during the season.

950,000 tonnes of wheat were delivered to CBH by January 6.

Barley

Frost also had some affect on the late-April/early-May sown barley, again reducing yield by up to 25 per cent. Some early receivals of barley were downgraded to feed quality due to high levels of fungal staining, cleaved grain and environmentally skinned grain. Generally, screenings and protein levels were good and yields ranged from two to 5.5 tonnes per hectare and again these yields are generally better than the five-year average.

Many growers are questioning why they are trying to grow malt barley in our environment with over 50 per cent being downgraded to feed on a regular basis. Anticipate a further swing

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towards high yielding feed barley varieties over the next few years as yield becomes the main driver of barley profitability.

672,000 tonnes of barley was delivered to CBH by January 6.

Canola

Generally the canola was very good quality with oil contents ranging from 40–46 per cent based on variety and combined admix measuring 1.2–1.6 per cent. Yields ranged from 1.2 to 2.5 tonnes per hectare. These yields were slightly higher than the five-year average. Waterlogging and lack of nitrogen were the main reasons for lower yields as well as some scattered hail damage that occurred during early grain fill.

CBH received 189,000 tonnes of canola by January 6.

Pulses

The fieldpeas were of very good grain size and colour, with yields ranging from 1.2 to 2.5 tonnes per hectare. Fieldpea yields were definitely higher than the five-year average by 0.2 to 1.0 tonne per hectare. The favourable spring and surprising lack of frost definitely helped achieve these yields as well as the increase in area planted to Kaspa.

58,000 tonnes of fieldpeas were delivered to CBH by January 6.

Around 40,000 tonnes of lupins were delivered. Quality was very good as were yields which varied from 1.5 to 3.5 tonnes per hectare. Lupin yields were above the five-year average and this can be partly attributed to the favourable spring conditions but mostly to lupins being grown mainly on sandy soil types that suited high yielding varieties.

Trends for 2006

Many growers have been busy soil testing in an effort to fine-tune their fertiliser inputs, especially with fertiliser now being the biggest farm input cost. It is pleasing to see more growers undertaking soil testing as the results often present opportunities to extract better value from fertiliser use. Most growers are looking for ways to increase the percentage of cereals in their rotations. One trend for 2006 will be more wheat sown on wheat.

Livestock are also becoming more popular, a trend that could see livestock, or legume based pasture, replace financially under-performing break crops such as peas and lupins.

Property values

Land prices have continued to rise. This has been largely driven by the sale of high rainfall land to produce trees, or more specifically, bluegums. These high prices, often reported to be above $3000 per hectare, have also increased the value of the adjoining medium and low rainfall cropping country. Recent sales at Scaddan, 60 km north of Esperance (450 mm rainfall zone) with five-year average wheat and barley yields of 3.5 tonnes per hectare, have reaped $2130 per hectare while 375 mm cropping country at Beaumont, 120 km north east of Esperance with five-year average wheat and barley yields of 2.6 tonnes per hectare, has sold for $1800 per hectare.

Quenten Knight
Agronomist, Precision Agronomics Australia, Esperance

South Australia

The highlights

- The final estimate of winter crop production in 2005–06 is 7.12 million tonnes from 3.71 million hectares.
- This is 7 per cent above the five year average.
- While farmers were pleased with the good yields, low grain prices were a major disappointment.
- Crop yields ranged from near average to well above average in the Murray Mallee and on Kangaroo Island, with below average yields largely restricted to parts of the Upper North.
- Grain quality was generally good with around 90 per cent of wheat accepted into milling grades and 33 per cent of barley classified as malting quality.

Western Eyre Peninsula

Harvest was completed by mid December along the coastal areas. Inland areas such as Poochera and Wirulla were about two weeks later than usual.

Yields were generally average to just above for most while the barley and pulse yields were excellent.

Quality was good in terms of protein and screenings although haydie was reported to have affected wheat yields in areas around Streaky Bay.

Despite a later than ideal start, and a reduced area, grain growers generally returned an average crop.

Eastern Eyre Peninsula

Harvest was completed by mid to late December. There were several reports of susceptible wheat, not sprayed for stripe rust, being binned as General Purpose. Both screenings and protein were slightly higher than expected.

The area enjoyed a mild spring with good rains allowing crops to finish well.

Overall, farmers were generally happy with yields given the late break and no starting subsoil moisture.

Lower Eyre Peninsula

Yields were good and generally considered above average with some isolated exceptions.

Wheat was generally above expectations with good grain size and protein. But growers of stripe rust susceptible varieties reported yield penalties where a robust fungicide program had not been employed.

Growers of the more resistant varieties did not generally experience these penalties – other growers take note!

Barley was a solid performer but traditional malting barley areas suffered from black tip knocking them out of the malting grades. On the other hand, non-traditional areas made the malting grade resulting in little overall effect on malting receivals.

Pulses were the standout crops of 2005. Record yields were achieved in crops such as beans, lupins and peas; and quality was good despite the wet spring.

Canola was again a solid performer with yields above average. There were some disappointments in terms of oil content, with many reports of tests around the 39 per cent level. This may have been due to windrowing too early and varietal choice could also have been an issue.

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Yorke Peninsula

Cereal yields were slightly above average but quality was variable with black tip affecting a significant proportion of crops.

In southern parts of the district black tip was a major problem in barley. There were some issues with delivery of windrowed barley, with sheep and kangaroo manure contamination in some samples.

Lower North

Cereal yields were mostly a bit above average with black tip affecting a significant proportion of barley and wheat. This was more severe in early sown crops which may have accounted for some of the differences in severity between varieties.

There were isolated reports of ergot contamination in some cereal deliveries.

Pulse yields were variable ranging from barely average to well above. Many fieldpea crops were affected by blackspot and some lentils with staining and contamination with vetch and bedstraw.

Canola yields were generally above average.

SOUTH AUSTRALIA 2005–06 WINTER CROP PRODUCTION AND AREA AGAINST THE 5 YEAR AVERAGE

		5 year average	2005–06
Wheat	Area	1,876,300	1,874,500
	Prod'n	3,290,600	3,429,200
Durum	Area	83,200	59,850
	Prod'n	190,000	149,4500
Barley	Area	1,035,400	1,099,500
	Prod'n	2,135,100	1,475,100
Oats	Area	86,700	84,900
	Prod'n	119,400	133,600
Rye	Area	8,000	8,900
	Prod'n	5,300	8,900
Triticale	Area	85,200	91,900
	Prod'n	119,000	145,200
Peas	Area	118,400	113,300
	Prod'n	171,100	190,600
Lupins	Area	65,300	56,300
	Prod'n	91,800	80,700
Beans	Area	92,600	90,100
	Prod'n	179,000	187,300
Chickpeas	Area	2,600	1600
	Prod'n	2,300	1450
Lentils	Area	59,600	55,370
	Prod'n	86,900	85,200
Vetch	Area	25,000	22,900
	Prod'n	16,400	13,900
Canola	Area	171,800	151,200
	Prod'n	235,300	219,100
Safflower	Area	1,100	800
	Prod'n	1,100	800
Linseed/linola	Area	100	100
	Prod'n	100	100
Total SA crop	**Area**	**3,711,300**	**3,710,700**
Total SA crop	**Prod'n**	**6,644,100**	**7,120,600**

Mid North

Harvest progressed with little hold-up and yields were mostly better than average, which pleasantly surprised growers. The crops responded extremely well to the spring rains.

Grain quality was mostly good except for higher screenings in some early maturing paddocks and those that were affected with high levels of stripe rust.

Low grain prices are the main threat to profitability.

Hay yields were much better than expected, but the late season rains downgraded quality in some areas. Also, patches of cereals were affected by black tipping from the November rains.

Upper North

A combination of cool changes and extreme hot, windy conditions delayed harvest during December. Wheat yields in the area north of Willowie were well below average with significant frost damage suspected.

Barley yields in the eastern part of the district were average to above average with a high percentage making malting quality. Wheat yields in the southeast part of the district were also well above average.

Wheat quality was generally good with high protein and low screenings.

Fieldpea yields were average to above average, with Kaspa again performing well. Canola yields were on the average but with higher oil content.

Kangaroo Island, Central Hills and Fleurieu Peninsula

Harvest continued into February on Kangaroo Island as often there were few reaping hours possible each day. But there were some high yielding crops on KI with some barley yielding over 4 tonnes per hectare.

Very little grain is stored on KI for movement to the mainland. Most is being stored on-farm for trading between farms. This is a reflection of increased awareness of the value of grain as a supplementary feed for ewes following disastrous weaning percentages last winter, plus increasing numbers of weaner cattle and lambs being lot-fed.

The low grain prices on offer on the mainland, and high freight charges, have also encouraged this intra-island grain trading.

Northern Murray Mallee

The region enjoyed generally good yields and quality and one of the best years on record for overall tonnage – due to an increased cropping area.

The disappointing grain prices generally meant that mallee farm businesses were satisfactory without making major gains, despite the good yields.

Southern Murray Mallee

Above average yields were harvested and good quality grain delivered across the district. Fungal stain was a problem in some wheat crops.

Hot conditions early in January delayed the lupin harvest but this was completed by late in the month.

Thanks to the generally high yielding crops, paddock stubble cover was excellent coming into 2006.

Lower Murray

Grain samples from many farmers across the district were downgraded at the silo with black tip.

But the majority of barley reaped in the district was malting quality with yields slightly above average. In general, heavier soil types performed the best with the sandier soil types not producing as well.

Summer weeds germinated throughout December due to the odd wet day, causing some farmers to start their summer weed spray program.

Many farmers were very happy with the 2005–06 crop yields, however poor grain prices took some of the shine off the good season.

Upper South East

Barley yields generally exceeded expectations while wheat, lupins and canola yields ranged from good to disappointing. Beans did not yield as well as expected.

Black tip was an issue in barley and wheat due to the late rains, although crops in general handled the December rainfall surprisingly well. But the big downside to the season was the low prices for grain.

Lower South East

A considerable amount of grain is being stored on-farm as growers wait to see how demand and prices go. The low grain prices are a concern to all producers.

Yields of cereals, canola and beans ranged from quite exceptional to disappointing but overall were slightly above average.

Bean size was variable and canola oil levels were reasonable.

Black tip was an issue in barley and wheat leading downgrading to feed grades.

Trends for 2006

- Total crop area is expected to increase slightly in 2006, with an expected increase in the area sown to low risk cereals, especially wheat and to a lesser extent barley.
- The canola area is expected to decrease to some extent, while the area sown to pulse crops is expected to remain largely the same.
- The area of pasture for livestock production is likely to increase, particularly in some lower rainfall districts.
- Crop area is now less dependent on the timing of the seasonal break with the increase in no-till farming and dry sowing.

PIRSA Rural Solutions contributors

Victoria

Wimmera

The wet summer in 2004–05 helped the Wimmera through 2005. After a series of eight dry and dismal cropping seasons in the eastern Wimmera, it was heartening to at last get a season that showed some promise. A dry finish to September 2005 did pull back potential record crops but weekly rains in October saw crops compensate to a large extent. Above average rainfall occurred throughout the region in October and November.

Cereals filled with little or no frost damage for the first time in several years and growers anticipated good yields of high quality barley and wheat.

The 2005–06 summer rain was patchy and with temperatures above average, weed growth was not abundant and volunteer cereals died. This gave some advantages for disease management but also means that there is less subsoil moisture to work with in the 2006 season than there was in 2005 (but considerably more than 2004). We are convinced it was the above average starting moisture that resulted in good yields for most crops around the eastern Wimmera in 2005.

Wheat

Stripe rust was well controlled by foliar fungicides in September and is considered a manageable disease in the future. Average yields were in the area of three tonnes per hectare with good quality grain and generally above average protein. Most wheat made the AH grade.

Barley

Barley crops looked a million dollars and performed well at the receival point too. The dry September capped the yield potential but averages over three tonnes per hectare were not uncommon. We were pleasantly surprised to see protein values at the high end of the malting range after good growing conditions, but this may be a result of a series of below average crops in preceding years.

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Canola

The area sown to canola dropped off significantly in 2005 due mainly to the dry autumn and late break, coupled with historically low prices. Those who persevered were rewarded with average yields but very low oil content resulted in a deduction rather than the usual oil bonus.

Rutherglen bug also arrived in plague numbers and caused harvesting problems in oilseeds including canola. More growers are likely to spray for this pest if they occur in these proportions again.

Pulses

Pulse crops benefited from the cool, wet spring conditions. Lentils, peas, beans and chickpeas all yielded very well and in some cases were the crops with the best gross margins.

Ascochyta was a problem in Howzat chickpeas but where a programmed spray regime had been implemented, losses were minimal. The new Genesis varieties stood up to a bad ascochyta year with few problems. Most received a fungicide application at mid-podding to avoid seed coat staining. This strategy appeared to be effective.

Insects presented a problem again this year with early flights of native budworm and lesser budworm meaning insecticide applications earlier than usual. Some crops required a second spray.

Fodder crops

Vetch and vetch/oats mixes are quickly finding a place in the Wimmera. Some crops are grazed in mid-winter before being cut for hay while others are made into high-yielding, high-quality hay. Good demand for hay is likely to see an increase in production.

Trends for 2006

There are two influences creating trends in the enterprise mix in the Wimmera. Low commodity prices and rising fertiliser costs are pushing the mix in favour of livestock and a less intensive cropping rotation.

On the other hand, a lack of water is making any shift toward livestock a very labour intensive option as water carting is very time consuming.

At the time of writing, water storages which provide water to stock and domestic users in the Wimmera, were holding just seven per cent of capacity. Without good winter runoff rain, there will be no dam fills in the Wimmera in 2006.

Property values

The heat appears to have abated from the land market this season. Demand for cropping land last year saw prices reach high levels, particularly land for lease.

It would seem that low commodity prices have outweighed the influence of good yielding crops for the moment.

Michael Laidlaw
Agricultural Management Services, Donald

Mallee

Season 2005–2006 delivered the crops we had anticipated after receiving 280 mm of summer rainfall from November to February. From March to May a total of only 7 mm of rain fell before late breaking rain in June saw sowing quickly completed. Despite a later than desired start, crops held on to subsoil moisture and carried through with good falls again in September and October.

Harvest commenced a little later than normal and the rush was on to get the grain off as prices plummeted. This was the downside to an otherwise satisfactory year. In addition to summer rain, Berriwillock received its district average growing season rainfall (228 mm) and above average annual rainfall of 370 mm.

Wheat

I would estimate the district average wheat yield to have been 2.5 tonnes per hectare but there were many reports of wheat yielding 3.2 to 3.5 tonnes per hectare. Yitpi was the main wheat variety grown, however owing to weed issues and intensified rotations, Clearfield JNZ and Wyalkatchem wheat were also common in the Mallee.

Yields were again satisfactory although stripe rust showed up earlier in these varieties. This reiterates the common sense approach that these varieties require more attention to leaf diseases. In many local wheat crops, high yields were offset by low protein where nitrogen was not top-dressed.

Barley

Barley yields were variable but mostly pleasing. Yields up to 3.5 tonnes per hectare were reported by many farmers. Due to late rains, protein levels saw malt barley making the grade. There was also a lot of feed barley around and the prices dropped off as the tonnes were being delivered. Contract harvesters were justified for those who were cashing their barley.

Canola

Plantings of canola were reduced as the break held off until June. May sowing is more desirable for canola in the Mallee. Using the stored moisture, canola looked fantastic all season. Heliothis infested crops heavily and required spraying. Most crops yielded between 1.0 to 1.5 tonne which didn't do justice to their appearance. Oil levels were also a bit disappointing. Those who reached 40 per cent should have been satisfied. This is one of the drawbacks of growing oilseeds in a dry climate.

Peas and lentils

Legumes were the outstanding performers for 2005–06. Peas quite commonly went 2.0 to 2.5 tonnes per hectare. The occasional crop yielded slightly above this which resulted in it having a better gross margin than any local cereal crops. Lentils yielding 1.8 to 2.2 tonnes per hectare and had growers wishing they went for more acres. It was time for lentils to perform as there haven't been too many boomers in the past three years.

But native budworm and its cousin, lesser budworm were out in high numbers. As they arrived before pod set, fortunately these crops didn't have to be sprayed twice.

With land prices strong last year, many who had been considering retirement sold up and made the most of the high demand. Prices paid for land have ranged from $750 per hectare for lighter soil up to $1200 per hectare for more productive red loam.

Livestock numbers are stable with some opting to feedlot lambs rather than sacrifice cropping land. This has made sense with water not being channelled into dams, and can be sourced from the one point. Traditional sheep farmers maintain that some diversity is the key to spreading risk. Recent dry years have backed this argument.

There has been a refreshing interest in cropping methods and this has been proven by attendances at conferences held by groups such as the GRDC, Birchip Cropping Group and No Till Farming Associations. Growers and advisers diaries are filling up to capture information.

Trends for 2006

Currently growers are planning for the upcoming season. I expect to see canola plantings reduced, depending on the timing of the break. There has been positive speculation about wheat prices and consequently the area sown will reflect this. Barley acres are not expected to alter much. Despite last year's record legume yields, most will be realistic about their potential and be conservative.

Simon Severin
Landmark – an AWB Company, Berriwillock

Murray Valley

Spring rainfall on most of the eastern Murray Valley was well above average in 2005. Between 100–200 mm fell from mid-October to mid-November. The higher rainfall districts suffered some minor water damage but overall, the season finished above average.

The spring rains resulted in early summer weeds emerging. Even though summer rainfall was below average for the region, weed control was performed by most growers to conserve moisture and nutrients, but on a lesser scale than in 2005.

Most long-range forecasting services predict above average rainfall for the 2006 cropping season. This is being taken into consideration in the current planning process. Soil testing and fertiliser programs are being carefully formulated in response to the increasing fertiliser prices.

While yields were generally good, poor harvest pricing has meant cash flows are minimal and planning is based on sound, reliable crop options.

Wheat

Wheat yields ranged from 3.5 to 5.5 tonnes per hectare. However, those who chose not to control stripe rust achieved only 2 to 2.5 tonnes per hectare.

Most crops were under-fertilised. Crop yield targets for nitrogen topdressing were 3.5 tonnes per hectare for wheat up to mid-September. The decision to apply more nitrogen was difficult given the unlikely scenario of achieving greater than this with the opening rains arriving six to eight weeks late. (The remarkable did happen though with a decile eight spring). As a result, protein contents were lower thus producing lower quality grades. The majority of extra yield came from the larger head sizes resulting from the cool, damp spring conditions with wheat heads producing 30–50 per cent more grain than average.

The conditions were unfortunately ideal for the onset of late crop diseases such as Septoria nodorum and Fusarium head blight in the wheat.

The management of stripe rust was also an issue. One key lesson was that whatever product was used, it must be applied before, or at, the very early onset of infection to get best results. Once the infection had advanced, only the better products such as tebuconazole and epoxyconazole were of value.

Those who chose not to control stripe rust achieved 2 to 2.5 tonnes per hectare as opposed to the district average of around four tonnes per hectare.

Selecting new wheat varieties to trial on-farm for stripe rust resistance is very topical. Growers should base their selection primarily on the best gross margin return rather than on stripe

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rust resistance. With the NVT trials recently released, growers should note that no stripe rust treatments had been applied.

Barley

Barley didn't utilise all the late rain like the wheat. Yields were average – three to four tonnes per hectare. The biggest disappointment in this region came when prices crashed midway through harvesting.

Canola

Canola crops yielded between 1.5 to 2.5 tonnes per hectare. Like wheat, most crops were under-fertilised. Crop yield targets for nitrogen topdressing were 1.5 tonnes per hectare for canola up to mid-September. Blackleg and sclerotinea had major impacts on most crops with sclerotinea blamed for 10–20 per cent crop loss late in the season. Local trials also showed up to 20 per cent yield improvement with at-sowing fungicides for blackleg control on varieties with low blackleg ratings (6 to 6.5).

Pulses

Bacterial blight was the largest concern in fieldpea crops during the main season, however, late season ascochyta and water logging also resulted in large losses. Some late sown crops in the drier parts of the region performed well (three tonnes per hectare) but the majority were poor.

Lupins performed well utilising the late rains yielding approximately 2.5 tonnes per hectare. With good harvest prices and the ability to graze stubbles due to the lack of summer rains, lupins presented the best gross margins for most growers.

With better disease resistance coming through new lines, faba beans are likely to increase marginally in area.

Trends for 2006

Due to price exposure at harvest, grain storage and alternative marketing options were taken up in greater number and are likely to increase this season. Sausage bags probably resulted in 20 per cent of grain stored on-farm across the region. At the moment SWAP markets are providing a good alternative for price risk management for 2006–07 and 2007–08 harvests.

On a more sour note, the major development impacting the region is the reduction in groundwater allocation. Significant capital improvements such as centre pivot irrigation have been undertaken in the past 12 to 24 months and now some irrigators stand to loose more than half their allocations.

Property values

Property values have generally stabilised over the past 12 months; however, they remain strong. Bare land with no improvements in a 500 mm rainfall zone is around $2500 per hectare. The 550 to 600 mm areas with no improvements are around $3500 per hectare. Improvements such as house, shedding or water allocations add around $750 per hectare to the values.

Corey Uebergang
IK Cardwell, Corowa

New South Wales

Eastern Riverina

Season 2005 proved challenging. It was 'just average' in terms of moisture and, in particular, commodity prices. The regular cycle of medium-to-low rainfall is now a common occurrence.

A very late start to season 2005 saw a decrease in canola planting and growers tending toward trying their luck with barley and late wheat with even an increase in the area sown to fieldpeas. No doubt some were nervous about the world pricing but most were aiming for higher yields to compensate. Many were able to lock in locally with good on-farm wheat prices obtainable throughout September–October. This helped growers' gross margins but on the diminishing harvest prices, those who already locked in were grateful of increased returns. After a kind winter and soft spring, yield potential remained slightly above average.

Spring and early summer rains built up some soil moisture and weed control was a high priority after the completion of harvest. January and February were extremely hot and dry. Cereal growers were generally happy to avoid having to use knockdowns. The long, hot, dry summer helped to keep the green bridge to a minimum and hopefully will have an affect on the incidence of stripe rust in the 2006 season.

Much of the area had average rainfall of between 750–900 mm. Most of this rain fell in the latter part of the season, with some falls at the beginning of the harvest of around 50 mm. This was not good for the growers who had hay sitting on the ground in early November.

With a lot of grain still stored on-farm, there will be pressure on growers needing the space for cropping inputs to market their grain in coming months. Many growers have tried the sausage bag storage system and general comments were good with only isolated problems.

Even with grain prices looking to be slightly above average in 2006, the anticipated higher input costs may see a decrease in cropping and a swing towards the currently more reliable livestock market for more consistent returns.

Wheat

Wheat has certainly been an interesting crop this season. Predictions were for lower yields, so nitrogen applications were generally reduced. Those who did apply nitrogen gained the benefit of higher yields. Average yields were 3.2–3.5 tonnes per hectare, with some five tonnes plus crops being the standout.

Many growers were able to deliver higher than expected AH quality grain, which helped to relieve the low commodity prices.

With the rust epidemic, many new resistant varieties were sown to avoid spraying. The results were reasonably successful across these varieties. Post-harvest analysis of yields and quality will play a big part in farmers' decisions to switch varieties.

Management of stripe rust (yellow rust) proved challenging. Spraying was done on almost all varieties and farmers have become more vigilant with regular monitoring of crops. This will allow more effective analysis of the range of programs used. While there looks to be no immediate end to the rust saga, hope is just around the corner with potential resistant varieties and good management.

With the rust epidemic, many new varieties were sown to avoid spraying. The results were reasonably successful across these varieties. Post-harvest analysis of yields and quality will play a big part in farmers' decisions to switch varieties.

Barley

Barley, in most cases, either yielded the same as wheat or better. Most growers were able to achieve malt grade with many taking the early cash prices with the majority going to export. A lot of the barley was put in late with few inputs. It is expected that the area under barley may increase in the 2006 season due to the good steady yields and commodity prices and also the difficulties with rust problems in wheat.

Canola

Canola yields and oil content were, surprisingly, generally a little bit better than expected. The reason was the soft finish to the season. At sowing time, many growers opted to avoid canola due to the late start, and wisely chose barley. Those who grew canola were happy with the 1.5 to 2.5 tonnes per hectare yields with oil content around 40 to 45 per cent. However, there were many variations in the district with crop varieties, sowing times and germination dates all differing.

Pulses

Pulse crops such as lupins and fieldpeas were well suited to the conditions in this past season. Against the odds after a late start, lupin and fieldpeas achieved yields of 2.0 to 4.0 tonnes per hectare and faba beans managed an extraordinary 2.8–3.8 tonnes per hectare. Windrowing proved popular and cost-effective but timing was important to maintain quality.

Bacterial blight was aggressive in fieldpea crops with little result from fungicide sprays seen this season. Regular updates were sent to all growers to keep them informed.

Trends for 2006

A small swing from other pulse crops into lupins maybe seen. But growers need to be cautious of the increased disease risk in lupins with any increases in area sown and the shortening of rotations. Seed treatments will play an important role.

In 2006, pre-planting nitrogen is expected to be down on previous years with many opting to top-dress as the season permits due to the high input costs for sowing. Incitec Pivot research indicates that by utilising their nitrogen budgeting techniques, yields have increased by greater than 10 per cent when nitrogen is applied strategically at the post-emergent stage in crops.

Fat lambs will certainly be on growers' minds with returns again expected to be, in some cases, better than cropping. This trend will continue in most mixed farming operations in our region.

Property values

Good cropping properties have been holding their value at around $2500 per hectare with yield potential around three to four tonnes per hectare. The isolated peaks seem to have gone out of the market and prices remain steady. There are two benchmark properties (larger holdings) coming up for auction in the next few months and they will be indicative of current market values.

Craig Sharam
Agronomist Elders Albury

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Central West and Western Plains

To say 2005 was an amazing year would be an understatement. If someone told you in January that it wouldn't rain until late June, you would be sowing into August, then in the traditionally lowest rainfall months of September and October you would receive at least double the average rainfall if not more and you wouldn't be harvesting until December with sensational yields — you would have been laughed out of town (or made some nice money through bets – one farmer wanted to bet me my ute he wouldn't make anything out of farming in 2005!! Oh, what could have been…). I wonder when we will see barley harvested in December in Coonamble again?

Seasonal conditions were perfect and freakish with an unbelievably mild finish to the 2005 cropping year. Harvest was simply an amazing time. I doubt enough photos were taken of the large crops sown in late July–early August that yielded up to the 4.9 tonnes per hectare mark. Protein levels were good although some screening issues were encountered.

There were a few crops sown on some isolated storms received in May. These started to struggle toward the end of August from lack of rain and suffered a yield check. The dry-sown crops at Nyngan also fall into this category, in particular the barley with a shorter growing season. Subsequently, the yields were lower here than in the rest of the district. Barley was the main victim with screening levels well into the 40–50 per cent in some instances.

Crops around Quambone were also affected by the drier spell. It seemed to be the case that the earlier sown crops, where people were lucky to fluke a storm, did not perform as well as those sown in July (when the bulk was sown).

Hail was a common yield inhibitor in a lot of the Central West, in particular the Parkes through to West Wyalong area — some paddocks being hit more than once and some with 100 per cent damage.

Crop choice was limited mainly to cereals due to the late break – some pulses went in and only the isolated crop of canola.

Wheat

Wheat was yet again the dominant crop, with a lot of the paddocks ear-tagged for a rotation crop sown down to cereals (read wheat and barley). This was due to the late break in the season and the lack of knowledge about how the rotation crops would perform after being sown so late. Sowing rates were increased to reflect the shorter growing season. Some farmers dropped fertiliser out of the equation to save costs but this was false economy I believe.

Tim Whiteley in a linseed crop on 'Gunnegaldra', Warren.

Yields were all over the place, with Warren probably averaging 2.4 tonnes per hectare, with higher yields both east and south of up to 4.8 tonnes per hectare.

Quambone and Nyngan were lucky to hit the two tonnes per hectare mark.

Stripe rust was an issue across the whole region, even in the drier areas. Much spraying was undertaken but more questions seem to have been raised than solved through the season. It was the high levels experienced in varieties that had a rating of four that caused the most headaches, wondering if and when the adult resistance would kick in. "To spray, or not to spray? — that was the question".

Many growers were forced into a corner and planted H45 due to the lack of other suitable later varieties.

Crown rot levels were unbelievable in 2005 and cut back yields in some paddocks, mainly in crops on heavier soils. This forced many growers to re-evaluate crop sequencing plans in 2006.

Barley

Barley areas were way up due to the later plantings. In the more marginal areas yields were disappointing due to the dry spell and also due to barley being quicker to finish than wheat. Further to the east, yields were spectacular in some cases. Yields above 2.4 tonnes per hectare were the norm and some reported above the 6.5 tonnes per hectare mark.

Net and the spot form of net blotch, scald, powdery mildew and falling over disease all presented themselves. Harvesting many of these crops was a nightmare as they were very flat, which led to some very cranky header drivers!!

Leaf diseases were more prevalent than normal due to the fact that many crops where sown back into barley stubble and conditions were moist and humid.

Pulses

Pulse crops were also greatly reduced in area. Only a small number of Albus lupins were sown in the Quambone, Gular and Coonmable areas. Fieldpeas were probably the most popular of the pulses sown and the planting window here was certainly pushed to its boundaries.

Crops such as fieldpeas and chickpeas fared very well with the soft finish and mild temperatures through to harvest. They

A healthy lupin crop at Quambone.

did not experience the extremely hot winds in September that we have seen in recent years that have caused flowering crops to abort.

The fieldpeas were awkward to harvest due to the wet weather, which made them sit flatter. The new variety Yarrum seems to be as flat as the Morgan crops in a number of paddocks (more cranky header drivers).

Both chickpeas and fieldpeas had some disease issues with ascochyta and powdery mildew respectively.

Fodder crops

Hay making was very tedious and frustrating with the showers about in October and November. Some cut crops were just left on the ground to rot. A number of paddocks that were to be undersown to lucerne this year were planted straight due to the late season. These plantings resulted in some lovely stands. Some sown in August were cut for hay in December!

Summer cropping wise, there has been quite a number of forage legumes sown, in particular lab lab and cowpeas and more so in the north of the region. The success of these was determined by the summer storms. We are yet again in a very dry pattern in the Central West with many farmers feeding flat out again.

Sorghum was also grown for forage and the occasional grain crop was sown.

Cotton

The cotton area was way down due to the low water allocations but the crops that were planted look very promising, with good fruit retention although the hot weather has led to short turn-arounds between irrigations. Defoliation is in full swing.

Trends in 2006

There will be a trend towards rotation crops this year as farmers are seeing a continual yield decline in wheat-on-wheat paddocks. The 2005 season saw many forced into a corner with no options other than to put a cereal on cereal. The main question in 2006 will be to determine which paddocks have the worst disease status as we obviously cannot put whole farms under alternate crops. The current high price of fertilisers has also created an increased interest in nitrogen fixing legume crops.

The new chickpea varieties are providing a lot of discussion and fieldpeas will continue to gain favour.

Forage crops will increase in area due to the strong state of the livestock game. The dry summer may see farmers needing to replenish feed stocks as well.

Property values

There have been a number of sales recently in the Narromine area with prices consistently around the $1050 per hectare mark. Gilgandra has had a number of sales around $1110 per hectare.

Penny Heuston
Heuston Agronomy Services

Southern NSW

With the 2005 break not happening until early-mid June, the season was not looking the best. But the yields that were achieved, given the late start, were remarkable – many wheat crops had a water use efficiency of around 20 kg per mm of rain.

Wheat

Wheat yields looked very promising leading into spring, but only patchy spring storms resulted in harvested yields in a range of 2.5 to 4.5 tonnes per hectare. Some achieved up to five tonnes where the spring storms fell.

Quality was a mixed bag, with screenings ranging from 3 to 20 per cent. Stripe rust, crown rot and take-all (due to low yielding break crops in the past few years) and high barley grass carryover were the main culprits. Crop potential was also set reasonably high coming into spring, so those areas that missed out on good spring rain had problems with high screenings.

Protein was generally lower then anticipated with levels from 13 down to as low as eight per cent. Nitrogen rates have been reduced considerably in the past two to four years and it showed in last season's protein levels.

Barley

Barley yields were up to 6.0 tonnes per hectare, with the average ranging from 4 to 4.5 tonnes. Screenings were highly variable, up to 30 per cent in some areas. A high percentage of barley made malt, with feed quality generally stored on-farm.

Net blotch was the major disease of the season and it reduced yield in many crops. Barley scald and mildew were also present in isolated areas.

Many crops put on heavy growth and a lot of these lodged in the spring storm areas. This problem showed the importance of variety selection – stronger straw strength varieties 'stood up'.

Canola

Canola yields looked very promising all year considering the late planting. Yields were in the 2.2–2.5 tonnes per hectare range. Oil was generally quite good ranging from 38 to 47 per cent, with the average being around the 42 per cent mark.

Sclerontina was a huge problem in isolated areas, reducing yield by up to 25 per cent.

In the areas of lower yields, moisture pinched off just at the end of the season, which reduced pod grain fill.

With the reduced yields of canola in the past few years, and low price, growers have not been overly confident in the crop and this has showed up in the greatly reduced plantings.

Pulses

Fieldpea area increased in the Central West. Lupins and chickpeas remained on par with the previous few years, which is down on the long-term average due to the late breaks.

All pulses responded to the mild 2005 spring with fieldpeas achieving yields of between 1.8 to 2.5 tonnes per hectare and lupins averaging close to 2.2 tonnes.

Fodder crops and pastures

The higher rainfall and cooler conditions of the upper slopes and tablelands have been the main production areas for fodder crops. Excellent results are being achieved with the dual returns from grazing and grain. But the longer growing season has encouraged a build-up in the levels of stripe rust in some varieties and in 2005, a substantial increase in the number of reports of the crippling disease wheat streak mosaic virus.

In other areas large oat plantings have provided an ample source of fodder for both grazing and hay/silage production.

For the first time in some years, reasonable areas of improved pasture were successfully sown in 2005. Existing pastures had deteriorated badly after several years of poor rainfall and heavy grazing pressure.

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Trends in 2006

In the past few years the trend has been into cereal on cereal on cereal as the break crop options have been too costly to produce for the yields gained. In 2006 we will see a swing back into canola if there is an early break. If not, there will be a big increase in the area of chickpeas, with fieldpeas remaining stable.

With the good return from lambs, grazing wheats will be at the forefront if an early break occurs.

Canola is trending towards triazine-tolerant varieties as they are yielding as well as conventional types. The triazine chemistry is leaving the paddocks exceptionally clean going into the following wheat crop – and it's a great weapon for battling herbicide resistance.

We will see a huge swing to new rust tolerant wheat varieties such as Ellison, Ventura and Carinya. These varieties have performed very well in terms of yield and quality and they have shown excellent disease resistance.

Trends in property values

We have seen the price of country ease back from the large hikes of the past three years. Country has not declined in value, merely levelled out. In small pockets were there are plenty of local buyers with few genuine vendors, property is still bringing record prices. But 80 km away, you can find a reasonable quantity of properties listed for sale with no genuine buyers.

Medium to high rainfall, excellent cropping/fattening country is selling for around $1700–$3200 per hectare (average wheat yields of 4.0–5.5 tonnes per hectare). Medium rainfall area properties (2.5–4.0 tonnes per hectare wheat yields) are making $1100–$1850 per hectare.

There has also been a great increase in the leasing of rural property in the past three years with prices ranging from $60–$110 per hectare (around $75 is the average).

Jim Cronin
Landmark Agronomy, Forbes

Liverpool Plains

Although we had a late start to winter, the Liverpool Plains was more fortunate than other regions with good winter rain providing growers with reasonable yields. Spring rain was variable throughout the region but enough to lure many growers into a greater than average summer crop area, only to be hit by one of the hottest and driest summers since records were first tallied. It reminds us of the reality of farming when we fall from the penthouse to the bottom floor in such a short period.

Despite being one of the better winter crop seasons, disease and grain quality were the biggest issues for growers. There was no rhyme or reason to variations in protein, screenings and grain weight when it hit the silos – growers and agronomists are still none the wiser. Prices received were below average but durum proved to be the only shinning light with many achieving DR 1 and 2.

WINTER CROP

Wheat

Strip rust and Fusarium head blight (FHB) were the more prevalent diseases in most varieties, especially the early sown dual-purpose wheat varieties of Whylah and Marombi. Although durum had some stripe rust pressure it appeared to retain its green leaf area at the flag stage. The incidence of FHB on the other hand seemed to be worse in the durums but surprisingly, growers were not punished at the silos.

Overall, yields for all wheats were reported to be anywhere from half to one tonne per hectare below average.

Barley

Quality confused us the most with light grain weight, high screenings, and high and low protein. There was more late barley planted to the south of the region with this problem but it was still evident in the northern areas which had an earlier sowing. There was a dry period over November (mainly the southern areas) which may have been the problem, but recent comments by industry cereal breeders suggest higher than average seasonal temperatures may have contributed to light grain weight and variances in protein, especially in the newer varieties such as Gairdner and Binnalong. The net blotches lingered in many crops devastating some of the more susceptible varieties like Tangangara. General yields were down on the average and overall, malting quality was scarce.

Canola

There was very little canola planted throughout the region – about five per cent of last year's area. Yields were admirable at 2.2 tonnes per hectare, which was up on the five-year average. Oil content is still the main concern for many varieties that perform well on the Liverpool Plains. Since the industry has lifted the minimal oil thresholds, we need varieties that can yield well in both tonnes and oil quantity. There were isolated outbreaks of aphid pressure and heliothis was widespread.

Pulses

Overall, the areas sown to pulses were significantly down on most average years. Faba beans were the predominant pulse crop grown and yields were surprisingly good ranging from 1.8 to 3.0 tonnes per hectare. I am not aware of any chickpeas grown last winter. Some growers tried fieldpeas but standability issues still need to be addressed with current varieties. Fieldpea yields varied with the ability to harvest pods off the deck but typical results ranged from one to two tonnes per hectare.

SUMMER CROP

Sorghum

To date, about 20 per cent of the sorghum crop has been harvested. This will be the year for the 'zero–tillers' who stored more soil moisture over the fallow period. Paddocks with good starting soil moisture will prove to be the best performers in the lowest rainfall areas. Lack of in-crop rain and unseasonably high temperatures throughout the critical flowering and grain stages will limit good summer crop yields. Areas to the south have recorded the driest four months on record with less than 50 mm of in-crop rain, mostly in less than 20 mm falls. Very isolated storms to the north have saved some dismal crops from being baled or grazed. Yields are ranging from 1.2 – 6.0 tonnes per hectare and most will harvest sorghum-2 grade or less.

Sunflowers

It has been a sad story for sunflower producers. Many may not breakeven. Crops have suffered worse than sorghum and Rutherglen bugs have been relentless. I have never seen such high insect pressure in sunflowers before. Numbers became impossible to count so most crops had two, and some three, aerial sprays. Heliothis damage was underestimated and with limited options for effective control growers were slugged with high in-crop costs. Dryland yields varied from 0.8–1.6 tonnes per hectare with high screenings and low linoleic levels

but grain weight was surprisingly adequate. Stockfeed rations will see a lot of sunflower this year. Irrigated yields obviously performed better at two to three tonnes per hectare.

Mungbeans

Mungbean crops scattered around the area struggled to perform on limited moisture. Thankfully, mirid and heliothis pressure was mild with one or two cheap mirid sprays needed to maintain flowers and pods. Quality should be good this year with the dry finish and hopefully growers will achieve sprouting prices at $650-700 per tonne. This may compensate for below average yields of between half to one tonne per hectare.

Corn

Potential yields on irrigated areas were hit hard over the demanding stages of the crop. Most growers could not keep enough water up to the crops especially over the short, critical period at the start of tasselling through to black layer. On average, water use efficiency was well down on last year and most growers felt they used an extra 1.5 to 2.0 megalitres per hectare. Some had cotton to manage as well, so the corn was sacrificed for the higher valued crop. Early estimations suggest that this may have cost them at least two tonnes per hectare on their corn yield.

Despite this there are still some rewarding yields coming in at 7.0–13.5 tonnes per hectare. The better of the dryland yields (4.5 tonnes per hectare) were planted early in September and escaped the extreme heat at tasselling.

Cotton

Dryland skip-row cotton will perform well in isolated areas which had decent in-crop rain. The margins on five bales per hectare leaves grain margins for dead but breakeven prices at current costs are nearly 3.2 bales per hectare. These are risky margins in drier years especially considering the re-cropping interval over the long-term. There is currently a skip row Bollguard trial in the southern area which has long been considered a traditional grain area.

Results are yet to come in but considering the dry season, it may become a viable option to sorghum with the current poor feed prices. Expected yields throughout the region will vary between 2.5–5.5 bales per hectare.

Summary

Overall, many growers have questioned the viability of cropping at present with low commodity prices and high fuel and nitrogen costs. Some are starting to accumulate cattle numbers in the back paddock, which are now bulging out onto cropping areas that are suddenly going under oats. This will probably become a stronger trend until either grain prices improve or input costs retreat a bit. Hopefully the cattle price will hold.

There have been very few properties change hands of late, which reflects growers' current concerns with high land values, low commodity prices and high input costs. Irrigation country appears to remain steady at $5000 per hectare but growers are finding it hard to value the water until allocations have been sorted out. Another hurdle for growers is the lack of skilled labour, and since the resource industry is commanding high prices for coal, the Liverpool Plains could well see a labour shortage in the rural sector.

Jim Hunt
Landmark – An AWB Company, Gunnedah
(with input from Nick Parke – Pursehouse Rural, Gunnedah & Peter Mackenzie – AgVance Farming group, Quirindi)

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Northwest NSW

Sporadic, below-average rainfall across the Northwest Plains during 2005 made for a difficult year for many growers. The average annual rainfall for Moree is 585 mm and a total of 523.8 mm was recorded in 2005. Almost half of this rain fell in late June when 212.8 mm was recorded at Moree airport.

Prior to the June rain, only a small area of winter crop had been planted following some isolated falls in the western and north-western parts of the region. The late break meant that many growers had to re-evaluate their winter crop options. A lot of growers chose to grow a reduced area of winter crop and fallow country that had been prepared for winter crop, through to a summer crop.

The majority of winter crop that was planted received very little rainfall during the growing season and also had to contend with two weeks of hot weather in early September. These conditions, along with later-then-optimum planting dates, took their toll and led to low yields and high screenings in most crops across the region.

The 2004–05 summer crops started promisingly with good subsoil moisture and reasonable rain early in the season. Unfortunately, patchy rain and hot weather during December and January caused lower yields and quality issues for some growers. Crops that were lucky enough to be under some of the summer storms preformed reasonably well.

Wheat

An area of approximately 619,500 hectares of wheat was planted in 2005. This was well down on the 2004 crop due to the late planting rain. Average yields were also down on 2004 with averages ranging from 1.5–2.75 tonnes per hectare. Very little in-crop rain, hot temperatures in September and incidences of stripe rust and crown rot all took their toll on yields and quality in many crops across the region in 2005.

Barley

The area of barley planted in 2005 was approximately 180,000 hectares. As with all winter crops, this was well down on 2004 figures. Yields ranged from 2.2 tonnes per hectare in the west to three tonnes in the eastern parts of the region. Quality was an issue with low test weights and high screenings causing trouble for some. The bulk of the barley crop went to feed grade, whereas in 2004 about 50 per cent of the crop went to brewers.

Chickpeas

Approximately 48,000 hectares of chickpeas were grown in 2005. Over half of this area was grown in the Walgett area where 25,000 hectares were planted. The average yield in 2005 was 1.5 tonnes per hectare. This was a similar average to the 2004 crop. Due to the lack of rainfall throughout the season, ascochyta was not a major problem for most growers but the majority of crops needed at least one treatment for helicoverpa.

Faba beans

Due to the lack of early rainfall, a reduced area of faba beans was grown in 2005. A total of 20,800 hectares were planted with the bulk of this area being to the west of Moree. Most crops planted in April were sown into wheat stubble with varying results in germination – ranging from reasonable to good. Average yields were 1.9–2.1 tonnes per hectare. Some of these earlier crops didn't preform as well with yields getting down to 1.3 tonnes per hectare. Most crops required treatment for helicoverpa.

Other winter crops

Small areas of fieldpeas, safflower and canola were grown in 2005. The areas of fieldpeas and safflower were up on 2004, while the canola area was down significantly due to the lack of early rain. Fieldpea yields averaged 1.8 tonnes per hectare, safflower yielded 0.8 tonnes hectare and canola averaged 1.7 tonnes per hectare.

Sorghum

Sorghum was off to a great start in 2004–05 but unfortunately a lot of crops ran into a hot, dry finish which took the edge off some potentially good yields. An area of approximately 57,700 hectares was planted for an average yield of three tonnes per hectare in the west to 3.5 tonnes in the east. Crops that were lucky enough to be under storms and avoided the heat at flowering time averaged well above this. These yields were much the same as 2003–04 sorghum crops while the area planted was down on the previous season.

Sunflowers

Approximately 17,700 hectares of sunflowers were planted in 2004–05, which is almost identical to the area planted in the previous season. Yields averaged 1.8 tonnes per hectare for early planted crops while the later crops didn't fair as well averaging only one tonne. This is the exact reverse of what occurred in the 2003–04 crops. Heat and moisture stress affected the quality as well as yield in many crops with low oil content and test weights causing trouble for some growers.

Pulses

An area of 10,700 hectares of mungbeans were grown in 2004–05, almost double the area from the year before but the average yields were down. Yields ranged from 0.6–1.1 tonnes per hectare. The area of soybeans planted was also up on 2003–04 with 4500 hectares being planted in 2004–05. Mixed results were achieved with yields ranging across the region from 1.5–3 tonnes per hectare. Most mungbean and soybean crops required treatment for mirids early in the season and helicoverpa later in the season.

Property prices

Property prices in 2005 have remained strong across the region. Prices range from $865–$1235 per hectare for country in the west to $2720–$2960 per hectare for country in the eastern parts of the region. Country in the highly sought after, and tightly held, 'Golden Triangle' (Croppa Creek-Northstar-Crooble) area has sold for over $3211 per hectare recently.

Cropping trends

Winter pulse crops are becoming more popular each year with growers in the Northwest. This is due to a number of reasons, which include; lagging wheat prices, the nutritional benefits of a legume rotation and the management of crown rot through the use of break crops. Another reason causeing growers to look at pulse crops this season is the current costs of the inputs required to grow a high yielding cereal crop. This, and the necessity for a large number of growers across the region to grow a break crop for crown rot management, will see an increased area of chickpeas and faba beans being grown in the Northwest this winter.

Scott Rogers
Agronomist, Landmark-an AWB company, Moree

Queensland

South Burnett

A mood of pessimism is in the Burnett at present. After a positive start to the 2005–06 cropping season, the region has fallen in a heap again due to higher than average temperatures and well below average rain. For many farmers this means two disastrous seasons in a row.

Summer crops of sorghum, peanuts, millet and corn were planted. Overall, crop areas were similar to last season with peanut areas slightly down and the balance taken up by sorghum and corn.

Irrigation water is the big issue with bores dropping and J.Bjelke-Petersen Dam down to seven per cent by March 2006 and dropping daily. There are no more allocations for next year unless we get some big rains to give a lot of run-off.

Peanuts

The 2005 peanut crop, harvested in autumn, will go down as one of the worst on record. Some growers, for the first time, did not thresh their peanuts and instead elected to bale the crop. Yields ranged from zero to two tonnes per hectare and averaged about 0.7 tonnes per hectare.

For many growers the 2006 crop is not much better. It started out well with good rains in spring and the crop looked good until the end of December. Yields are well below the level considered to be viable and will come in under one tonne per hectare. Most growers would be budgeting on yields between two to 2.5 tonnes per hectare.

Downgrades due to quality issues are acutely compounding the poor crop yields. Penalties for aflatoxin contamination have also been high. Grower returns have dropped from $600 –$700 per tonne down to $200–$250 per tonne for high levels of aflatoxin. It is fortunate that the peanut industry has invested in technology to remove poor quality peanuts before they get to the marketplace. Peanut prices are down due to a decline in world prices.

Peanut rust has been a problem, with the poor yield potential and significant infections, the decision whether to spray with fungicide has been difficult.

Corn

Most of the crop was off to a reasonable start but many corn crops burnt off and yielded only 25 per cent of the expected three to four tonnes per hectare.

Growers were quite pessimistic about planting corn for the 2005–06 season as there were still significant amounts of last season's corn in silos. Many growers were not holding out for a particular price — the buyers were just not there. Much of the corn slowly cleared over the growing season. Prices are improving as the dry weather impacts on grain crops. Autumn prices are starting to reach $180 per tonne compared with $20 less than a couple of months ago.

Sorghum

This crop was also off to a reasonable start. But the dry and heat also took its toll. Yields are around one and a half to two tonnes per hectare compared to the longer term average of three to four tonnes.

Other issues to surface this year include cutworms and rutherglen bugs. Heliothis also gave quite a few sorghum crops a touch up.

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Pulses

The area planted to pulse crops in the Burnett is now quite low. Soybeans, mungbeans, adzuki beans and navy beans are all well and truly minor crops.

The severe heat affected emerging bean crops and soybeans. Adzuki and navy beans needed replanting. Insect pests such as heliothis, pod-sucking bugs and mirids were not serious problems this year.

Fodder crops

Failed corn crops have been silaged. There will be a real shortage of lucerne hay this year as irrigation water supplies dry up.

Wheat

After a good start, the wheat crop hit the wall in the September and October heat. Rains then affected the low yielding winter crops at harvest with yields typically under one tonne per hectare.

Many had shot grains and proved very hard to move. To add to the poor winter crop season, stripe rust was officially recorded in the South Burnett for the first time.

Trends in 2006

The area devoted to eucalypt plantations is steadily increasing and some of the better cropping country is starting to go under trees. In a report in the *Courier Mail*, the company Forest Enterprises Australia, stated that they currently have about 6000 hectares near Kingaroy and are going to try to increase that by about 2000 to 3000 hectares per year up to between 12,000 and 15,000 hectares. This does not include the areas managed by the DPI's Farm Forestry scheme. This means that, very soon, there will be more area under eucalypt plantations than planted to corn or peanuts in the South Burnett.

Great news about the construction of the ethanol plants! This will provide a consistent outlet for grain. I was in the US recently and visited an ethanol plant in Nebraska where 70 per cent of the local corn went into ethanol. Will we reach this level in Australia?

More cropping country is also going under pasture by both cropping farmers and blocks bought by 'lifestylers'.

Property values

Prices for bare cropping land can be up to $5000 per hectare and higher depending on improvements. With the current returns from cropping it is very hard to justify these prices.

Ian Crosthwaite
BGA AgriServices Kingaroy

Darling Downs

Winter 2005 started with some good soaking rain in late May and early June, but the writing was on the wall because many winter paddocks had marginal levels of subsoil moisture. Western Downs areas had the best of the planting conditions. July through to September then turned very dry – in some areas only 30 mm of rain fell over three months – and the rain only restarted once the headers were in the paddock.

Summer planting rain arrived in October and continued into November with a promising start to the season. The SOI and other indicators hinted at neutral sea surface conditions but December turned on a very hot and dry spell, which severely affected all crops. Rainfall arrived in January and February 2006, but as storm falls, interspersed with more hot conditions.

It has been a hard summer for crops. Fallow ground was left with only fair, rather than good, stored moisture levels.

Winter 2005

Sowings were slightly up on expectations for wheat and barley, but very few chickpeas were planted. Western Downs growers managed to plant at almost the ideal time, having the earlier break with the rain, while Eastern Downs growers were planting more into July.

The dry winter, although not particularly cold, affected most crops. In the Western Downs it took the gloss off a potentially top crop, but yields ended up being fair on average, with good quality. Most wheat made PH and screenings were generally low.

But the picture on the Eastern Downs was much worse, with some crops dying in the paddock – a rare and unwelcome sight on the Downs. Those crops on subsoil moisture still had disappointing yields and screenings were high and then the later crops suffered some sprouting caused by the summer planting rains in October. Chickpeas were very average and although it was too dry for ascochyta, heliothis control was needed in every crop.

Winter 2005 yield summary

Crop	Eastern Downs	Western Downs
Wheat	0 - 2.5 t/ha	1.0 - 2.5 t/ha
Barley	1.0 – 2.5 t/ha	1.5 -3.5 t/ha
Chickpeas	0.7 – 2.0 t/ha	

Summer 2005–06

The planting rain was patchy and this proved to be the same through the season: patchy storm rain. There was a move back to cotton on dryland areas because of downward pressure on grain prices but irrigators were hampered by a lack of available water. Some growers moved to gritting corn, which returned to the Eastern Downs with contracts. Sorghum plantings were again strong and similar to last season's record levels.

Sunflowers were back with most of the monos being planted in northern NSW and there was a good later planting of mungbeans and some soybeans. There was also an increase in the area of forage sorghum and other forage crops this summer, as the cattle prices have maintained their strong levels.

There was concern at planting though, with some crops being planted on limited subsoil moisture. The December heat resulted in a number of short fallow sorghum crops almost dying until further rain allowed them to tiller and produce a low yielding crop.

Western Downs areas then had a torrid time through early 2006, missing out on the storm showers, leaving all crops and pastures struggling. January rain saved the Eastern Downs crops but insect pests became the main focus.

Heliothis numbers soared with an influx of *H.armigera* well above numbers of the past few seasons and alongside cotton, grain and pulse crops came under pressure. Bollgard cotton stood up well but needed frequent control for sucking pests, with whitefly coming into the western regions late in the season – not a welcome visitor.

Sorghum suffered its heaviest heliothis pressure for many years. Timely control was very important as was the need for knockdown insecticides to aid the NPV as grubs grew so quickly in size. This was then followed by midge pressure on the later crops, so there has been some insect damage this summer.

Mung and soybean crops have also needed regular mirid and heliothis control.

The result of all this is that these crops have cost more to grow this summer, and as the grain harvest is now underway, yields are coming in below expectations by (up to one tonne per hectare in sorghum).

Irrigated corn, harvested earlier as a result of being planted in the spring, has yielded very strongly and the irrigated cotton yields will be very dependent on the amount of water available. Mungbean yields have also been moisture dependent.

Summer 2005–06 yield summary

Crop	Eastern Downs grain	Eastern Downs silage
Sorghum	1.5 – 6.0 t/ha, up to 7.0 t/ha	20 – 30 t/ha
Irrigated maize	7.5 – 12.0 t/ha	50 – 65 t/ha
Mungbeans	0.7 – 2.0 t/ha	

Winter outlook for 2006

Western Downs areas, where there was very little opportunity to plant much dryland summer crop, will be looking to another strong winter crop, if they can get the planting rain. The Eastern Downs would like the opportunity to plant but after the past two very difficult winters, growers will be more cautious.

However, growers will be looking for the chance to rotate some crops and we expect more chickpeas to go in, as well as growers trying other alternatives such as canola and faba beans further west.

The main requirement is some good rain to provide the confidence to plant.

Hugh Reardon-Smith
Agronomist, Landmark-an AWB company Pittsworth

Central Highlands

Graingrowers across the Central Highlands had mixed fortunes in 2005, with some growers able to double crop, while others did not get a single planting opportunity for the 12 months. Rainfall across the region was variable, although the southern highlands cropping districts (Gindie, Orion and Rolleston) did get excellent widespread planting rain in May and follow up rain in June that resulted in some very good winter crop yields.

Across the Highlands, annual rainfall was generally below average with Clermont receiving 540 mm (81 per cent of the long term mean), Emerald 501mm (79.5 per cent) and Rolleston 594 mm (93 per cent).

The Central Queensland climate is amongst the most variable in the world and the growers in this region have suffered significantly over the past decade with many below average seasons and extended periods of drought.

Sorghum 2004–05

Only 94,000 hectares were planted to sorghum across the Central Highlands from late 2004 and into 2005. This planting resulted in just over 200,000 tonnes of sorghum produced on the Central Highlands with an average yield of 2.2 tonnes per hectare. This average yield was below the long term average for the region of 2.8 tonnes per hectare.

The majority of the sorghum planted in 2004–05 was in the southern highlands, although there was a sprinkling of plantings in the northern highlands due to patchy storm rain. Yields in the northern highlands were in the main, very ordinary, with many crops not making it to harvest. The southern highlands, however, had a better season and consequently moderate yields of up to 2.8 tonnes per hectare were recorded. The best yielding crops were planted into wheat stubble, demonstrating just how effective wheat stubble is in capturing rainfall.

Sunflowers 2005

The area planted to sunflowers was greatly reduced in 2005 with only 2500 hectares planted. This figure is well down on the long term average area planted of 50,000 hectares, due primarily to inadequate soil moisture at planting and the undiagnosed sunflower disorder, which has severely affected grower confidence in the crop.

As mentioned in last year's annual district report, in the 2004 season there was an unknown disorder present in many sunflower crops across the highlands that caused significant dieback in some crops. Symptoms ranged from total death of young plants; shortened internodes; deformed growing points, sometimes silvery or necrotic; reduced root growth and in some cases club roots; and blackening and breakdown of the pith extending to vascular tissue to produce black lesions on the stem, causing the stems to weaken and plants to lodge.

As a result of the disorder in 2004, many growers would not consider sunflowers a viable cropping option until the cause of the disorder had been resolved or symptoms in-crop stopped occurring. In 2005 the same symptoms reappeared, further denting grower confidence in this once widely planted crop.

Opinions are varied among the farming and scientific community as to the cause of the disorder with no one factor standing out as a main cause. Consequently, DPI&F recently appointed a full-time technician to undertake research over 18 months on the disorder. Through this appointment DPI&F would like to identify the cause of the disorder and outline management practices that can be adopted by growers to prevent it from occurring. If successful, this project will restore grower confidence in sunflowers as a viable cropping option for the Central Highlands.

Wheat 2005

Winter crop rainfall across the central highlands was quite variable prior to planting and during the growing season in 2005. The southern highlands received excellent planting rainfall 75 mm to 125 mm, which allowed many growers to double-crop out of sorghum. This planting rain was followed by good falls a month later, which allowed the establishment of secondary roots and a high yield potential for the crop.

The northern highlands, however, had less rain and it was very patchy, with the vast majority of growers unable to plant due to marginal soil moisture. Those who did decide to plant

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Brendan Lynch (DPI&F) and Capella Grower Alan Storey in a young wheat crop at Moonggoo that had just received moderate follow up rain in June, after being planted on marginal soil moisture in May.

were acutely aware that the crop was high-risk, but the need to establish stubble cover was seen as paramount. The growers who did plant (in the main) received enough follow up rainfall to ensure a harvest.

For growers who harvested in early October, stubble cover provided by the recently harvested wheat crop came in handy, as good falls were recorded across the Central Highlands. However, on the southern highlands, approximately 50 per cent of crops were not harvested before the rains, which resulted in losses in the form of sprouted grain and weather damaged crops.

For harvested crops, the range in yields was large due to the significant rainfall variability across the region during the winter planting window and the crop growing period.

On the southern highlands, double-cropped wheat yields ranged from 1.5 to 2 tonnes per hectare, while wheat planted into fallow country ranged in yield from 2.5 to 4 tonnes, with a few growers reporting up to five tonnes per hectare. It should be noted that although excellent planting and follow up rain set a high yield potential for the crop, the dry finish to the season meant that this potential was not fully realized.

Yields in the northern highlands ranged from 0.5 to 1.5 tonnes per hectare, although the real payoff was the establishment of excellent stubble cover, which assisted greatly in wetting up the profile and reducing soil loss during rainfall events in spring.

Overall, 135,000 hectares of wheat were planted across the highlands with 270,000 tonnes of grain harvested at an average yield of two tonnes per hectare. This compares favourably with the average yield for wheat in Central Queensland since 1998 of 1.58 tonnes per hectare.

Chickpeas 2005

The variable rainfall across the Central Highlands meant that the majority of chickpea crops planted in 2005 were in the southern highlands due to the better winter cropping season. Most growers who planted a winter crop opted for wheat over chickpea due to the superior stubble cover that wheat provides. The chickpea planting area for 2005 was in the vicinity of 25,000 hectares.

Moving towards harvest in October, the chickpea crop for the Central Highlands was expected to produce between 25,000 – 30,000 tonnes, however, rains just prior and during harvest resulted in difficult to harvest crops. Consequently, yield was reduced to only 18,000 tonnes across the region with an average yield of 0.7 tonnes per hectare. This yield falls below the long term average yield for the region of one tonne per hectare.

Property sales

Property sales around the Central Highlands were strong but not buoyant during 2005, with demand (for grain properties) largely driven by beef producers looking for suitable country which had the ability to be used for increased production via leucaena, butterfly pea and/or forage crops.

In terms of land prices, on open downs soil around Capella, buyers could expect to pay between $860–$1100 per hectare depending on the level of block development (average production 3.2 tonnes per hectare sorghum and 2.5 tonnes wheat). For similar cropping country on the southern highlands you could expect to pay a little more due to the improved winter cropping opportunities. The price for more fertile scrub soil blocks would be higher again.

Crop prospects for 2006

The crop prospects for 2006 are currently not too good for a large portion of growers in the region. In October 2005, there were widespread rains across the Central Highlands, although the far north of region did miss out. This rain resulted in a number of late spring sorghum plantings, especially around Capella with minor plantings also around Gindie. A number of these crops failed due to extreme temperatures during summer and a lack of in-crop summer rainfall. Crops that have been harvested have generally been quite poor.

The vast majority of current December-planted sorghum crops are located in the northern highlands, as growers on the southern highlands have had one of their driest summers on record. The sorghum that was planted was struggling until some handy rain in early March boosted things along.

This March rain was essentially around the northern highlands, with the southern highlands completely missing out. Around Clermont and Kilcummin rainfall between 75 to 125 mm was recorded, while around Middlemount and Dysart falls of up to 200 mm were experienced. This rainfall is outside the traditional sorghum planting window, hence most growers will opt to store the moisture and hope for follow up rainfall between late March and late May before planting chickpeas or wheat.

Growers outside these areas still require good soaking rains to refill parched soil profiles before a planting opportunity could even be considered.

Brendan Lynch
QDPI&F, Emerald

Rice District Reports

From the RRDC chairman

The 2005 rice season

The crop harvested in 2005 produced around 305,000 tonnes which was the third successive year of low production caused by the drought.

An exceptionally cold period during early 2005 February caused a high proportion of sterile florets in the head of many late sown crops. This caused industry yields to be well below average. This also contributed to the low production year in 2005. This below average yield follows the previous year's yield of 10.2 tonnes per hectare – historically the highest.

The expected price for the 2005 crop is around $265 per tonne based on the return for medium grain.

The current 2006 rice season

"The drought is over – or we hope it is."

Production for the 2006 crop currently being harvested, is expected to be around one million tonnes. Production estimates have increased during the growing season from 830,000 tonne early in the season, to over 900,000 tonne later in the season. The one million tonne estimate is the result of very favourable seasonal conditions – hot weather during January and February. This compares with the 2005 growing season when cold temperatures caused sterility and lower yields.

Above average temperatures during March have made draining decisions very difficult. Some growers may have been caught unaware and drained crops too early. The result is 'haying off' of the crop or the lack of moisture during the grain filling period and maturity phase of the crop. Haying off causes early maturity and rapid dry-down of grain with a reduction in the quality of the grain at harvest.

Despite this situation, the yield for this crop is expected to be above average and may even exceed the highest industry yield of 10.2 tonne per hectare. This will only be confirmed when the crop is 'in the bag', as harvest is occurring as we speak.

Price indications are good at around $280 per tonne, though the optimists think that $300 per tonne is possible.

There is a tremendous amount of optimism about the next season rice crop, as evidenced by the 300 growers who attended the *2006 Rice Field Day* in February.

The next season's crop may be even larger than the one currently being harvested. This is due to a number of reasons:

- The carry-over of irrigation water from the current season;
- The low prices expected for other crops such as wheat and maize; and,
- Growers 'hungry' for liquidity after three years of drought.

However, the size of the crop will ultimately depend on the availability of irrigation water.

Let's hope that the three-year drought is now history and seasons can get back to normal.

Rice Research and Development

Low rice production during the drought years of 2003, 2004 and 2005 had a significant affect on the level of funding for rice research and development (R&D) activities. Expenditure on these activities tumbled from around $3.5 million at the start of the drought to around $2.0 million 2005–06.

The number of projects being funded decreased from 39 to 19 during the same period. But with increased production this season, R&D activity has been cautiously increased to around $2.3 million. Normal production years in the future may see this figure increase, again cautiously.

"With the end of the drought, we are back in business."

Daryl Gibbs, Chairman
RIRDC-Rice Research and Development Committee

Murray Valley

The 2004–05 rice season

The 2005 rice harvest was one of the poorest on record for the Murray Valley. As one local grower said, it was the first time that they made a loss from rice growing in their 32 years of production. The record cold weather in the first week of February caused major damage to all but the very early or very late crops. To make the situation worse, most producers who actually grew a crop did so by 'borrowing' Snowy Water (at considerable cost) and will need to repay that water at some time in the future.

Most growers with Amaroo averaged no better than five tonnes per hectare, with some doing far worse.

The 2005–06 rice season

Thankfully, the current season is a marked turnaround from the previous one. Not only is there much more rice sown than in the last two years, the crops are also looking very good. The establishment season was as good as you could hope for, so most crops were off to a good start. Even those sown in muddy water established reasonably well.

Herbicides were in short supply at the start of the season but most growers seem to have managed to achieve adequate weed control. There were some problems with dirty dora control due to the preferred herbicides being unavailable but very few barnyard grass control problems emerged. The new foliar-applied grass control herbicide Barnstorm gave very pleasing results.

The best feature of the season, however, was the absence of cold night temperatures during early pollen microspore. Mid-January to mid-February were well above average for both maximum and minimum temperatures. For this reason, I have not seen any crops this season that I would call a failure.

It seemed to me that many crops were actually under-fertilsed this season. No doubt this was in response to the cold temperatures of the previous two rice seasons. Growers opted to get a reasonable yield with minimal risk of cold damage rather than experience the higher risk of pushing for maximum yields.

The weather remained quite hot up until mid-March, which caused some crops that were drained too early to have significant areas hayed off. Harvest commenced mid-March, though most growers will not start until April.

The water supply situation continued to improve throughout the season, getting up to 56 per cent of MIL entitlements by the end of the growing season. This is about where many growers had budgeted on it getting to, so they did not have to secure additional water to finish crops.

2005 winter crop performance

Yields form the 2005 irrigated winter cereals were mostly disappointing. This was probably due to the late start to the season and the significant moisture stress that most crops encountered during stem elongation. Many growers were not aware of how greatly the yields were affected until harvest. Yields were often about three tonnes per hectare even though the stubbles looked like they were from much heavier crops.

The only crops that did yield very well were those on beds that were watered in July or early August with river water. Crops on the flat or those waiting for MIL water were substantially lower yielding.

Stripe rust was once again the major disease problem.

For many growers, winter crop production was an exercise in maintaining cash flow, not in making good profits.

Trends in cropping and livestock

Everything points to next season's rice plantings being very large. The water situation should be much better than the past four years. Many growers are quietly confident of full allocations and will be bitterly disappointed if they are not achieved.

Returns per megalitre from rice are currently higher and far more reliable than from winter crops, so that is where growers will concentrate their activities. Most irrigators are currently very strapped for cash and are keen to get back to regular rice payments.

John Fowler
Fowler Agricultural Service, Deniliquin

Western Murray Valley

The 2005 crop

Rice yields in 2005 varied with soil type, fertiliser strategies, paddock layout, variety and sowing date. Yields were down on the 2004 rice crop, but only marginally, which was a welcome surprise.

Amaroo ranged from 7.4 to 9.3 tonnes per hectare averaging 8.7 tonnes while Opus varied from 8.6 to 9.8 tonnes averaging 9.0 tonnes. Koshihikari yields fluctuated between 3.7 and 6.1 tonnes per hectare.

Quest was outstanding with yields between 6.1 to 9.8 tonnes

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per hectare with later sowings yielding less. Earlier sowings with good management fetched the higher yields averaging 8.9 tonnes per hectare.

In many cases, Quest on average, out-yielded Amaroo. With the later sowings due to indefinite water allocations and lack of water allocation, Quest could become the variety of choice for local rice growers.

Only mulching or burning delayed sowing winter crops into the harvested bays. Many rice growers have had great success sowing winter wheats and utilising the left-over moisture from the rice crop.

The 2006 season

The 2006 rice season is quickly coming to an end with many Western Murray Valley crops commencing lock up and beginning to drain water off blocks.

Harvest of the early maturing varieties on good landformed lasered bays will begin as early as March 15. These layouts can be drained quickly and enable trafficability with headers.

Yields are predicted to be on the higher side of average (8.5 to 10 tonnes per hectare) with the good temperatures during pollination and adequate nutrition.

Unlike previous years, the 2006 season has been exceptional for establishment, with quick bay fill-ups, good ground preparation, effective weed control and most importantly, favourable temperatures during both panicle initiation and early pollen microspore.

Rice prices, indicated by Ricegrowers Australia, are between $260–$280 per tonne for the 2005–06 harvest.

This forecast price and predicted yield should put most rice farmers in good stead for the coming winter season.

But rice stubbles may not be sown to wheat given the ordinary wheat price and uncertainty with soft wheat contracts. Instead, pastures such as balansa clover, Persian clover and grazing oats may be grown.

Laurence Pearce
IK Caldwell, Deniliquin

RICE DISTRICT YIELD COMPARISONS (T/HA)

	Griffith (Amaroo)	Coleambally (Amaroo)
1994	9.1	9.4
1995	10	9.9
1996	7.5	6.6
1997	9.3	9
1998	10	10.1
1999	10.1	9.6
2000	9	8.5
2001	10.2	10.3
2002	9.6	8.6
2003	10.9	10.5
2004	9.8	8.7
2005	9.3	7
Average 1994-2005	**9.57**	**9.2**
Last five year rolling average	**9.96**	**9.02**
	Griffith (Langi)	**Coleambally (Langi)**
1994	8.3	8
1995	9.6	9
1996	8.2	7.2
1997	8.6	8.5
1998	9.6	9.8
1999	9.2	8.8
2000	7.1	8.3
2001	9.5	9.2
2002	9.1	7.8
2003	9.9	9.1
2004	8.6	6.8
2005	7.8	6.3
Average 1994-2005	**8.8**	**8.23**
Last five year rolling average	**8.98**	**7.84**

Coleambally

2004–05 rice crop

The average Amaroo yield of seven tonnes per hectare was the lowest since 1996 and much lower than the 9.2 tonnes per hectare average (see chart). Temperatures were also the lowest on record for February, when many crops were at the critical stage of reproductive development.

2005–06 rice crop

The 2005 rice crop got off to a good start. Rice establishment was better than average. Above average temperatures at the end of October and early November assisted the October sowings. Less wind also aided establishment.

In contrast to the three previous drought affected seasons when water allocations were low and uncertain, farmers have sown most rice on time with 85 per cent sown by the end of October. The rice area is at least double last season's area with the late increases in water allocations resulting in some late crops going in during December.

The crop has been favoured by above average temperatures through most of December, January and February.

Nitrogen uptakes were about average but with lighter shoot weights and higher leaf tissue nitrogen concentrations. The main variety, Amaroo, is heading up to 15 days earlier than expected given the growing conditions. As a result harvest has started earlier than normal and it is pleasing that above average yields are being reported.

Other summer crops 2005–06

There was a big increase in the area sown to soybeans in Coleambally due to the late water allocation increases. Around 2000 hectares were grown and excellent looking crops should yield over three tonnes per hectare. Harvest will start in late March.

Maize areas were restricted due to less contract availability, however, good yields are expected from well managed crops.

2005 winter crop

The 2005 winter cropping season will be remembered as a late season with opening rains not starting until the first week of June.

Overall, yields were disappointing considering the good in-crop rain with wheat yields reduced because of a combination of factors such as waterlogging, lower nutrition levels, stripe rust and late sowing.

Wheat yields averaged 3.8 tonnes per hectare which includes both dryland and irrigated crops. The best irrigation crops yielded around six tonnes per hectare but in general, crops yielded about 30 per cent below their potential.

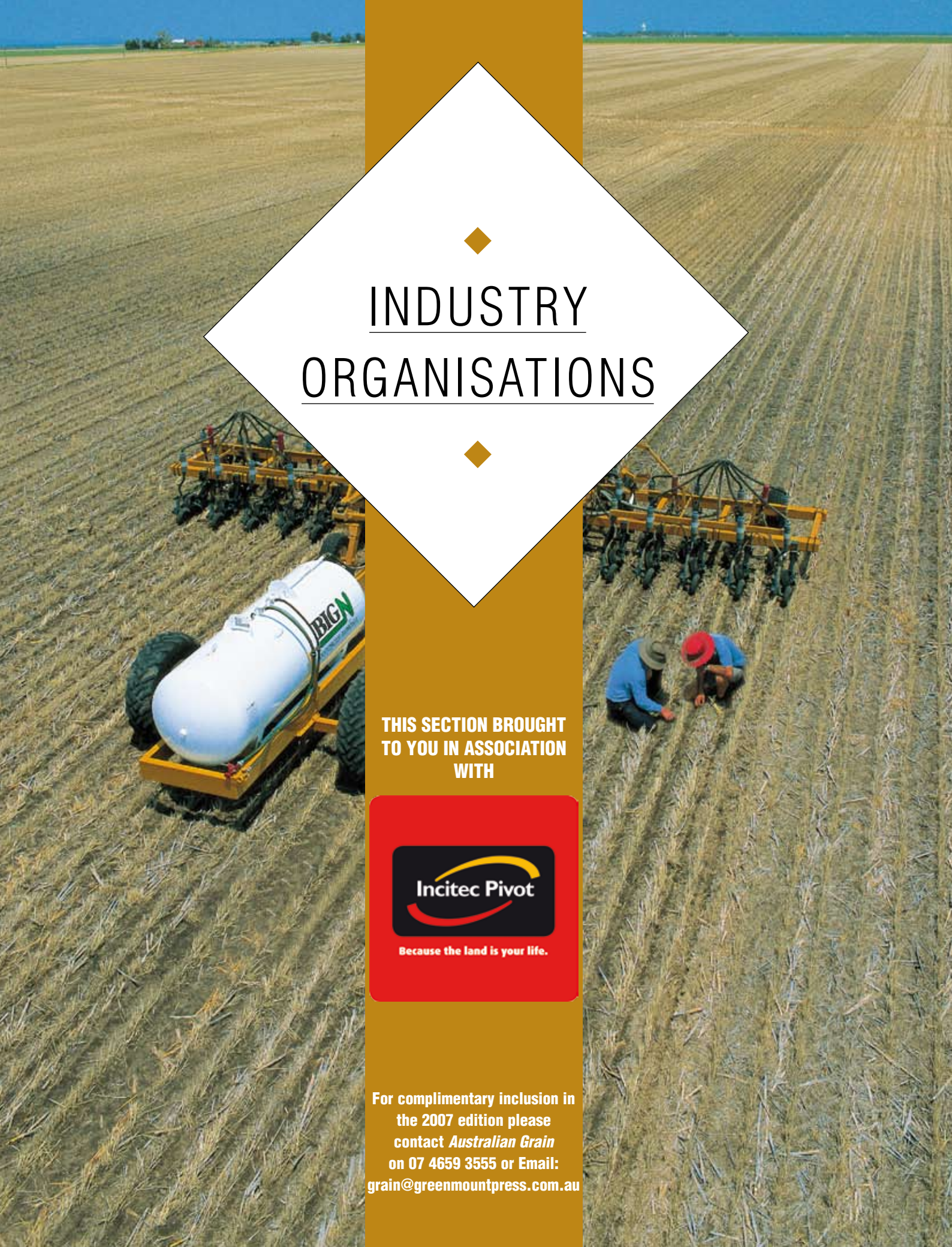
Barley crops averaged four tonnes per hectare for the estimated 10,000 hectares in the CIA. Irrigated barley screenings were high in many crops due to a combination of management, the season and variety factors.

Canola yields, at 2.4 tonnes per hectare, were average with the best crops yielding just over three tonnes per hectare and oil levels in the high 40s. Faba beans averaged 4.2 tonnes per hectare with only a few crops reaching the five tonne level.

Future cropping trends

- Continued focus on maximum returns by value-adding and water use efficiency.
- Increased areas of canola and faba beans are needed to balance rotations, but returns need to improve.
- Relatively stong market demand for rice compared to other crops.
- Good soft wheat contracts are important to winter crop economics.
- Interest in durum wheat production.

Kieran O'Keeffe
District Agronomist (Coleambally), NSW DPI, Griffith



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Rural Industries Research and Development Corporation
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PO Box 4776, KINGSTON ACT 2604
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Email: rirdc@rirdc.gov.au
Website: www.rirdc.gov.au
Managing Director: Dr Peter O'Brien
Email: peter.obrien@rirdc.gov.au

Australian Centre for International Agricultural Research (ACIAR)
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Email: aciar@aciar.gov.au

Web: www.aciar.gov.au
Director: Mr Peter Core

Australian Seed Federation Limited

(formerly Seed Industry Association of Australia)
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Email: admin@asf.asn.au
Web: www.asf.asn.au
President: Mr Tim Teague
Chief Executive Officer: Mr Christopher Melham

Australian Wool Innovation Limited (AWI)

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SYDNEY NSW 2000
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Chief Executive Officer: Dr Graham McMaster
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Land and Water RDC

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Email: Land&WaterAustralia@lwa.gov.au
Chair: Ms Roberta Brazil
Executive Director: Mr Andrew Campbell

Landcare and Sustainable Industries

Acting General Manager: Mr John Cameron
Ph: 02 6272 4624

Natural Resource Management

Executive Manager: Mr Tom Aldred
Ph: 02 6272 4623

NRM Water and Murray-Darling Basin

General Manager: Mr Simon Smalley
Ph: 02 6272 3297

Puragrain Pty Ltd

PO Box 7, NORTH RYDE NSW 1670
Phone: 02 6620 3010 — Fax: 02 6622 2080
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Web: www.puragrain.com.
Joint Managing Director: Dr Graham McMaster
Joint Managing Director: Professor Robert Henry

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Cereal Pathology — Ph: 08 8303 9360
Entomology — Ph: 08 8303 9540
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Ph: 08 8303 9417

WA Herbicide Resistance Initiative

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Faculty of Natural & Agricultural Sciences,
University of Western Australia.
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Chair: Dr Tony Gregson
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CRC for Australian Weed Management

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Program Leader: Dr Steve Walker

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Web: www.wheat-research.com.au
Managing Director: Peter Vaughan

CRC for Plant-Based Management of Dryland Salinity

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Email kgoss@fnas.uwa.edu.au
Chair: Alex Campbell
CEO: Kevin Goss

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Chief Executive Officer: Guy Roth

CRC for Tropical Plant Pathology

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Phone: 03 9209 2000 — Fax: 03 9670 2782
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Managing Director: Mr Thomas Keene

ABB Grain Ltd
124–130 South Terrace, ADELAIDE SA 5000
GPO Box 1169, ADELAIDE SA 5001
Phone: 08 8211 7199 — Fax: 08 8231 1249
ABB Grain Marketing Help Line: 1800 018 205
ABB Storage Help Line: 1800 654 452
ABB Fertiliser: 1800 456 055
Email: abb@abb.com.au
Web: www.abb.com.au
Managing Director: Mr Michael Iwaniw

Cooperative Bulk Handling Limited (WA) (Grain Pool Pty Ltd is a wholly owned subsidiary of CBH)
30 Delhi Street, WEST PERTH WA 6005
Phone: 08 9237 9600 — Fax: 08 9322 3942
Email: info@cbh.com.au
Web: www.cbh.com.au
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Chief Executive Officer: Mr Imre Mencshelyi
Executive Manager Corporate Affairs: Mr Rhys Ainsworth

SFE Corporation Limited
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Mr Jeremy Johnston
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Email: admin@nacma.com.au
Web: www.nacma.com.au
Chief Executive Officer: Mr Geoff Honey

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Email: info@afaa.com.au
Web: www.afaa.com.au

Australian Pork Corporation

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ST LEONARDS NSW 1590
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Australian Association of Nuffield Scholars

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Web: nuffield.com.au
Chairman: Mr Peter Nixon

Australian Lot Feeders' Association

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Phone: 02 9241 6988 — Fax: 02 9241 6986
Email: alfabeef@feedlots.com.au
President: Mr Malcolm Foster
Executive Director: Mr Rob Sewell

Australian Oilseeds Federation

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President: Mr Mark Allison
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Email: fmca@flourmillers.com.au
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Web: www.biotechnology.gov.au

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Level 1, 165 Walker Street, NORTH SYDNEY NSW 2060
Ph: 02 9463 9333 — Fax: 02 9463 9393
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(MDP 54)
PO Box 100
WODEN ACT 2606
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Email: ogtr@health.gov.au
Web: www.ogtr.gov.au
Gene Technology Regulator: Dr Sue Meek

Pastoralists' & Graziers' Association of WA Inc.

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Phone: 08 9479 4599 — Fax: 08 9277 7311
Email: pga@pgaofwa.org.au
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Grains Policy Director: Mr Slade Brockman
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Phone: 07 4162 6311 — Fax: 07 4162 4402
Email: peanuts@pca.com.au
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Managing Director: Mr Bob Hansen

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Phone: 02 6260 4322 — Fax: 02 6260 4321
Email: admin@phau.com.au
Web: www.planthealthaustralia.com.au
Chairman: Mr Andrew Inglis
Chief Executive Officer: Ms Lindy Hyman

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1800 084 881

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Program Manager – Crop Support: Mr John Slatter
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Pulse Development Officer (South East): Mr Trevor Bray
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Mob: 0428 606 886
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Executive Director: Victoria Taylor
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Ricegrowers' Limited - trading as SunRice

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LEETON NSW 2705
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Chairman: Mr Gerry Lawson
Chief Executive Officer: Mr Gary Helou
Secretary: Ms Mandy Del Gigante & Mr Claude Cassar
Email: mdelgigante@sunrice.com.au
Web: www.sunrice.com.au

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NORTH MELBOURNE VIC 3051
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Email: TractorMachinery@access.net.au
Web: www.tractormachinery.com.au
Chairman: Mr Richard Lewis
Executive Director: Mr Vin Delahunty

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AgVance Farming Pty Ltd

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Contact: Peter McKenzie

Birchip Cropping Group

Ms Alexandra Gartmann, CEO
Birchip Cropping Group & Wimmera Farming Systems
PO Box 85, BIRCHIP, Vic 3483
Phone: 03 5492 2787 — Fax: 03 5492 2753
Email: info@bcg.org.au
Web: www.bcg.org.au

Central West Farming Systems — Farmers Advancing Research

P.O. Box 171 CONDOBOLIN NSW 2877
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Email: cwfs@agric.nsw.gov.au
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Grower Group Alliance
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NEWTOWN VIC 3220
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Web: www.sfs.org.au

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Mobile: o427 000 729
Email: ken.flower@wantfa.com.au

Government Grants

For grants administered by departments operating under the Department of Agriculture, Fisheries and Forestry (DAFF) see:
Web: www.affa.gov.au/content/grants.cfm

GrantsLINK (for assistance with federal grants for community projects)
Web: www.grantslink.gov.au
Phone: 1800 026 222
For information on state government grants,
Phone: ACT: 13 22 81
New South Wales: 1800 463 955
Northern Territory: 08 8999 5511
Queensland: 1800 803 788
South Australia: 1800 182 234
Tasmania: 13 62 47
Victoria: 1300 366 356
Western Australia: 1800 198 107

Australian Government Regional Information Service
Web: www.regionalaustralia.gov.au/
Phone: 1800 026 222

Industry Cooperative Innovation Program
Web: www.ausindustry.gov.au
Phone: 13 28 46 ■

GRDC REPORT TO INDUSTRY

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GRDC RESEARCH OBJECTIVES

CURRENT PROJECT INFORMATION

WHEAT PROJECTS

COARSE GRAINS PROJECTS

OILSEEDS PROJECTS

PULSE PROJECTS

PASTURE RESEARCH

MULTI-COMMODITY PROJECTS

SECTION 5
GRDC REPORT TO INDUSTRY

The Grains Research and Development Corporation and Australian Grain present this special 'Report to Industry' — an easy to follow guide to your research levies at work for current and on-going projects. GRDC business highlights and research objectives are reviewed and a comprehensive listing of individual projects is provided.

Projects are indexed (see page 109) and listed according to their relevant commodity group (wheat, coarse grains, oilseeds, pulses or pastures) or under the multi-commodity heading in the case of research covering several grain groups. If you would like to follow-up on any projects, key researcher contact details are also provided.

Lloyd O'Connell, Editor, *Australian Grain*

From the GRDC Managing Director and Chairman

Peter Reading, Managing Director

Terry Enright, Chairman

The pressure on Australian graingrowers to be at the leading edge of new production technologies has never been greater.

The rapidly changing global market is putting enormous pressure on the economics of grain production. And this highlights the urgent need for new technologies that will not only sustain on-farm productivity, but also create new uses for grains (such as specialised functional foods) and therefore new markets.

The harsh reality of Australian rural production generally is you innovate or die. For growers this means continuing to learn about new management and agronomic practices, and the selective adoption of those compatible with their operations and circumstances.

The continuous decline in terms of trade is being compounded by the emergence of China and India as major producers with export potential, and increasing production capacities in Eastern Europe, Russia and Brazil

This creates a major R&D challenge to equip Australian producers with the technologies that can enable them to cope, and ideally, keep ahead of changing market dynamics.

"Innovation is the answer"

Such technologies include ongoing research into minimising the impact of production constraints such as climate variability and soil deficiencies, as well as the development of more robust cropping systems through lifts in management skills, intensity and diversity of operations and technology adoption across the board.

Since the GRDC's establishment in 1990–91, investment in R&D has contributed to an 86 per cent increase in average annual grain production (to about 43 million tonnes), which has been derived from a 64 percent increase in area planted (now about 23 million hectares).

Over this period, the total factor productivity of grain farms has continued to grow at a very impressive 3.2 per cent per annum. The value of the industry has more than quadrupled from $2 billion to almost $9 billion, while at the same time growers have also overcome numerous environmental and economic challenges.

The Way Forward

Two years ago the GRDC conducted a review of its strategic direction and how to better implement Driving Innovation, the organisation's 2002 to 2007 Five Year Research and Development Plan. This review also sought to align the corporation with Towards a Single Vision for the Australian Grains Industry: The Australian Grains Industry Strategy 2005-25, which was released at Grains Week in April 2004.

The result of this extensive review is the GRDC's new strategic business plan – *The Way Forward*. This plan articulates the organisation's response to what impacts on the GRDC's immediate business environment (for example, R&D partnerships) on a day-to-day basis, and what impacts on our broad business environment (for example, grain markets) over time.

The primary objective of the strategy is to ensure that Australian graingrowers are provided with technologies that enable them to remain competitive. The four strategies to support this objective are to:

- Coordinate a national portfolio approach to grains R&D;
- Deliver against Australian Government priorities;
- Grow and leverage total grains R&D; and,
- Ensure R&D is market driven.

The strategy identified four principal pathways to market for R&D: Better varieties faster; Better farming practices adopted faster; New products; and, Communication and customer services.

The organisational structure has been changed and the business groups in GRDC's current Annual Operational Plan 2005–06 reflect these paths to market.

Key initiatives currently being implemented include the National Variety Trials program and the National Barley Breeding Initiative, which are clear examples of the principles in action.

By implementing *The Way Forward*, the corporation will be a key driver in helping Australian graingrowers to remain competitive in the global grain markets.

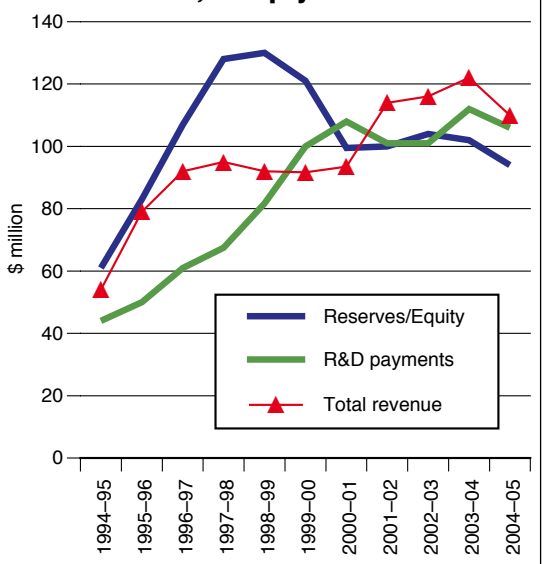
The year ahead

The year ahead will be challenging for the corporation as we work together, and with other industry members, on the development and adoption of technologies that will meet stakeholder needs and enable the Australian grains industry to remain globally competitive. The GRDC will continue to build relationships with customers and partners to enhance our performance-driven focus on outcomes.

The GRDC's achievements depend on the vision and cooperation of members of the Board, panel members, staff, our working partners and our various stakeholders, and we thank them for their significant contribution to grains industry R&D. We would like to especially thank those members of the GRDC regional panels who are retiring, for the valuable help they have provided.

Peter Reading, Managing Director
Terry Enright, Chairman

GRDC reserves, R&D payments and revenue



NOTE: Reserves/Equity is a combination of Contracted Research and Capital Commitment Reserves.

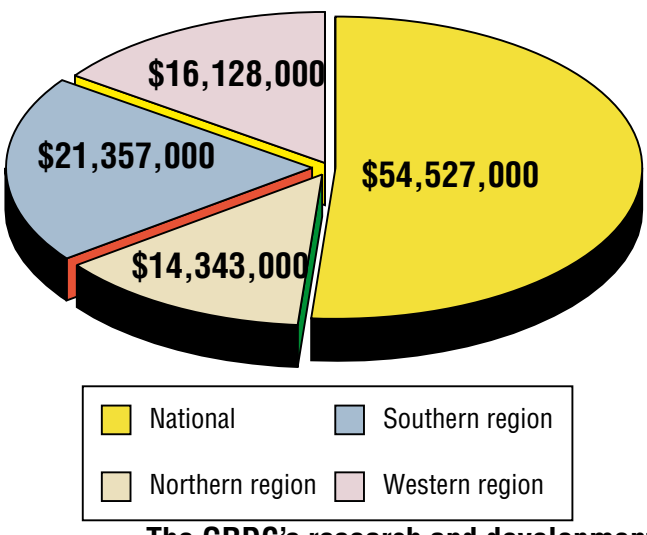
GRDC'S FIVE YEARS AT A GLANCE

	2004-05	2003-04	2002-03	2001-02	2000-01
GRDC					
Revenue	$110.0m	$122.3m	$116.2m	$114.2m	$93.5m
Expenditure	$119.5m	$124.0m	$112.0m	$113.8m	$115.7m
Operating surplus/(deficit)	($9.5m)	($1.7m)	$4.2m	$0.4m	($22.2m)
Total assets	$135.7m	$141.0m	$151.7m	$150.0m	$134.5m
Total equity	$94.0m	$102.5m	$104.2m	$102.5m	$99.5m
Industry contributions	$64.2m	$68.8m	$65.0m	$63.2m	$48.9m
Commonwealth contributions	$35.7m	$42.3m	$39.0m	$40.8m	$34.5m
R&D expenses	$106.4m	$112.5m	$101.3m	$101.2m	$107.8m
Employees	$4.9m	$4.9m	$4.0m	$3.5m	$3.0m
Suppliers	$5.5m	$6.1m	$6.2m	$6.3m	$4.9m
Number of full-time GRDC staff positions	46	43	42	38	36
Grains industry					
Estimated number of grain farms*	37,841	38,574	38,802	38,466	38,811
Number of grain crops covered by R&D levies	25	25	25	25	25
Grain industry's estimated gross value of production	$7,000m	$9,200m	$4,746m	$9,116m	$7,968m
Total grain production – summer and winter crops	33.9mt	42.7mt	16.9mt	39.4mt	37.3mt

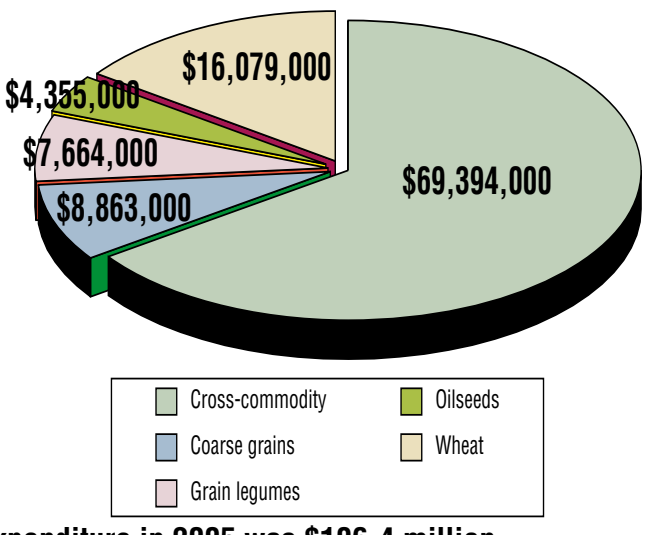
*ABARE estimates for the total number of broadacre farms planting more than 30 hectares per annum for grain production.

Where your research dollar is invested…

GRDC investment by region: 2005



GRDC investment by commodity: 2005



The GRDC's research and development expenditure in 2005 was $106.4 million.

SECTION 5
GRDC REPORT TO INDUSTRY

Western Panel

In 2005 Western Australian graingrowers survived frosts, a soft finish to the growing season, rust and record hailstorms that battered the eastern grainbelt, making paddocks look more like frosty Antarctica than the outback WA.

Dale Baker

However, after a year that seemed to be struck by the bad hand of Mother Nature on a monthly basis, timely rainfall and mild spring temperatures combined to produce a remarkable recovery in the 2005–06 winter crop.

That recovery enabled WA growers to deliver a bumper crop of 12.4 million tonnes, even if some growers were still harvesting well into the New Year.

R&D investments

The GRDC consulted growers to ensure its $24 million Western Region investment in 2005–06 addressed emerging and medium term grower needs.

While this money was kicking off new research, other investments matured.

One of these was a new potential dwarf milling oat variety launched at the 2005 Dowerin field day.

Named after the WA river, Kojonup, it was released, with GRDC support, as a provisional milling oat variety based on its performance in laboratory milling tests.

Its milling quality is significantly better than current dwarf milling varieties and it has improved yield compared with tall milling varieties.

Kojonup is resistant to the predominant strains of leaf rust in WA, although there is some susceptibility to stem rust.

The Western Panel — FRONT L to R: Ruth Young, Merrie Carlshausen, Neil Curtis, Julia Polkinghorne, GRDC Western Panel Coordinator. BACK: Robert Belford, Richard Oliver, David Capper, Neil Young, Greg Fraser (GRDC Executive Manager – Practices), Ralph Burnett, Vic Dobos (GRDC Executive Manager – Communications) and Dale Baker.

Local network

I helped launch the Local Farmer Group Network (LFGN) project at the 2005 Agribusiness Crop Updates, to help local groups identify and act on significant issues affecting their farm businesses and communities.

LFGN is locally focused and actively encourages motivated individuals to enjoy the proven benefits of peer support, group learning and group management, with support from the University of Western Australia.

LFGN complements the GRDC's investment in the Grower Group Alliance, which mainly focuses on the more established, bigger groups.

Former Mingenew Irwin Group (MIG) Manager and Planfarm consultant, Cameron Weeks was instrumental in developing and forming the Grower Group Alliance and he was awarded the 2005 *Seed of Light* award for excellence in research communication.

Cameron helped turn MIG into one of Australia's most successful grower groups. In 2005, MIG conducted about 70 trials and hosted more than 350 growers at field days.

Nuffield scholar

Cunderdin graingrower David Fulwood was the GRDC supported 2005 Nuffield scholar for WA. He will use his scholarship to explore the value-adding potential of providing fully traceable grain products. While abroad, he hopes to develop a better understanding of how to increase the value of homogenous grain and grain products.

He believes there are opportunities for adding value to Australian grain by branding the unprocessed grain or end products for niche markets, enabling producers to retain greater ownership of the end product.

Barley breeding

In May, the GRDC announced the formation of Barley Breeding Australia (BBA), which will help support the expected doubling of Australia's 6.6 million tonne barley crop.

This is particularly significant in WA, where we produce a third of the national crop, earning more than $500 million in barley and malt exports.

BBA participants include the WA Department of Agriculture, SA Research and Development Institute, NSW and Victorian Departments of Primary Industries, Queensland Department of Primary Industries and Fisheries and the University of Adelaide. The program will establish close ties with industry, including growers, Barley Australia, maltsters and the Livestock Feed Grain Users Group.

New chickpeas

The year was also full of good news for chickpea growers, with the release of two new varieties in August.

Kabuli chickpea is back in rotation thanks to the release of new ascochyta blight resistant varieties that will help re-introduce a popular crop after it was devastated by the disease.

The two new varieties, Almaz and Nafice, were developed by close co-operation with the International Centre for Agriculture Research in Dry Areas, Syria, the Aegean Agriculture Research Institute, Turkey and the Centre for Legumes in Mediterranean Agriculture (CLIMA).

Some pundits suggest that ascochyta resistant kabuli chickpea varieties, with improved yield and large seeds, could see WA's kabuli crop grow to 30,000 hectares, worth $20 million.

Crop threats

Stripe rust and frost were the two major crop threats in 2005, with frost hammering down the original estimate of 13.2 to 12.4 million tonnes.

Cool and damp conditions from October to early November aided the survival of rust inoculum, which could result in a 2006 outbreak. Most WA growers could be found driving spraying rigs during the summer.

To ensure spraying remains an effective management option for over-summer and in-season weeds, the GRDC continued to invest in the WA Herbicide Resistance Initiative (WAHRI).

Wild radish was a major hindrance in 2005, but GRDC supported research may have revealed the most successful methods to control the weed, which is traditionally difficult to manage with glyphosate.

It found that the double knock technique continued to control large wild radish where glyphosate was applied first and there was at least a day between herbicide applications.

Another breakthrough came when research found a new strategy for controlling the seed bank, should herbicides or other weed control fail. The research found that a single mouldboard ploughing buried annual ryegrass seeds to a depth greater than 10 centimetres, from which they could no longer emerge.

A mouldboard plough treatment reduced annual ryegrass seedlings by more than 95 percent at two sites.

Lupin lookout

Dr Mark Sweetingham revealed that integrating lupin-based food products into human diets could help combat the global obesity epidemic and create another market for WA grown lupins, which are high in protein and dietary fibre.

Food companies are now exploring lupins because of the functional properties and potential health benefits of their protein and fibre components, which have excellent foaming, emulsifying, water absorption and fat binding properties.

Research indicates lupins can benefit bowel health and help combat cardiovascular disease and obesity.

Mark's GRDC supported research team revealed that lupins could supplement a wide array of foods from egg white replacement to flour.

At 500,000 hectares, lupin is WA's largest pulse crop and so the Western Panel have placed a strong emphasis on finding it new premium markets.

The GRDC also supported ongoing research into lupins for aquaculture feed.

The $4 million Grains and Fisheries Research and Development Corporations program found that high-quality lupins, which are easily pelletised, have a protein component vital for modern fish diets and so could reduce aquaculture's dependence on expensive fishmeal feeds.

The aquafeed push is gaining momentum, with leading international aquaculture research institution, Norway's AKAVFORSK, joining the program, along with scientists from CSIRO Marine Research and the Tasmanian Aquaculture and Fisheries Institute.

Co-operative Bulk Handling, George Weston Foods and global producer of innovative fish feeds, Skretting, are also investing in the program to capitalise on the opportunity to include Australian lupin kernel meal in the annual global 3.6 million tonne farmed trout, prawn and salmon industries.

Single Vision

Research and development is thought to increase grain productivity by 1.7 per cent per year, but the GRDC now aims to virtually double that impact, to three per cent per year.

Speaking at the 2005 Grains West Expo in July, GRDC Chairman, Terry Enright said that along with resolving the GM issue, he prioritised progressing the *Single Vision* strategy and increasing productivity of grains R&D so that the $120 million spent in 2005, for example, would represent even greater value to growers.

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Members of the GRDC Western Panel on their 2005 spring tour inspect a canola trial at Corrigin.

New panel

A crop of highly skilled scientists and graingrowers were appointed for three year terms to the GRDC Western Panel in 2005.

The new members, Ralph Burnett, David Capper, Merrie Carlshausen, Richard Oliver, Neil Young and Ruth Young, were selected for their experience in growing, researching, processing and marketing.

Ralph Burnett has worked as a crop protection and agronomic consultant for 29 years and has considerable experience in chemicals research and development.

David Capper works for CBH and is a highly experienced grain quality manager with considerable knowledge of product testing and market requirements. He also share-farms a small grain and sheep enterprise.

Merrie Carlshausen farms at Wubin in WA's north-eastern wheatbelt and is a member of the Liebe Group, where she Chairs the Ethics Committee, sits on the Management and Finance Committee and is a partnership development officer.

Professor Richard Oliver is a researcher and Professor of Molecular and Physiological Plant Pathology at Murdoch University. He is the Director of the Australian Centre for Necrotrophic Fungal Pathogens and is on the Centre for Legumes In Mediterranean Agriculture's program management team and industry advisory group.

Neil Young has farmed at Kojonup for more than 30 years, is immediate past President of WANTFA, a member of the State Salinity Council and a member of the Department of Agriculture's Katanning Advisory Panel.

Ruth Young of Calingiri works in her family's grain farm and also for various agribusinesses, including farm consultancies, grain marketing companies, training organisations and research and development groups.

Spring tour

Members of the GRDC Western Panel visited the Department of Agriculture, CSIRO, Murdoch University, University of Western Australia and the Corrigin Farm Improvement Group during the panel's annual spring tour.

With two thirds of the panel newly appointed, it was important to introduce them to GRDC funded research bodies and also a farmer group and their trials.

Panel thanks

I sincerely thank all panel members, including outgoing members Dr Julie-Ann Lloyd Smith, Darrel Dent, Deane Aynsley, Dr James Ridsdill-Smith, Andrew Lee and Ian Blayney, for their individual and collective contributions during 2005.

A diverse array of talents, interests and views ensured vigorous and meaningful debate on all issues and projects, for the benefit of all stakeholders, especially WA graingrowers.

I welcome the six new panel members who join existing panel members, crop physiologist and agronomist, Dr Bob Belford and Department of Agriculture Wheat Development Officer, Ben Curtis. Also, I welcomed the contributions of GRDC Executive Managers Vic Dobos and Greg Fraser, who were seconded to the Western Panel in 2005.

Western Panel Chairman
Dale Baker

Northern Region

Ian Buss

It would be a fair guess that there would have been fewer Northern Region graingrowers sceptical about climate change as 2005 turned into 2006. Once again a summer season that started with so much promise literally dried up under record high temperatures in December and January and rainfall continued what now seems to be an annual pattern of erratic patchy falls across the region.

Despite its frustrations with the weather, which is the ultimate governor of profitability, the grains industry across Queensland and northern New South Wales continued to look for positive solutions to ongoing challenges like crown rot and stripe rust. And, as always, growers looked to research and technology to improve their prospects of economic and environmental sustainability. The 2005 winter cropping season confirmed the reality of crown rot as an ongoing problem and the likelihood of stripe rust continuing to spread.

Management of stripe rust

It has to be said that there was a massive industry response to stripe rust in the areas of communications and training to help advisers and growers improve their management of the disease. The GRDC worked with rust specialists from its research partners to put together the comprehensive information base 'Reference Point – stripe rust', effectively a road map for stripe rust information, with active internet links to the latest identification and management publications, recent Update papers, data on varietal sensitivity, fungicide information and labels and key wheat pathology contacts for NSW and Qld.

It was e-mailed to some 1000 consultants, advisers and farmers across the grains belt. At the beginning of 2006 it appeared that, while the fungicides, seed treatments and cultural tools such as controlling the 'green bridge' are available to manage stripe rust, there is still the challenge of ensuring industry wide adoption. The selection of the best possible rust resistance in an agronomically acceptable cultivar will be the key to successful rust management strategies.

Crown rot

Crown rot remains the single most debilitating disease of winter cereals in the northern region, with a significant build-up of inoculum loads across the northern region in 2005. While resistant varieties – even some with a higher level of tolerance – remain the Holy Grail against crown rot, managing rotations to reduce inoculum loads is the industry's best control option for the moment. NSWDPI is achieving considerable success with research that uses precision planting to avoid contact and inoculum spread from stubble to newly emerging crops.

Grains Research Updates

The first Grains Research Update ever held on the Atherton Tableland was also the first major GRDC event in the northern region in 2005. It attracted some 60 growers and 10 other industry people – a pretty impressive roll-up in a small but significant farming area where a wide range of smaller crops are grown in rotation with mainstream maize and peanuts. An exit

survey of growers attending the Atherton update indicated the most favourable reaction to sessions was on crop spraying and farm management leading to improved profitability.

Spray drift

Spray technology and spray drift show up regularly in lists of graingrower concerns across the north. The GRDC is supporting a three year project by the Centre for Pesticide Application and Safety at the University of Queensland's Gatton campus to use its $750,000 wind tunnel at Gatton, and other advanced technology, to look at droplet size and new technology nozzles, formulations and adjuvants. The influence of soil moisture status and higher temperatures on the efficacy of 2,4–D and glyphosate, with testing to focus on selected 'hard to control' weed species will also be undertaken.

The GRDC is also backing a national campaign by the CRC for Australian Weed Management to run a series of two-day workshops to train farm advisers to help graingrowers be more strategic about long term weed management and use a more diverse range of control tactics. Between 15 to 20 courses are planned before the end of 2006, involving more than 200 grain industry advisers.

Release of new varieties

Plant breeders continued to make their contribution to the quest for farm profitability and there were significant releases in two sectors outside the ongoing, mainstream cereal breeding programs. The QDPI&F peanut program out of Kingaroy will be commercially releasing this year three new, high-oleic varieties and three new chickpea varieties – two from the NSW DPI program and one from QDPI&F – with improved resistance to aschochyta blight and phytophthora.

While chickpeas remain the front-running winter pulse crop, they do have their difficulties, and the results of a collaborative CSIRO/APSRU/Michael Castor and Associates project indicate that low plant available water and susceptibility to flower loss from chilling appear to contribute to disappointing chickpea yields in south west Queensland and north west New South Wales. Management options appear to be delaying planting until at least late May, which should reduce early biomass in the crop and delay flowering into warmer temperatures. Longer term chilling tolerance into locally adapted varieties would help.

Farming practices change

The Northern Panel and GRDC remain committed to supporting Sustainable Farming Systems research, development and extension in the three sub-regions – Central Queensland, southeast Queensland and northeast NSW and the drier southwest Queensland and northwest NSW. In 2005 the panel decided to look to the private sector to lead a campaign to improve the performance of grain-based farming systems in the drier environments. It did so in response to concerns from industry that change at farm level has been difficult to achieve in some of the drier cropping areas. Growers from these areas were also concerned that they might not be getting full value from the research they support through crop levies.

Consultants B&W Rural at Moree, Greg Rummery at Walgett and Michael Castor and Associates of Goondiwindi – collaborating as the Northern Grower Alliance (NGA) – are working on the GRDC project 'Validation and integration of new technologies in north-west New South Wales and south-west Queensland', basically the area covered by its long-running Western Farming Systems project. With its more than 500 grower members, Conservation Farmers Incorporated will have a coordinating, communications role across the project in both states and will benchmark the economic and environmental performance of industry best practice. North of the border, the corporation is working with QDPI&F to carry out a similar role to the NGA in the graingrowing areas of western Queensland, around St George and Roma.

The Northern Region possibly leads Australia in the adoption and improvement of controlled traffic technologies but it was still an agreeable surprise to see some 200 people attend

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The Northern Panel — FRONT L to R: Di Bentley, Ian Buss, Richard Heath, Gavin Whiteley (GRDC Executive Manager – Corporate Services), Chris Joseph. BACK: Bill Yates, James Clark, John Harvey (GRDC Executive Manager – Varieties), Michael Southan, Graeme Wright, David Freebairn.

SECTION 5
GRDC REPORT TO INDUSTRY

the two-day Australian Controlled Traffic Farming Conference and following field day in Gatton. The GRDC supported the conference where 39 sugarcane farmers, seven cotton growers and 10 from the vegetable industry joined the 47 graingrowers who attended. The event was organized by the CTF Solutions company, which has GRDC support for the five-year project 'Managing variability, from controlled traffic farming and raised bed farming to information rich agriculture'.

Calls for more 'interoperability' between the many available GPS brands and products, liaisons between like-minded farmers and calls for a grid of global positioning base stations all came from the conference.

The impact of rising oil prices on the cost of farm inputs became more obvious as 2005 progressed and it was interesting to note the rise of grower interest in the potential of feedlot and other manure to replace chemical fertilisers, particularly when only short transport distances are involved. The more than 400,000 beef cattle in feedlots in southern inland Queensland alone produce some 500,000 tonnes of manure a year. The use of manures also tends to be part of grower interest in the wider issues of soil biology and structure, and the GRDC is supporting a number of research projects in these areas.

Other more general research areas supported by the GRDC are the potential of early harvesting of high moisture grain to improve yield and quality, resistance to stored grain insecticides – particularly phosphine – and frost tolerant wheat.

Northern Panel

The Regional Panel system is one of the GRDC's great strengths, ensuring as it does that relevant industry research priorities are considered when investment decisions are made. Panel members are appointed for three years and three growers, a specialist pulse agronomist and an expert in the field of grain testing, milling and processing joined the new Northern Panel on July 1. They are growers James Clark (Hunter Valley), Bill Yates (Garah) and Richard Heath (Curlewis), Kingaroy QDPI&F agronomist Graeme Wright and BRI Australia manager of grain processing Michael Southan (Sydney). NSW growers Phil Bardsley, Warwick Fisher and Mark McKay, durum breeder Ray Hare and agronomist John Doughton left the panel and, on behalf of the industry, I thank them for their contributions. Gunnedah consultant Di Bentley, Dalby grower Chris Joseph and Toowoomba soils scientist David Freebairn continued into the new term, along with myself as chairman.

Northern Panel Chairman
Ian Buss

Crop rotation is the industry's best crown rot control for the moment.

Southern Panel

David Shannon.

Grain growers in the GRDC Southern Region would be understandably relieved at the relatively good production achieved from the 2005 winter crop. Much of the crop was not sown until June, however it is notable that in many areas up to a quarter or more of all crops were sown dry.

The late start led to expectations that yields and quality would generally be poor, but good rainfall in spring resulted in considerable tonnages of fairly good quality grain being produced across the region.

Significantly, canola production fell substantially last year. This was in part due to the late start but also due to the general decline of canola in the Southern Region. New South Wales served as a highly illustrative example. Although seasonal conditions were favourable for canola and yields were above those of previous years, the area planted to canola was reduced by two thirds in 2005.

The decline of canola has been due to many crops not achieving their yield potential, with subsoil constraints and disease identified as the main culprits. Addressing the need to retain canola as an important break crop is one of the GRDC's investment priorities for 2006–07.

The season has also highlighted the importance of the GRDC's investment in research to reduce the impact of climate variability on grain production. Accurate seasonal forecasting will produce risk management options for farmers in the Southern Region.

National Variety Trials

The development of National Variety Trials (NVT) has been completed and the trials themselves are now providing data results. NVT has been designed to evaluate new varieties of winter cereals, canola and important pulse crops prior to their commercial release. Trials will be carried out by selected providers across Australia in a program entirely funded by the GRDC except in Western Australia, where the GRDC has partnered with the Department of Agriculture to evaluate barley, oats and pulse varieties.

The GRDC will contract private agronomists to conduct key research trials.

NVT will expand in the coming years. Important lessons learned in the development phase will be used to implement the program across more crops and to measure more variables within each crop.

Canola

Addressing the 'canola decline' will be an important priority for GRDC. Some crops in the Southern Region are not achieving their yield potential. Limited root growth due to subsoil constraints (acidity, sodicity, salinity and compaction) and disease have been implicated as contributing to yield decline. It is imperative we develop management strategies that maximise yields and restore growers' confidence in canola in order to retain it as a break-crop in sustainable rotations.

In 2006–07 the project will seek to identify and quantify the impact of hostile subsoils on canola yields and to develop management options to overcome them.

Progress with canola has already been made on the disease front. Management of blackleg in the eastern states of Australia is a burden on growers and has contributed to canola decline. New studies supported by the GRDC have revealed the potential to chemically interfere with, and even break, the blackleg fungus life cycle by treating canola stubble.

Rust resistance

The battle against stripe rust and its relatives goes on. The GRDC-supported Australian Cereal Rust Control Program (ACRCP) continues to play an important role in developing disease-resistant germplasm and offers cereal breeders the unique opportunity to screen breeding populations under artificially-created rust epidemics at any stage of their development.

A highlight has been the release of AGT Scythe, the first of the new generation wheat varieties developed by Australian Grain Technologies (AGT), a joint venture of the GRDC, the University of Adelaide and the South Australian Research and Development Institute (SARDI). Expected to be available in large quantities in 2006, it is a mid-season variety with excellent stem rust resistance. Under conditions not really suited to mid-season varieties, trials demonstrated it consistently yielded higher than Yitpi, currently the most popular variety among Southern Region growers.

CSIRO breeding lines are meanwhile showing considerable levels of resistance to stripe and leaf rust. These are developed from New Zealand germplasm derived from lines in that country and the northern hemisphere where they are subject to far greater disease pressure than that experienced in Australia. It is suspected the resistance comes from a combination of several major and minor genes, which should prove quite robust to any new rust pathogen.

These lines have been developed as part of the GRDC's high-rainfall zone program, which is focused on producing quality milling wheat varieties for the expanding high-rainfall zone in the Southern Region.

Extension network

Another priority for 2006–07 will be enhancing communication and extension activities between private agronomists, agribusinesses and growers around trials in targeted areas of the Southern Region. Extensive survey work among growers conducted by the GRDC has indicated the increasing influence of private agronomists and farm advisers in growers' crop choices and management decisions.

The establishment of such networks also recognises that many growers operate in areas not currently addressed by GRDC-supported grower group-based projects. The aim is to meet their extension needs by contracting private agronomists to conduct key research trials and associated communication activities, ideally based on localised issues such as soil health, crop nutrition and spray application.

National pulse management approach

Pulse Australia, in partnership with the GRDC and state government agencies, is developing management packages for all new pulse varieties. The project coordinates research in key pulse production areas of South Australia, New South Wales and Victoria in a national approach aimed at enhancing the adoption of new varieties and delivering benefits along the value chain.

The Southern Panel

Over the past year, five new members have joined the Southern Panel. With the five previous members, the panel continues as a group of skilled individuals with experience in production, research, processing and marketing. Many thanks to outgoing chair Ian MacKinnon and the other retiring panel members for their valuable contribution to R&D in the Southern Region.

As the new chair, I am a broadacre grain farmer from Kapunda, SA as well as a wool and meat producer. Other panel members are Jeff Arney, farmer, Bordertown, SA; Andy Barr, plant breeder and farmer, SA; Merna Curnow, grain and prime lamb producer, Laanecoorie, Victoria; Dr Barbara Howlett, plant pathologist, University of Melbourne; Graeme Lukey, management and strategic expertise in the cereals processing industry, Vic; Dr Allan Mayfield, farm adviser and independent consultant, SA; Dr Mark Peoples, CSIRO Plant Industry, plant physiologist and agronomist; Andrew Rice, agricultural consultant and mixed farmer, NSW; and, David Wolfenden, grain and sheep producer, NSW.

Southern Panel Chairman
David Shannon

The Southern Panel — FRONT L to R: Alan Mayfield, Barbara Howlett, Graeme Lukey, Iftikhar Mostafa (GRDC Executive Manager – Corporate Strategy and Program Support), Merna Curnow. BACK: Jeff Arney, David Shannon, Andrew Barr, Vince Logan (GRDC Executive Manager – New Products), David Wolfenden, Andrew Rice. (INSET: Mark Peoples)

GRDC business highlights

INCOME ($m)

	2005	2004
Industry contributions	$64.2	$68.8
Commonwealth contributions	$35.7	$42.4
Interest income	$7.6	$5.8
Royalties	$1.1	$0.6
Project refunds	$1.2	$2.9
Other income	$0.2	$1.8
Total revenue	$110.0	$122.3

VS

EXPENDITURE and INVESTMENTS ($m)

	2005	2004
Administrative costs	$5.9	$6.6
Employees	$5.2	$4.9
R & D payments	$106.4	$112.5
Asset writedown	$2.0	—
Transferred to or (from reserves)	($9.5)	($1.7)
Total expenditure & investments	$110.0	$122.3
Accumulated reserves	$94.0	$102.5

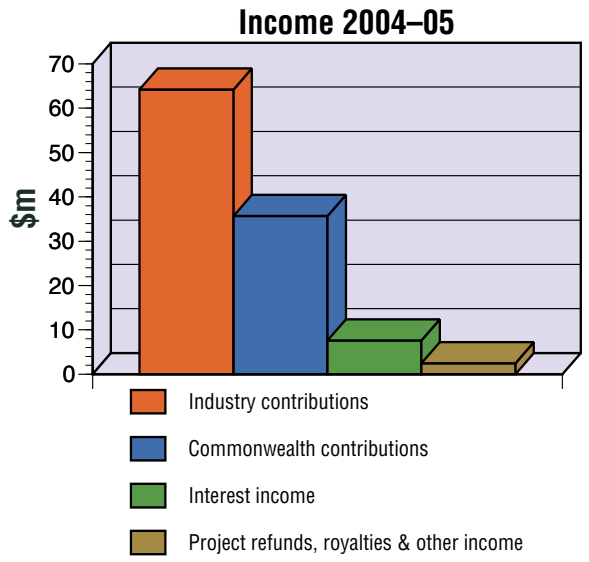
BALANCE SHEET AS AT JUNE 30, 2005

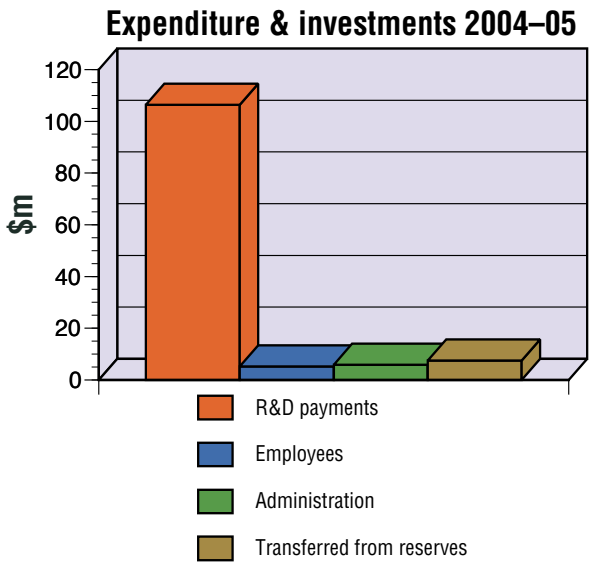
(Total Assets minus Provisions and Payables equals Equity)

	2005	2004
FINANCIAL ASSETS		
Cash	$10.2	$2.4
Receivables	$3.4	$4.5
Investments	$116.8	$129.6
Total financial assets	$130.3	$136.5
NON-FINANCIAL ASSETS		
Land and buildings	$4.7	$3.8
Infrastructure, plant and equipment	$0.5	$0.5
Intangibles	$0.1	$0.2
Other	$0.03	$0.03
Total non-financial assets	$5.3	$4.6
Total assets	$135.7	$141.0
PROVISIONS AND PAYABLES		
Research and Development	$39.5	$37.4
Other	$2.2	$1.2
Total provisions and payables	$41.7	$38.6
NET ASSETS	$94.0	$102.5
EQUITY		
Accumulated surpluses	$12.2	$12.8
Contracted research reserve	$74.1	$79.9
Capital commitment/revaluation	$7.8	$9.9
TOTAL EQUITY	$94.0	$102.5

HOW THE 2004-05 FIGURES STACKED UP

INCOME (Total $110 million) **versus** **EXPENDITURE & INVESTMENTS** (Total $110 million)





INDUSTRY CONTRIBUTIONS FROM LEVIES TO YEAR ENDED JUNE 30, 2005

During the reporting year there were 25 leviable grains and levy rates were:

WHEAT — (0.99 per cent of farm gate value);

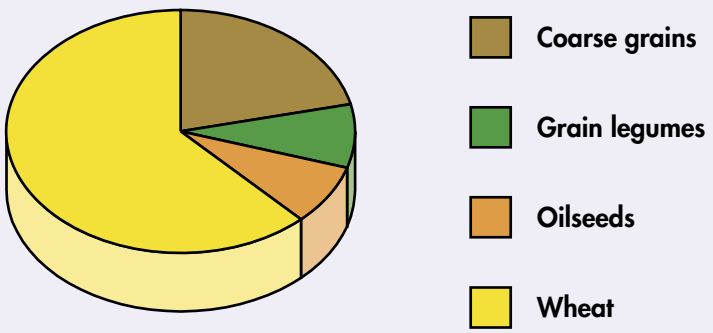
COARSE GRAINS — barley, oats, triticale, cereal rye, millet and canary seed, sorghum (0.99 per cent of farm gate value) and maize (0.69 per cent of farm gate value);

GRAIN LEGUMES — (0.99 per cent of farm gate value) lupins, field peas, chickpeas, faba beans, vetch, peanuts, mung beans, navy beans, pigeon peas, cowpeas, lentils; and,

OILSEEDS — (0.99 per cent of farm gate value) — canola, sunflower, soybean, safflower, linseed.

	Coarse grains	Grain legumes	Oilseeds	Wheat	TOTAL
2004–05	**$13,730,000**	**$5,421,000**	**$5,165,000**	**$39,877,000**	**$64,193,000**
2003–04 comparison	$17,052,000	$4,036,000	$7,002,000	$40,686,000	$68,776,000

WHERE YOUR 2004–05 RESEARCH LEVIES CAME FROM



COMMONWEALTH CONTRIBUTIONS TO YEAR ENDED JUNE 30, 2005

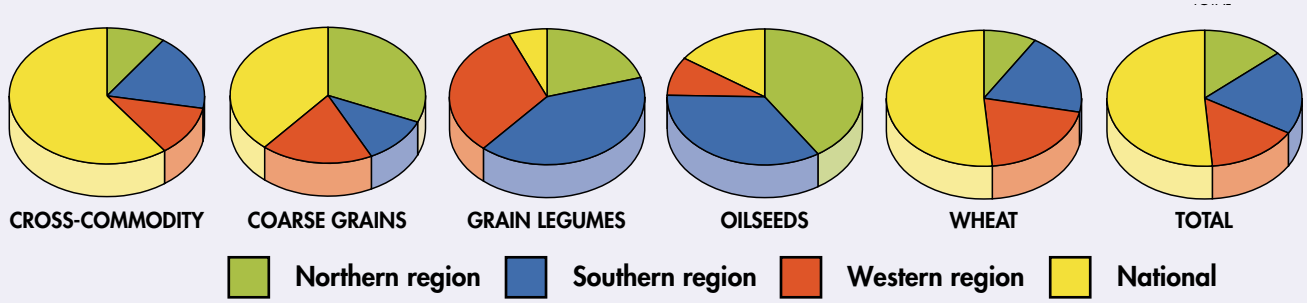
The annual Commonwealth contributions are equal to 50 per cent of the amount expended by the GRDC – subject to contributions not exceeding either the amount of grain levies paid by growers; or, 0.5 per cent of gross value of grain production for that financial year.

	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	TOTAL
2004–05	**$11,529,000**	**$4,421,000**	**$6,097,000**	**$7,512,000**	**$2,398,000**	**$3,785,000**	**$35,742,000**
2003–04 comparison	$12,457,000	$5,448,000	$7,978,000	$9,825,000	$2,884,000	$3,772,000	$42,364,000

RESEARCH AND DEVELOPMENT PAYMENTS TO YEAR ENDED JUNE 30, 2005

	Cross-commodity	Coarse grains	Grain legumes	Oilseeds	Wheat	TOTAL
National	$41,667,000	$3,439,000	$491,000	$671,000	$8,259,000	**$54,527,000**
Northern Region	$6,801,000	$2,787,000	$1,565,000	$1,778,000	$1,412,000	**$14,343,000**
Southern Region	$12,590,000	$993,000	$3,132,000	$1,504,000	$3,138,000	**$21,357,000**
Western Region	$8,336,000	$1,644,000	$7,664,000	$402,000	$3,270,000	**$16,128,000**
TOTAL 2004–05	**$69,394,000**	**$8,863,000**	**$7,664,000**	**$4,355,000**	**$16,079,000**	**$106,355,000**
2003–04 comparison	$70,572,000	$9,246,000	$9,509,000	$5,412,000	$17,755,000	$112,494,000

WHERE YOUR 2004–05 RESEARCH DOLLARS WERE INVESTED



The Way Forward

In 2004 the GRDC conducted a significant strategy review that led to the release in January 2005 of the GRDC strategic business plan – *The Way Forward*. This strategy builds on *Driving Innovation*, the GRDC's 2002–07 Research and Development Plan, and is the organisation's response to:

- The complex and dynamic research environment we currently work in;
- Predictions for industry growth outlined in the Australian Grains Industry Strategic Plan 2005–25;
- The rapid changes and consolidation occurring within the grains industry;
- The changes occurring within state-based departments of agriculture; and,
- The changing profile of the Australian graingrower.

The success of the strategy will depend on how well it meets and exceeds the needs and expectations of the principal stakeholders of R&D investments by the GRDC, namely growers and the Australian Government.

Some of the review's key findings

- If Australian graingrowers are to continue to effectively compete in global markets, the GRDC must take the lead role in coordinating and facilitating a national R&D grains agenda/portfolio.
- The GRDC must clearly articulate the strategy to its major customers (growers and the Australian Government) as well as relevant sections of the grains industry.
- The GRDC must meet and exceed the expectations of its customers.
- The market needs and signals must clearly feed back into and drive the R&D agenda.
- The GRDC agenda must also respond to the issues of sustainability of agriculture, addressing the triple bottom line of people (society), planet (environment) and profit (economy).
- A national grains R&D portfolio must be developed with clearly defined 'gateways' and 'pathways to market'.

BUSINESS GROUPS

In accordance with the strategic review's key findings, the GRDC has restructured its programs around business groups – pathways to market. This reflects a determination to structure around delivery to end-users and customers, rather than around types of crop or areas of research.

Varieties

The 'Varieties' pathway covers all activity where the R&D benefit to growers and other stakeholders is delivered through crop genetic enhancement.

Practices

The 'Practices' pathway covers all activity where on-farm benefit is delivered through changes in farming practice rather than through genetic enhancement.

New Products

This pathway follows the off-farm benefits of new products created out of GRDC research investments. The emphasis is on partnering with other links in the value chain – ensuring that other parts of the chain contribute to product R&D cost – while part of the benefit can be captured by graingrowers.

Communication, Customer Services & Capacity Building

This is a broad, generic pathway where the primary means of delivering benefit is through delivery of information to stakeholders. A primary objective is to continue building our human and structural research capacity to ensure future R&D needs of the grains industry are met.

FROM GRANTS TO INVESTMENTS

The GRDC has traditionally defined itself in terms of the agricultural production sector of the grains industry. This remains the central reference point of the GRDC's grower stakeholders. However, changes in the business environment and in the expectations of our stakeholders, have broadened the GRDC's scope of interest.

The nature of the GRDC's work has also changed, and continues to change. Rather than being totally driven by proposals from researchers, our approach now also relies on scoping and designing investments and negotiating their implementation. We have moved from a 'grant' to an 'investment' paradigm. This means changes in processes, skills, workloads and access to networks and partnerships.

The key challenge facing the GRDC in the short-to-medium term is to continue coordinating and facilitating a national approach to grains R&D, so as to ensure a balanced R&D portfolio with reduced areas of fragmentation or duplication.

The GRDC will continue to forge closer links between grain producers, R&D institutions and downstream markets.

Real issues for R&D investments for 2005–06

- There continues to be a decline in real terms of trade for the grains industry.
- The GRDC needs to develop strategies with the state departments to ensure ongoing capacity to deliver new technology and innovation at the regional level.
- Consumer influence, with an agenda based on food safety, quality, nutrition and diversity, is increasing in importance to the grains market.
- Globalisation of agribusiness and agricultural research is ongoing, producing many new cross-sectional alliances, mergers, acquisitions and joint ventures.
- The GRDC continues to work with its R&D partners to review strategic directions for barley breeding and pulse breeding. These are complex undertakings requiring extensive consultation and careful change management.
- Grower survey results indicate that, whilst most graingrowers are satisfied with the job done by the GRDC, many do not have a good understanding of what the GRDC does and how the benefits of its work are delivered. The GRDC must work to raise grower awareness and strengthen the GRDC brand.
- *The Single Vision* – Australian Grains Industry Strategic Plan 2005–25 has identified high levels of fragmentation and duplication in numerous aspects of the industry, including infrastructure, grower representation and R&D. The GRDC is in a unique position to work towards less fragmentation and duplication in the research arena.
- With new entrants to grain commodity markets (for example, Eastern Europe) the GRDC needs to work closely with marketers and bulk handlers, to identify and meet the needs of high value grain markets where Australia can secure competitive advantage – this particularly entails a focus on Asia.

The priorities and the pathways

The priorities in 2005–06 have been guided by the objectives and strategies of each of the GRDC business groups. They have also been guided by the *Driving Innovation* themes of being business driven; linking science, technology and adoption; being a global leader; and sustainability – the triple bottom line. Outputs consistent with these themes are delivered through each of the GRDC's pathways to market. ■

WHAT IS THE GRDC?

The Grains Research and Development Corporation was established in 1990 as a statutory corporation under the Primary Industries and Energy Research and Development Act 1989.

The GRDC's role is to invest in research, development and related activities to benefit Australian graingrowers, the wider grains industry and the Australian community. In doing so, the GRDC invests in research where obstacles to industry's progress exist and where R&D may be effective in overcoming these obstacles.

This includes

- Investigating and evaluating the requirements for R&D in the grains industry.
- Coordinating or funding the execution of R&D activities.
- Facilitating the dissemination, adoption and commercialisation of the results of R&D.

The GRDC research portfolio covers a total of 25 leviable crops

- Wheat.
- Coarse grains: Barley, oats, sorghum, maize, triticale, millets/panicums, cereal rye, canary seed.
- Pulses: Lupins, field peas, chickpeas, faba beans, vetch, peanuts, mung beans, navy beans, pigeon peas, cowpeas, lentils.
- Oilseeds: Canola, sunflower, soybean, safflower, linseed.

Varieties

Better varieties faster

OBJECTIVES

To develop and commercialise new superior crop varieties with significantly enhanced production and market performance compared to current benchmark varieties in Australia.

To accelerate the rate of gain in key genetic traits of importance to the Australian grains industry.

To improve overall effectiveness and cost efficiency of GRDC-supported crop improvement programs in Australia.

ACHIEVING THE OBJECTIVES

Scope

The Varieties business group reaches across the GRDC's 25 leviable crops, spanning cereal crops (including wheat and barley), summer coarse grains, pulses and oilseeds.

The business group includes GRDC investments in gene discovery, breeding technologies, genetic resources, functional genomics, germplasm enhancement, genetic transformation, plant breeding, crop variety testing, grain quality research, plant pathology (where directly related to breeding), and education.

The group supports crop improvement for growing domestic industries, as well as for export, with the aim of raising the overall value of the Australian grains industry. The continuing prosperity of the industry depends on the development of new varieties with enhanced yields as well as quality attributes that add value and meet market demands. The latter is being achieved by collaborating with grain marketers and bulk handlers to clarify end-user requirements. Growing superior high-yielding varieties using optimal systems for crop management will lead to increased productivity.

The search for new sources of disease resistance to incorporate into crop plants continues, alongside research to improve our understanding of the processes involved in resistance breakdown.

Investment budget for 2005–06: $59.60 million

R&D INVESTMENTS

National approach to crop variety testing

In response to strong demand from growers for independent crop variety testing, the GRDC has replaced the state-based crop variety evaluation programs with a nationally coordinated and independent crop variety evaluation program. The new model for pre- and post-release crop variety testing was developed in consultation with industry stakeholders, including the state departments of agriculture, the Grains Council of Australia and the Australian Seed Federation. The model was implemented in 2005 as the National Variety Trials (NVT) with the following key features:

The separation of breeding work and subsequent evaluation trials;

Equal access for all breeding programs;

National coordination of trials;

Uniform trial protocols; and,

The collection of trial data into a national database for access by growers and their advisers, researchers and state departments of agriculture.

The GRDC has contracted the Australian Crop Accreditation System (ACAS) to manage the trials and trial data. ACAS was established in 1997 to develop accreditation protocols for crop evaluation by public breeding programs and crop variety trials, and to provide information on crop performance to growers. Under the proposed agreement with the GRDC, the company will focus its activities on the management of NVT, and has appointed a senior technical crop evaluation expert, Allan Bedggood, as NVT manager.

The program objective is to test all newly developed winter cereal crops, although canola and pulses have also been included in the trial program. The program will assess crop performance criteria such as yield and minimum receival standards, and produce independent disease ratings for wheat and durum. The GRDC has implemented the new scheme by seeking expressions of interest and appointing several variety evaluation services to conduct the trials.

Winter cereals

Major investment has continued in 2005–06 in wheat and barley breeding.

The introduction of novel germplasm is recognised as a key contributor to the development of new varieties. The GRDC is also collaborating with AWB International and other major grain exporters to develop wheat varieties with quality attributes that are suited to Asian markets.

The GRDC has been building on international collaborations, through centres such as CIMMYT (the International Maize and Wheat Improvement Centre) in Mexico and ICARDA (the International Centre for Agricultural Research in the Dry Areas) in Syria, that have made major contributions to the long-term productivity and sustainability of the national grains industry. The GRDC is putting new arrangements in place to coordinate the introduction and evaluation of new genetic material in existing projects with CIMMYT, and to enhance the delivery of new genetic material to cereal breeding programs.

Australian Winter Cereal Molecular Marker Program

The Australian Winter Cereal Molecular Marker Program (AWCMMP) is one of the GRDC's largest individual investments: it has a cumulative investment (from 1996) of over $20

million. The program was extended for three years from July 2004, with an emphasis on the validation and implementation of markers for breeding programs.

The investment in AWCMMP is an integral part of the GRDC's strategy to provide growers with improved varieties through investment in winter cereal breeding. It enables the breeding programs to access and implement molecular marker technology that reduces the length of the breeding cycle and allows rapid and effective selection for desirable traits that are often difficult or impossible to select for by conventional means.

An important feature of the AWCMMP program is the coordination and communication of R&D activity across its many related projects.

There is a significant increase in the level of adoption of marker-assisted selection (MAS) by the wheat and barley-breeding programs. This increased adoption is the result of many factors, including the sustained GRDC investment in people and projects, as well as changes in marker technology that are dramatically reducing per-marker assay costs for breeders.

Support is also being given to gene discovery for plant improvement, through basic research projects that include a substantial partnership in the Australian Centre for Plant Functional Genomics.

Investment is also being made in two cooperative research centres, the Cooperative Research Centre for Molecular Plant Breeding and the Value Added Wheat Cooperative Research Centre, to further enhance the technological base for cereal crop improvement.

Reduced grain defects in wheat

Support is also being provided for R&D related to cereal quality. In particular, further investment is being made in projects that aim to eliminate serious grain defects such as pre-harvest sprouting, blackpoint, and late maturity alpha-amylase production.

After a decade of GRDC-supported research, progress is being made in understanding the causes of grain quality defects — including preharvest sprouting, late-maturity alpha-amylase and blackpoint — that regularly lead to price downgrades of otherwise profitable crops. Each of these grain quality defects is controlled by independent genes that are triggered by particular weather conditions. The incidence and severity of losses are variable, making it difficult to select improved varieties and to predict the risk of downgrading.

Both sprouting and late-maturity alpha-amylase result in high levels of alpha-amylase activity in the grain. This causes starch to break down during processing, which results in end-product quality problems such as discoloured flour and sticky dough that collapses when baked. Blackpoint affected grains contain a pigment in the seed coat overlying the embryo or 'germ' of the seed that can contaminate the flour with black specks during milling, making it unacceptable for pasta and noodle products. A considerable research investment by the GRDC over the past three years has led to advances in technology that can help wheat breeders to screen breeding populations for lines with greater tolerance to these defects. However, the path to new cultivars is not as direct as might be assumed.

Pre-harvest sprouting

An example is the work conducted over the past 20 years by Associate Professor Daryl Mares on the problem of pre-harvest sprouting. Tolerance to pre-harvest sprouting is intrinsically linked to dormancy, so a key step in the development of more tolerant lines has been to unravel the factors controlling dormancy. Dr Mares has identified at least two genes that influence dormancy levels in wheat. One gene is expressed in the embryo of the seed and is a critical component that must be present for any level of seed dormancy to develop. This gene appears to make the grain sensitive to the plant hormone abscisic acid, which inhibits germination at the time of crop maturity, but alone provides only an intermediate level of dormancy. Further research is examining that gene's interaction with the second gene, and possibly other minor genes that control dormancy, to determine whether higher dormancy levels can be achieved.

Having identified good sources of sprouting tolerance, the next steps in the research included transferring the dormancy genes into locally adapted germplasm and developing screening techniques that are independent of environmental factors. After much time and effort, a screening system is now in place that can accurately identify breeding lines that carry the dormancy genes, and readily allows Australian plant breeders to incorporate improved germplasm into breeding programs. The introduction of stronger dormancy genes into new varieties will considerably reduce their susceptibility to pre-harvest sprouting without affecting their germination percentage when sown.

The search for rust resistance

Long-term investments in major initiatives such as the Australian Cereal Rust Control Program (ACRCP) – which brings together the CSIRO, CIMMYT, the University of

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PLANNED OUTPUTS
Variety testing and performance data made available to Australian graingrowers.
New improved varieties released to the Australian grains industry.
New advanced germplasm and molecular markers developed and into breeding programs.
New genes with potential importance to the Australian grains industry discovered, and made available for further development following proof of concept.
New breeding technologies developed and made available to researchers and plant breeders.
Variety-specific agronomic information made available to graingrowers.
Industry learning and skills development targeted to enhance research capacity into the future.
PERFORMANCE INDICATORS FOR 2005–06
Crop variety testing — Establishment of the National Variety Trials Program in consultation with research partners and industry stakeholders.
Wheat breeding programs — Achievement of key milestones for 2005–06.
Barley breeding-establishment of a nationally coordinated program for barley breeding, with strong market links.
Pulse improvement — Establishment of a nationally coordinated program for field peas, chickpeas, lentils, and faba beans, with strong market links.
Importation of new wheat germplasm — Coordinate arrangements for the introduction and evaluation of CIMMYT germplasm for Australian breeding programs.
Genetic resources centres — Establishment of a nationally coordinated project for the curation of crop and pasture plant species for Australian agriculture.
Major research programs — Achievement of key milestones for 2005–06 for the Australian Centre for Plant Functional Genomics, Cooperative Research Centre for Value Added Wheat, Cooperative Research Centre for Molecular Plant Breeding, and the Australian Winter Cereal Molecular Marker Program.

SECTION 5
GRDC REPORT TO INDUSTRY

Sydney and the GRDC in a combined effort to reduce the impact of cereal rusts – continue to prove their worth to Australian graingrowers. In 2005–06, new cultivars planned for release include a Janz-like cultivar with enhanced rust resistance, and a second replacement for the rust-susceptible wheat variety H45.

In addition to playing a pivotal role in developing disease-resistant germplasm, the ACRCP provides a unique service to Australian cereal breeders. The program provides plant breeders with the opportunity to screen their breeding populations under artificially created rust epidemics at any stage of their development. The breeders are provided with accurate and detailed assessments of the performance of their advanced breeding lines.

WA strain

The strain of stripe rust first identified in Western Australia in 2002 has proven to be even more aggressive and virulent than first feared, and varieties thought to have moderate levels of resistance later succumbed to severe disease pressure. However, the battle against stripe rust is far from lost. Resistance genes recently identified in Australian germplasm, together with germplasm from CIMMYT and Europe, hold the promise of durable resistance.

Researchers at the ACRCP believe that a commitment to using genetically diverse sources of resistance in Australian breeding populations can produce varieties with robust combinations of resistance genes.

High rainfall zone and resistant varieties

On another front, breeding lines developed by CSIRO as part of the GRDC's high-rainfall zone program are showing outstanding levels of resistance to stripe and leaf rusts. The germplasm behind the lines in this program comes from New Zealand Crop and Food Research. The lines are derived from the Northern Hemisphere and New Zealand, and subjected to growing conditions with much more disease pressure than we are used to experiencing here in Australia.

The New Zealand germplasm is routinely challenged with all of the principal rust pathogens through the ACRCP, and trials conducted in all states of Australia have thrown up a large number of lines showing almost total resistance to stripe rust.

The genes responsible for this high level of resistance are not yet characterised, but they are suspected to be a combination of several major genes and a number of minor genes. If that is the case, this level of resistance should be quite robust, as any new pathogen will need to overcome a combination of genes to break down the plant's resistance.

GRDC supported groups, such as Southern Farming Systems, trial varieties and disease management options for high-rainfall zone graingrowers.

The high-rainfall zone wheat program is focused on producing quality milling wheat varieties for the expanding higher rainfall zone of the Australian wheat belt. Only white grain lines are under consideration, with the target of producing varieties that will meet the standards of the Australian Hard segregation.

The move to breed varieties especially suited for the high-rainfall zone is particularly timely, with the increasing value of livestock dictating a swing back to the traditional mixed-farming approach and a renewed interest in the techniques of grazing grain crops. Access to a diversity of short, medium and long-season wheat varieties that can be adapted to meet the changing circumstances of the industry is a significant benefit to Australian growers.

Improved malt quality in barley

While domestic consumption of malt has been static, export demand for processed malt and malting grain is forecast to increase significantly, underpinning the need for new varieties to replace older varieties that do not match market requirements. With GRDC support, researchers have assessed the genetic make-up of overseas barley varieties in order to incorporate the genes for high-quality malt extract into lines suited to Australian conditions.

For example, at the University of Adelaide Dr Jason Eglinton has combined the best malting qualities of overseas varieties with the Australian adaptation from *Barque* to create the new variety *Flagship*. This variety is suited to all the traditional malting barley production areas, has superior malting quality to *Franklin*, has shown about a 7 percent yield advantage over *Schooner* in South Australian trials, and has improved resistance to cereal cyst nematode and a range of leaf diseases. Limited seed supplies are available in 2006 but as commercial quantities come online, *Flagship* will suit the demands of the premium export markets across South-East Asia.

Improved frost tolerance in barley

There is no barley germplasm that can provide total frost tolerance. To achieve this, genes would have to be introduced from another species: for example, the freezing-tolerant Antarctic hair grass. Given that genetically modified organisms (GMOs) are currently not accepted in the marketplace, barley breeders, with GRDC support, are doing the next best thing – using their detailed knowledge of barley's genetic make-up to increase the level of frost tolerance in new lines.

Genetic knowledge and molecular markers have enabled the development of lines that will suffer only 10 percent damage when exposed to a –4°C frost, a considerable improvement on current varieties that typically suffer 40 percent to 60 percent damage. The genes responsible for improved frost tolerance are now being incorporated into adapted lines via conventional breeding, with the aim of releasing new barley varieties with improved tolerance to frost at the critical stages of flowering and setting seed.

The importance of breeding for resistance to pathogens is also recognised, and genetic approaches to disease control are being supported. A new initiative being supported in 2005–06 specifically targets fungal blotch diseases caused by *Septoria nodorum* and *Septoria tritici*.

Understanding and manipulation of the genetics of both pest and crop host continue to provide growers with crop varieties that are resistant to key pests and diseases and, through gene discovery, promise new approaches to crop protection. The identification of plant genes that provide protection, and of pest genes that provide targets for novel control technologies, is an important part of this business group.

Canola

The GRDC continues to support the National Brassica Improvement Program, which is focused on improving the quality, yield, disease-resistance and agronomic performance of canola, as well as progressing the advance of speciality cultivars (such as varieties high in oleic acid and low in linoleic acid), and promoting *Brassica juncea* for low-rainfall environments. A particular focus of canola breeding programs is identifying new genetic sources of resistance to blackleg. This is needed to re-establish blackleg resistance in canola, which has been breaking down in recent years. The breeders are working closely with other researchers seeking agronomic solutions.

Sorghum

Sorghum is well adapted to dry environments, and it is likely that the sorghum genome contains a range of drought tolerance mechanisms. The identification of the genes and gene networks that contribute to that drought tolerance trait could be important both for sorghum and for other crops. Accordingly, the GRDC will continue to invest in a collaborative project with overseas scientists to identify those genes. The project enables Australian researchers to capitalise on significant United States investment and collaboration to assist plant breeders to more efficiently breed sorghum and other crops that perform well in the water-limited environments that are common in Australia.

Lupins on the up and up

Lupins were once a significant crop (reaching two million tonnes a year), particularly in Western Australia, but the outbreak of the fungal disease anthracnose in 1996 has severely impacted on production. GRDC-supported breeding programs had been concentrating on yield, but with the emergence of anthracnose they had to change to breeding for resistance to the disease. Their efforts led to the release of several varieties with improved disease resistance, but it turned out that those varieties were adversely affected by the broadleaf herbicide metribuzin.

To address this, the breeders screened their germplasm for tolerance to the herbicide. This work has led to the development of the new variety *Mandelup*, which has strong resistance to anthracnose and, most importantly, is tolerant to metribuzin. Together, these two attributes will allow lupins to be retained as a break crop in crop rotation, thus contributing to more sustainable agriculture. In addition, the new variety's improved resistance to aphids should reduce pesticide use, which in turn will reduce input costs and increase profitability for growers.

Australia has a large collection of lupin lines across all the species, but this material has not been fully characterised to record all the desirable traits. Therefore, the GRDC will support the further characterisation of this germplasm and create a core collection that represents the diversity within each species. These subsets will subsequently be used by the breeders to obtain germplasm with desirable traits. This has the potential to increase lupin productivity in a large range of environments, and to provide valuable new germplasm for breeding programs.

Pearl lupins

Pearl lupin (*Lupinus mutabilis*) is a new lupin species with higher oil and protein content than the more widely grown narrow-leaf lupins. The higher oil and protein content makes it highly attractive to the stockfeed industry and may open up new markets for lupins. Although work on this species is at an

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CASE STUDY

Collecting genetic resources for crop improvement

The GRDC is supporting the curation of Australia's collections of plant genetic resources. There are five genetic resource centres around Australia specialising in field crops and forage plant species, namely: the Australian Winter Cereals Collection (Tamworth, New South Wales), the Australian Temperate Field Crops Collection (Horsham, Victoria), the Australian Tropical Crops and Forages Collection (Biloela, Queensland), the Australian Medicago Genetic Resource Centre (Adelaide), and the Australian Trifolium Genetic Resource Centre (Perth). In addition, CSIRO maintains the Collection of Australian Indigenous Relatives of Crops (Canberra).

Between them, the centres store almost 150,000 accessions, which have been received from overseas collections and breeding programs, as well as from collecting expeditions. Plants are grown out to meet quarantine requirements, to characterise phenotypes and to multiply seed. Collections are maintained in long-term storage under conditions of low moisture and low temperature. The centres provide small quantities of seed on request to researchers and breeders, as well as to other collections.

Since the mid 1990s the GRDC has been the major R&D corporation providing financial support for the operation of the five centres. Over the past 15 years, these centres have operated independently, with host organisations being responsible for operating the centres and maintaining the germplasm collections.

The GRDC has recently been working towards the restructuring of the plant genetic resource centres into a single national system. With the support of Australian Wool Innovation Ltd, the GRDC is promoting the coordination of crop and pasture plant germplasm collections to achieve greater efficiencies in their operation. Discussions with partner organisations (mainly state government departments) have resulted in agreement to develop a unified, coherent national system. A new program entitled Plant Genetic Resources: Enhancing Germplasm Conservation for Australian Agriculture is now in place, and has been contracted to run for three years.

The GRDC has also been building on international collaborations, through centres such as CIMMYT in Mexico and ICARDA in Syria, that have made major contributions to the long-term productivity and sustainability of the national grains industry.

The GRDC is putting new arrangements in place to coordinate the introduction and evaluation of new genetic material into existing joint projects with CIMMYT, which will further enhance the delivery of new genetic material into cereal-breeding programs.

GRDC Chair Terry Enright checks on the progress of some promising CIMMYT wheat varieties destined for Australian fields.

SECTION 5
GRDC REPORT TO INDUSTRY

early stage, the GRDC will continue to invest in this crop to ascertain its potential.

Given increasing interest in lupin protein isolates and concentrates for the human food ingredient and higher protein feed markets, pearl lupins may have an important role to play.

Fab faba beans

The release of the new faba bean variety *Cairo* by GRDC-supported pulse breeding programs has renewed interest in growing faba beans in the north. The New South Wales Department of Primary Industries selected *Cairo* because it was bred specifically for cropping systems in northern New South Wales and southern Queensland.

The combination of increased yield, seed size and disease resistance offered by *Cairo* makes it a significant advance over varieties currently available for the north. Faba beans in the northern region are often affected by the diseases rust and chocolate spot. *Cairo* is moderately resistant to rust and, even in the most severe epidemics, will reduce but not eliminate the need for fungicide sprays to control the disease. *Cairo* also has a larger seed than other varieties do, making it better suited to the quality attributes (size, colour and uniformity) that importing nations, such as Egypt, are looking for.

Hybridisation

The GRDC has also invested in two projects that aim to develop viable interspecific hybridisation techniques for chickpeas and lupins. The projects link into work that is already in progress at the University of Western Australia and, if successful, will greatly assist in the development and introduction of desirable traits into pulse-breeding programs.

Vetch

Vetch is another versatile crop adopted by growers as a pulse rotation in the low-rainfall areas of southern Australia. In some areas vetch is virtually the only reliable pulse option. Substantial progress has been made towards the use of vetch as a multipurpose crop: it has rotational benefits for the cereal crops that follow, is a valuable, high-protein feed grain for the sheep and pig industries, and is a component in export hay.

In 2005–06, the program will focus on breeding for increased disease resistance, especially against ascochyta and rust, as well as on breeding a variety with lower anti-nutritional factors.

Weed control in pulses

Weed control is often a major problem in the pulse phase of crop rotation, as there are a limited number of selective herbicides capable of controlling weeds without harming pulse crops. Most herbicide trials for pulses have been undertaken on non-acidic soils, but recent studies have found that some herbicides affect pulses differently on acidic, sandy soils. The GRDC is providing support for screening the pulses suited to the western region for their tolerance to a range of herbicides on acidic, sandy soils. The project will build on the existing expertise at the University of Western Australia and be linked to other weed management work in Western Australia to develop a comprehensive herbicide management package for pulses. This will open up new opportunities to increase the use of pulses in crop rotations.

CASE STUDY

Resurrecting the chickpea industry

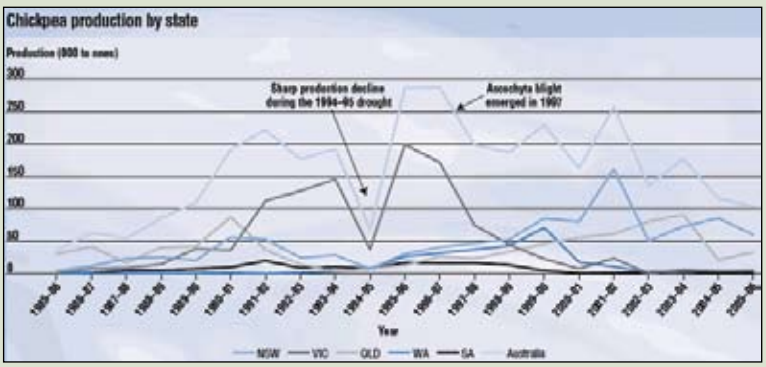
Prior to the emergence of ascochyta blight in Australia in 1997, the chickpea industry was expanding rapidly. However, as none of the varieties available at that time had any resistance to the disease, ascochyta blight led to the virtual collapse of chickpea production across the southern and western regions (see chart below).

The emergence of the disease required a major shift in emphasis by the agencies involved in chickpea research. A number of strategies were employed to combat ascochyta blight. One was the development of a management package to minimise the impact of the disease. Another was the screening of a large number of chickpea lines in Turkey and at ICARDA in Syria, for resistance to the disease.

At the same time, the breeders made specific crosses for ascochyta blight resistance. These were assessed in their disease nurseries and the best lines were rapidly advanced by single-seed descent. The first variety with improved resistance, *Howzat*, was released in 2002, but it was useful only as an interim measure to sustain the industry.

As a result of the determined efforts of the breeders in the various programs, a number of new varieties with greatly improved ascochyta blight resistance and good seed quality have been released. Two new Desi varieties are *Genesis 508*™, from the Victorian Department of Primary Industries program, and *Flipper*™, from the New South Wales Department of Primary Industries program. Both of these varieties have significantly improved resistance to ascochyta blight, and they should lead to a resurgence of the crop in the southern and western regions.

Two ascochyta resistant Kabuli types were also released in 2005. *Almaz* and *Nafice*, were developed by close co-operation with the International Centre for Agriculture Research in Dry Areas, Syria, the Aegean Agriculture Research Institute, Turkey and the Centre for Legumes in Mediterranean Agriculture (CLIMA).



COMMERCIALISATION

As in previous years, during 2005–06 the GRDC and its research partners made substantial investments in the breeding of new plant varieties. The intellectual property in these new varieties is co-owned by the GRDC and its research partners. In recent years, a dozen or more new varieties have been commercialised annually and, subject to successful field trials, it is anticipated that a similar number of new varieties will be released in 2005–06.

Where GRDC plant-breeding investments are made with institutional research partners, the GRDC is actively involved in seeking plant breeders' rights and the commercialisation of each new variety. This activity includes both the selection of licensees and the negotiation of suitable agreements. Where the GRDC invests in plant breeding in the private sector, the private sector company will be responsible for commercialising any new varieties produced, and the GRDC will participate in the commercialisation process through research or equity arrangements, as negotiated. ■

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Practices

Better farming practices adopted faster

OBJECTIVES

To develop better farming practices and have them adopted faster.

To develop sustainable farming systems, adapted to each of the industry's agroecological regions, that are responsive to grower, community and catchment needs.

To develop and deliver cost-effective, robust and environmentally responsible solutions to current and potential crop threats.

ACHIEVING THE OBJECTIVES

Scope

The Practices business group aims to develop optimal farm management practices that, when used to grow superior high-yielding varieties, will lead to increased productivity from sustainable grain production systems.

Better farming practices contribute to increased productivity by minimising yield losses caused by a broad and constantly changing spectrum of biotic and abiotic stresses, such as weeds, diseases and invertebrate pests, poor soils and variable climate. The scope of the business group's activities includes developing and validating new technologies to better manage crop threats before harvest and maintain grain quality after harvest, and integrating those technologies with existing farming practices.

The business group also focuses on developing solutions that are cost effective, innovative and diverse.

Investment budget for 2005–06: $34.20 million

The increasing complexity of farming systems, and the need to reduce reliance on traditional chemicals due to the development of pest resistance, provide crop protection challenges that demand integrated solutions. Increasingly, the challenge is to integrate control methods not only within pest categories but also across them, in an effort to develop whole-of-farm management strategies that reduce crop protection costs.

As we develop a better understanding of the genetics and diversity in both pests and crop hosts, our ability to manipulate pest-host interactions increases, providing farmers with vital alternatives to traditional mechanical and chemical solutions.

Another important focus is slowing the development of herbicide resistance in several important weed species. Research in this area is seeking to develop more sustainable weed management practices to delay the onset of resistance in regions and cropping systems at risk, as well as to develop alternative control strategies where herbicide resistance already exists.

The business group also supports education, training and other capacity-building activities that facilitate on-farm practice change and allow the grains industry to make the best use of new technology.

R&D INVESTMENTS

New technology

The development of new technology remains central to an innovative and productive grains industry. Two new crop protection initiatives in 2005–06 seek to capitalise on past successes within and outside the field of agriculture, to extract value for graingrowers. In one project, a model system that has provided valuable advances in human pathology, is the subject of an exploratory study seeking new methods to control plant parasitic nematodes. The second project will explore the feasibility of applying novel genetic techniques to the control of pest land snails.

The development of immunocontraceptive technology for the control of mouse plagues has continued in 2005–06 through the GRDC partnership with the Cooperative Research Centre for Australasian Invasive Animals. Existing long-term investments in the Cooperative Research Centre for Australian Weed Management and the Crown Rot Initiative have been maintained.

New investments in real-time and near-real-time soil testing will assist growers to be more efficient in their on-farm operations. Major investments in 2005–06 have included ongoing projects on applying precision agriculture; improving nutrient management; identifying ways to overcome surface and subsoil constraints; managing natural resources (especially through the Grain & Graze program); and managing climate variability and risk. Better training of growers – in ways to measure the level of soil water available for crop growth and make management decisions accordingly – is another focus for the year, with workshops in southern and western Australia.

A audit of relevant emerging technologies in each GRDC agroecological zone and subzone is being carried out. The findings will be used to explore and prioritise investment options on the basis of their likely returns to the industry. The emerging technologies deemed most likely to improve whole-of-farm profitability – while protecting and enhancing the resource base – will subsequently be selected for investment support and promotion to growers.

The emphasis will be on achieving increased profitability and sustainability for the greatest number of growers collectively managing the largest area of cropping land.

Grower groups

It has long been believed that grower groups play an important role in increasing the on-farm adoption of better practices by providing a network of farmers willing to help validate new technologies and practices, and integrate them with existing

farm management practices, in various regions. A major review and development of a business case in 2004–05 has identified and documented the many benefits that arise from the GRDC's ongoing investment in grower groups across Australia. The business case has provided a basis for continued investment in 2005–06.

Agronomy

Canola

Canola production in Australia has declined in recent years. To address this, the GRDC has continued to invest in research to identify and develop solutions to the key constraints to canola production. New projects are looking specifically at agronomic factors such as paddock nutrition, subsoil acidity and lack of root penetration. This work complements an existing GRDC-supported project, undertaken by Oilseeds WA, that works with growers and industry to provide production packages for high-, medium- and low-rainfall environments of Western Australia.

The GRDC continues to invest in the development of new strategies to better manage the devastating blackleg disease. Blackleg is the most serious disease of canola in Australia, and its severity has increased in recent years in parallel with the intensity of canola production.

Whilst the GRDC and its research partners continue to invest in breeding for blackleg resistance, the industry is also looking at strategies on how to better manage the disease.

Ongoing research by Dr Steve Marcroft indicates that, if growers do not grow varieties with the same source of blackleg resistance in consecutive years and continue to grow crops away from last year's stubble, disease pressure drops markedly. This is good news for growers, indicating that they can manage this disease on-farm.

Pulse packages

Given the increasing number of pulse varieties being released each year it is easy for growers and marketers to become confused. So, in partnership with the GRDC and the various state agencies, Pulse Australia has developed a program to produce pulse variety management packages for all new varieties.

Each management package is specific to a particular variety and covers all aspects of its agronomic management, including optimum sowing times, plant density, weed and disease control, particular herbicide treatments and harvest management. The packages also assist in meeting grower needs for information that is independent, objective, credible and up to date.

This is a national approach that coordinates research in key production areas across Victoria, South Australia and New South Wales. The packages will enhance the adoption of new pulse varieties and deliver benefits along the value chain to growers, agronomists and marketers alike, thus enhancing the ability of growers to capture all the benefits of a new variety.

Mixed enterprises

Recognising that grain production makes up only part of mixed-enterprise farming operations in many parts of Australia, the GRDC is continuing to explore opportunities to collaborate with research organisations dedicated to related agricultural enterprises. Mixed-enterprise farms in southern cropping regions mostly comprise grain-livestock production systems, whereas in the north, cotton is often grown in rotation with grain crops. Following the tradition of the Grain & Graze program, which was established to study agronomic issues common to grain and livestock producers, the GRDC has become a partner in the new Cooperative Research Centre for Cotton Catchment Communities. This new partnership will identify research areas of common agronomic interest to the grains and cotton industries, including chemical use, soil health and water availability.

Similarly, since pasture remains a major use of land in rotation with grain crops, a business case is being prepared for investment in pasture research collaborations with organisations dedicated to livestock industries (such as Australian Wool Innovation Ltd, Meat and Livestock Australia, the Rural Industries Research and Development Corporation, and Dairy Australia). The business case will look beyond species improvement to examine the whole pasture value chain. This study will form the basis for collaborative, whole-of-farm approaches to pasture research in future.

Integrated pest control methods

Improved understanding of the biology of pests (weed, disease and invertebrate) remains fundamental to their control. Application of this knowledge through integrated management practices increases the efficacy of control and reduces reliance on single, reactive pest control options.

Better management of crown rot

New information from GRDC-supported research is giving farmers the upper hand in the battle against the cereal disease

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PLANNED OUTPUTS

New technology and practices to overcome soil constraints, harness the benefits of soil biota, and extend cropping rotation options.
Integrated farm management practices that enable diverse farming businesses responsive to product prices; protect crops from disease and weed invasion; assist in overcoming subsoil constraints; improve opportunities for nutrient inputs, particularly nitrogen fixation; and allow for weather and climate variability.
Natural resource management practices integrated into viable farming systems that lead to efficient water use and reduced drainage below the root zone; provide for efficient nutrient uptake; improve catchment management of salinity and water quality; and develop new learning methods.
Improved management of weeds, diseases and pests through a better understanding of their biological interactions with crop plants.
Increased diversity of crop protection strategies through understanding and use of the genetics of pest or host.
Improved risk management through rapid identification of and response to threats.
Management options that conform to economic, environmental and social demands.

PERFORMANCE INDICATORS FOR 2005–06

Implementation of a stratified survey to measure current on-farm practices such as the use of gypsum and lime for soil amelioration, controlled traffic, precision agriculture, variable rate technology, nutrient budgeting, risk management tools, the monitoring of water use and deep drainage, and the sowing of perennial pasture species.
Faster adoption of new practices, including targeted sustainable on-farm practices and technologies, by graingrowers.
Increased number of farmers involved in grower groups.
Enhanced management options for cereal foliar and root diseases across agroecological zones.
Increased farmer awareness and adoption of weed management practices that delay the development of herbicide resistance.
Identification of new approaches to crop protection, including the use of genetic manipulation of weeds, pathogens, invertebrate pests or crop hosts.

crown rot, which costs Australian graingrowers an estimated $56 million a year.

In recent trials, sowing non-host crops (legumes, canola or sorghum) reduced the incidence of crown rot by more than the simple effect of reducing the number of consecutive wheat crops or increasing the time between them. Rotation crops with denser canopies tended to increase the rate of wheat stubble breakdown and reduce the survival of the crown rot pathogen.

Similarly, experimental treatments that increased humidity and boosted microbial activity also reduced survival of the fungus in wheat residues. The significant factors included dense crop canopies, high rainfall or irrigation, and contact between soil and straw.

Removing fallow wheat residues by burning, cultivation or grazing also reduced the incidence of crown rot, but these practices tended to reduce soil water storage as well, thus reducing any yield benefits (in the following wheat crop) from controlling the disease. It is now clear that grazing, burning or cultivation are less desirable management strategies than rotation.

Grass weeds had only a small influence on the incidence of crown rot in wheat and, compared with stubble from the previous wheat crop, made only a small contribution to inoculum levels in a wheat–chickpea rotation. The direct competition effects of weeds on grain yield are far more important than the role of weeds as secondary hosts, although the latter may become more significant in long rotations.

In contrast to the above examples, high levels of nitrogen increased the severity of disease, and increased its incidence under conditions of water stress. This means that when crown rot is present farmers need to avoid excessive nitrogen and match nitrogen application to water availability.

This work provides farmers with considerable new information on ways to increase the mortality of the fungus. Armed with such information, growers can choose a mix of rotations, fertiliser regimes and residue management strategies that maximises their control of crown rot.

Mixing up weed control

Herbicides have given farmers unprecedented control over the weed burdens that reduce crop yield. However, biological systems do not forgive over-reliance on any single management tool, such as herbicides, and the grains industry is rapidly approaching the point where diversity of weed management practices, rather than percentage weed control in any one year, will determine success.

Where stubble was concentrated in a windrow, the required temperature to destroy weed seeds was reached.

Burning weed seeds to manage herbicide resistance

Weeds that are developing resistance to our most widely used herbicide, glyphosate, are a risk to the sustainability of modern farming systems that rely heavily on herbicide use rather than tillage for weed control. A random survey of farmers in the Western Australian wheat belt conducted by researchers from the Western Australian Herbicide Resistance Initiative (WAHRI), with support from the GRDC, found the vast majority of populations of ryegrass (94 per cent) and wild radish (85 percent) were resistant to one or more herbicides.

In the northern region of the Western Australian wheat belt, the researchers found no wild radish populations that were susceptible to all commonly used herbicides and only one completely susceptible ryegrass population. In the same region, almost 90 percent of the wild radish and annual ryegrass populations were resistant to two or more herbicides.

Because of the rising incidence of herbicide resistance, the aim of Western Australian growers is to limit the number of weed seeds entering the seed bank. To that end, WAHRI has been working with growers to develop a range of management techniques to address the problem.

The two preferred methods are harvesting the weed seeds for later destruction or burning stubble to kill the weed seeds in the paddock.

WAHRI trials show that the effectiveness of the second strategy depends on the heat generated by the burn and the length of time that heat is maintained. A temperature of 400°C for a minimum of 10 seconds is needed to kill ryegrass seeds, while for wild radish the temperature needs to reach 500°C for the same duration.

The trials show that, under Western Australian conditions, those parameters are unlikely to be met in a standing stubble burn. In a 2.3 tonnes per hectare standing stubble burn, for example, the required temperature was reached only at 20 centimetres height, well away from seed on the ground.

In contrast, where stubble was concentrated in a windrow, the required temperature was reached at ground level, and 99 percent of the ryegrass seed was killed by the treatment. Similar results have been shown for wild radish seed. By windrowing the wheat stubble, it is estimated that the same fuel load could be concentrated to become equivalent to 15 tonnes per hectare of combustible material, dramatically improving the effectiveness of the fire.

The research shows that burning can be used as an effective weed control tool, but the amount of combustible material available is critical. The good news for farmers is that narrow windrows have a number of advantages besides concentrating combustible material. They are easier to burn without affecting the rest of the paddock, and the small amounts of stubble remaining between the windrows after burning serve as a cover against wind erosion and, where the paddock is lightly grazed over summer, do not appear to be unduly disrupted by sheep.

These findings will enable growers to reap immediate practical benefits from the ongoing research into the complexities of herbicide resistance.

Blackleg resistance

Integrated control methods are also being sought to address disease threats such as the breakdown of blackleg resistance in canola. Blackleg disease remains the major threat to the

sustainability of the Australian canola industry and the GRDC continues to invest in work to discover the reasons for the breakdown and search for a solution. This includes identifying new sources of genetic resistance to blackleg, as well as developing better management packages.

Blackleg is a debilitating disease of canola which, depending on seasonal conditions, can infest over a million hectares of canola stubble in Western Australia. Canola growers in the eastern states must also manage the disease, which appears to be an important part of the general malaise called 'canola decline'. New studies supported by the GRDC have revealed the potential to chemically interfere with and even break the blackleg fungus life cycle by treating canola stubble.

Airborne spores are the most virulent and important source of blackleg epidemics under Australian conditions. Researchers at the University of Western Australia are investigating how fungicides, herbicides and surfactants can inhibit spore production and release. Trials have confirmed that applying certain fungicides, and even a herbicide, to stubble residues results in reduced spore emissions. In addition, the link between the level of disease pressure – that is, the number of spores discharged – and the severity of blackleg has been demonstrated for the first time.

The incidence of crown cankers caused by blackleg indicated significantly lower infection in plots where residues had been treated. Canker severity at late flowering was reduced by up to 45 percent due to significant reductions in spores discharged during the seedling phase.

Since it is possible to affect spore production, and since a reduction of spores results in lower disease levels, it now remains to be seen whether researchers can first develop a cost-effective treatment or management option, then integrate it with existing blackleg management and control strategies. Meanwhile, canola growers can start looking forward to brighter days without blackleg.

SUSTAINABLE FARMING SYSTEMS

Managing sodic-saline subsoils in the north

There are large areas of sodic–saline subsoils that constrain crop production in the northern cropping region. If growers can adapt to and manage those constraints, productivity and profitability will be increased.

Relatively minor changes, such as altering the crop varieties grown, may be appropriate on soils with minor constraints. Work in the GRDC-supported Subsoil Constraints Initiative has identified wheat and barley as the best adapted winter crops for sites with sodic–saline subsoils. Amongst winter non-cereals, canola, mustard and field peas were more successful than chickpeas at the sites tested. Varietal differences were often related to season length.

Alterations in the length of the fallow period may be necessary in moderately to highly constrained sites, to allow for the decreased amount of rain required to fill the soil profile, while on severely constrained soils, substantial management changes may be needed.

Necessary changes might include altering rotations or using ameliorants such as gypsum and lime. In some situations, constraints may be so severe that profitable cropping is precluded.

The continuing work of the Subsoil Constraints Initiative will assist growers to decide whether to adapt, modify or avoid cropping in affected areas.

Permanent beds for sustainable cropping systems on irrigated farms

Permanent beds offer greater flexibility for cropping systems on irrigated farms. A large experiment being conducted by the New South Wales Department of Primary Industries, in partnership with the Australian Centre for International Agricultural Research and the GRDC, is evaluating permanent beds for cropping systems that include rice in the rotation.

The results indicate that changing from cropping systems where rice is grown on the flat to systems based on permanent bed layouts can increase farm profit, water use efficiency, sustainability, and ease of management. Bankless channels offer a new advantage, by allowing permanent beds within rice bays to grow a range of winter and summer crops in rotation with the rice.

Given the need for changes in water use in irrigation areas, options that allow irrigation farmers to diversify into a wider range of crops, including non-irrigated ones, are welcomed.

Canopy management for cereals

Canopy management, or managing the green surface area of the crop canopy in order to optimise crop yields and inputs, is attracting increasing attention. The theory is based on the premise that the crop's canopy size and duration determine the crop's photosynthetic capacity and, therefore, grain yield – as long as production is not limited by other factors such as water and nutrient availability, or pests, weeds and diseases. Canopy management also offers great potential for managing crop leaf diseases in high-rainfall situations, with the more open canopies of some crops known to be less susceptible to disease.

GRDC-supported work conducted in Victoria by the New Zealand Foundation for Arable Research, has shown that late application of nitrogen, based on growth stage and canopy size, results in improved protein levels and reduced screenings, but does not increase grain yield. In higher rainfall years the results could be different.

Improving understanding of canopy management will assist growers to manipulate their crops for optimum yield and quality.

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Canopy management, or managing the green surface area of the crop canopy in order to optimise crop yields and inputs, is attracting increasing attention from growers and researchers.

SECTION 5
GRDC REPORT TO INDUSTRY

Grazing grains for more profit in the high-rainfall zone

Results from GRDC-supported work conducted to date by CSIRO, the New South Wales Department of Primary Industries and the Farmlink grower group indicate that incorporating dual-purpose wheats into mixed-enterprise farming systems (that combine cropping and livestock production) can be profitable. Grazing of dual-purpose wheats in the high-rainfall zone does not reduce grain yield, provided the animals are removed before the crop's stems begin to elongate.

A number of experiments have found that higher grain yields were achieved in crops that had been grazed than in ungrazed crops. The reason is that grazing reduces both the size of the canopy and the root mass, which in turn can reduce the crop's demand for water.

In southern New South Wales and northern Victoria, allowing livestock to graze on winter cereal crops during their winter growth phase fills an important feed gap for animal producers, after stubble from the previous season has been eaten and before the prolific spring growth of more traditional pastures.

It appears that high animal production can be achieved regardless of whether stock are rotated on and off the growing crop or simply left to graze on the leafy crop until just before stem elongation. Crop variety does not matter much, as long as the crop has a true winter habit with genes that delay reproductive development even when the crop is sown early.

These findings should encourage both existing mixed-enterprise farmers and other graingrowers who are considering diversifying into livestock production.

Smart management to offset frost risk

In terms of total cost to the Australian grains industry the value of production lost due to frost is small. However, when a frost occurs on a property it can have devastating impacts for the individual farm enterprise. GRDC-supported work with both ConsultAg in Western Australia and the South Australian Research and Development Institute has identified some simple management tools that can lessen the impact of frost.

When a frost occurs on a property it can have devastating impacts for the individual farm enterprise.

The study showed that farmers can reduce their exposure to frost by identifying frost-prone paddocks and developing a frost minimisation plan.

A plan may include some of the following elements:

Do not aim for maximum production – look at ways to minimise losses.

Select frost-tolerant varieties.

Sow a blend of different varieties in the one field.

Ensure potassium levels are right – this helps give greater cell strength.

On heavy, dark surface soils, high levels of stubble can exacerbate frost.

Claying of sandy surface soils can help reduce frost damage.

Applying late-season nitrogen can increase a crop's susceptibility to frost.

The use of such plans can assist farmers to minimise production and financial losses due to frost.

Harnessing soil microbes to suppress root disease

The level of root disease suppression in soils is a function of the population, activity and composition of the soil's microbial community. All soils have an inherent level of suppressive activity, but this level can be significantly modified by management practices used within a farming system.

In work funded by the GRDC through the Soil Biology Initiative, conducted at Avon in South Australia, disease suppression increased from low to high levels over a period of five to ten years, following a change in management practices. The increase in suppression provided complete control of the soil-borne diseases rhizoctonia and take-all.

The management practices consistently related to soils with improved disease suppression include intensive cropping, stubble retention and limited or no cultivation. These practices also increase biologically available carbon inputs and result in changes to the composition and activity of the soil microbial community over time. There is greater competition for soil resources, which, along with predation and inhibition of pathogens, leads to increased disease suppression.

The management practices and the resulting disease suppression collectively contribute to above-average yields, making these findings great news for growers.

Fluid fertilisers balancing cost and convenience

The GRDC has a large R&D investment in developing the use of fluid forms of fertiliser for Australian cropping systems. The work grew from observations that fluid forms of phosphorus appeared to result in greater growth and yield of cereals in the alkaline and highly calcareous soils of the upper Eyre Peninsula in South Australia.

The project's various components aim to determine which soils are likely to show benefits from use of fluid rather than solid fertilisers; to uncover the mechanisms by which fluids can improve crop growth and yield; to demonstrate the effectiveness of different delivery systems for fluids; and to undertake an economic analysis of the use of different fertiliser forms.

A report commissioned by the GRDC (*The Potential of Fluid Fertilisers for Broadacre Cropping in Australia*, available on the Grain Zone website) concluded that not all soils are likely to show benefits from using fluid phosphorus, and that the use of fluids in general is very price-sensitive. But, where prices are broadly equivalent, more growers are now using fluid

forms of nitrogen and phosphorus for the combined benefits of convenience (especially for post-emergence applications) and increased yield (with fluid phosphorus).

Precision agriculture to improve paddock performance

Precision agriculture (PA) provides a tool that allows growers to vary inputs in order to reduce their own costs and to protect the environment. In some instances it is more economic to vary inputs according to potential yield and profitability, while in others it is better to treat the paddock, and sometimes even the farm, more homogeneously.

Once a grower has the basic agronomy right and is accounting for seasonal rainfall variability, it is time to consider whether it will be worth using PA to match inputs to the spatial variability present within individual paddocks or across the whole farm. It could be anticipated that where spatial variability is low and paddocks are small (less than 40 hectares), where seasonal rainfall variability is high, or where crop response to variable input rates (for example, of fertilisers) is low, then PA may be of little benefit.

In contrast, where spatial variability in yields is high, rainfall variability is lower, or crops clearly respond to different rates of inputs, adopting PA could be the next big step a grower can take to lift profit.

The Precision Agriculture Initiative is developing tools that might assist growers to make such decisions. The first tool, released in 2004 by CSIRO Sustainable Ecosystems, is a simple spreadsheet that uses the size of the cropped area, yield, and the cost of PA equipment to calculate the percentage lift in yield (or gross margin) required to make an investment in PA equipment financially viable. This vital information will help to ensure that PA fulfils its potential to improve both paddock performance and farm profits.

Biosecurity

Incursions are a constant threat to agriculture, and changing farm practices create new opportunities for existing organisms to flourish. The ability to detect and respond rapidly to new and emerging pest threats is critical to sustaining Australian export markets and a competitive advantage.

The newly formed Cooperative Research Centre for National Plant Biosecurity will provide an important vehicle for GRDC investments seeking to develop tools that detect and respond to new crop threats.

COMMERCIALISATION

At the farm level, the majority of the Practices outputs are delivered as pest management recommendations and other practical advice on the sustainable management of crop threats. Most of these outputs are delivered straight to growers through the GRDC and its partner research organisations (notably state agencies, cooperative research centres and grower groups), with no commercial value extracted on the way.

Similarly, a number of predictive models developed in GRDC-funded projects are widely used by agricultural advisers and consultants, but none is sold commercially. Examples include the Ryegrass Infestation Management tool and models that guide weed management practices to minimise the development of herbicide resistance.

A commercial PreDicta B soil-borne pathogen test has been enhanced by the addition of a crown rot analytical tool.

An area expected to deliver a commercial return for the GRDC and its partners involves biological inputs for farming systems. The GRDC has made significant investments in soil biology research between 2001 and 2007. Part of that expenditure has been directed towards the development of new biological soil inoculants for cereal and other crops. A business case recently developed as part of a related commercialisation project, *Biological Inputs for Profitable Farming*, seeks to maximise the benefit to growers arising from adoption of this new technology, as well as to obtain a reasonable return for the GRDC and its research partners. ■

CASE STUDY

Protecting the grains industry and its markets

Statistics compiled by the Australian Government Department of Agriculture, Fisheries and Forestry show that 67 exotic plant pests, diseases and weeds were discovered in Australia in the period 1996 to 2002. As no quarantine system can be foolproof, it seems inevitable that some exotic pests will be found first in a crop rather than at the border.

In 2002, Plant Health Australia coordinated the development of a *Grains Industry Biosecurity Plan* that includes internationally recognised protocols to identify and manage pest outbreaks. Threat summary tables for the 14 highest value grain crops in Australia have been prepared, prioritising the major pest and disease threats for each crop and identifying required management actions.

The GRDC is providing ongoing support for Plant Health Australia to further develop the *Grains Industry Biosecurity Plan* in consultation with grains industry and government representatives. The involvement of growers is also critical. If growers are suspicious about a pest or disease in their crop, they must understand the importance of determining whether or not it is an emergency plant pest. Early reporting increases the potential to eradicate a problem and lowers the costs of doing so.

The flip side of the benefits of biosecurity is being able to defend Australian trade against damaging claims. Such was the case with a shipment of wheat to Pakistan in 2004. In response to a claim that the shipment was contaminated with Karnal bunt, the internationally accepted diagnostic protocols developed for the *Grains Industry Biosecurity Plan* were put into action to clearly demonstrate that there was no Karnal bunt in Australia. Within days, appropriately trained people were able to investigate the claim and conduct laboratory tests resulting in a clean bill of health for the shipment.

Australia's grain biosecurity plan helped the industry rapidly disprove claims that an Australian wheat shipment was contaminated with Karnal bunt – an exotic disease not present in Australia.

New Products

OBJECTIVES

To develop innovative technologies, management practices and grain products that enhance grower profitability and the competitive performance of Australia's grain value chains.

ACHIEVING THE OBJECTIVES

Scope

The New Products business group targets opportunities both pre- and post-farm gate, by investing in R&D in new grain food products and new farm products and services, providing growers with additional options in farm management and marketing.

A key component of the work of the business group is delivering products to growers, through bundling GRDC co-owned intellectual property, accessing external intellectual property and preparing robust business cases to facilitate the commercialisation of new products.

The identifying features of this business group include a market-driven approach to managing investment, the attraction of international collaborators and co-investment by third parties, as well as a portfolio of investments that require significant capital and time before their R&D produces outcomes ready for delivery and adoption.

Activities are solidly focused on innovative and leading-edge R&D that gives rise to the development of novel technologies.

Overall, New Products will work closely with other GRDC business groups to identify investments that can be successfully promoted from the early stages of R&D to clear pathways to market.

Investment budget for 2005–06: $11.00 million

PLANNED OUTPUTS

Grain market intelligence and value chain analysis to improve the market orientation of GRDC investments and Australia's competitive performance.
Sustainable grain storage technologies to support efficient industry logistics and grain marketing.
Quality management strategies and technologies to assist industry, including growers, to assess and manage grain quality.
Food safety management strategies and technologies to improve public health outcomes and reduce market risk.
New food, feed and industrial products to improve grower margins and Australia's competitive performance.
Initial investigation of technologies to assist growers in the analysis on-farm of soil and grain properties.

PERFORMANCE INDICATORS FOR 2005–06

Commencement of a situational analysis of on-farm grain storage, taking into account the needs of growers, identifying storage options and the impacts that they could have on other value chain participants.
Collaboration with three or more value chain participants, ensuring that Australian grain participates more effectively in Asian markets.
Commercial evaluation and testing of biological inputs for profitable farming, enabling final commercialisation arrangements to be established.
Development of a business case for the commercialisation of a suite of new grain fumigants, and the commercialisation of these fumigants through to the negotiation of suitable licensing arrangements.

INVESTMENT STRATEGIES

New uses

Investments in new grain products for food and other uses has been a focus for this business group throughout 2005–06. New Products will continue the GRDC investment in the Cooperative Research Centre for Innovative Grain Food Products. Several opportunities for co-investment in functional foods are being explored, with a continuing strategy to develop niche products that can provide increasing levels of differentiation.

Similarly, several opportunities relating to new grain products for industrial use will be explored. The GRDC–CSIRO four-year joint investment in the development of crop biofactory technology and products has commenced. This year the work has focused on the areas of industrial oils, complex monomers and protein biopolymers, as well as intellectual property development, which will serve to attract future third-party investors.

Food safety initiatives

Whilst the food safety risks in the grains industry are low, it is essential for the industry to manage domestic and inter-

Some projects deal with the assessment and management of mycotoxins in maize.

national perceptions of such risks in order to maintain and enhance market access.

The GRDC continues to support the Australian Food Safety Centre of Excellence, as well as a variety of projects related to food safety within the GRDC's total investment portfolio. One project aims to produce an assessment of food safety risk for the Australian grains industry, to include the effects of the naturally occurring toxin deoxynivalenol, which is formed by fungi such as Fusarium species in wheat. Other projects deal with the assessment and management of mycotoxins in maize, and the evaluation and further development of biocontrol options for the organisms that cause annual ryegrass toxicity.

These projects will provide both useful tools for growers and vital strategic information for the grains industry as a whole.

Grains for livestock

The Premium Grains for Livestock Program will continue as a collaboration with end-use industries. Database compilation has been finalised and database interrogation is identifying grain characteristics that are closely related to end-use characteristics. NIR (near-infrared) calibrations will be refined, and the GRDC will work on programs to look at more effective breeding for selected feed grains.

Also as part of a larger collaborative program involving industry and end-use companies, New Products is finalising the commercialisation of lupin-based products for aquaculture needs.

Quality testing

A continuing key objective will be the development of grain quality testing using NIR and mid-infrared (MIR) technologies. These measurement tools are designed to enable growers to maximise the value of their grain crops or improve their input or management practices. A scoping study has been undertaken to determine what measurements are most useful to growers, and whether third-party-owned intellectual property can be accessed and adapted for on-farm use by growers and their advisers.

Storage

Grain storage will continue to be a key investment area for the GRDC, managed by New Products. Maintaining the effective use of phosphine is a priority for stored-grain research, and a major initiative will be to define phosphine strategies for the whole grains industry, including growers, researchers and bulk handlers.

The study of chemical strategies for the management of grain storage pests is ongoing in 2005–06 in all regions.

Most notably, the phosphine resistance monitoring and management investment continues, as stored-grain pests develop resistance to phosphine and other chemicals.

The GRDC-supported National Resistance Monitoring and Management Program monitors and detect levels of resistance to phosphine and other commonly used grain protectants in Australian grain-growing regions. The data generated was used as the basis for rewriting the cylinder gas label and the solid formulation label for phosphine as approved by the Australian Pesticides and Veterinary Medicines Authority. The data demonstrates the influence of grain temperature on phosphine toxicity and defines both optimal gas concentrations and exposure periods.

With GRDC support, the Queensland Department of Primary Industries and Fisheries, the New South Wales Department of Primary Industries and the Western Australian Department of Agriculture have demonstrated that farmers can control resistant populations of insects by using storage sealed to an appropriate standard.

The QDPI&F has, under an Australian Quarantine Inspection Service-approved quarantine facility, evaluated a highly phosphine-resistant strain of Chinese rice weevil. The evaluation identified the phosphine fumigation protocols necessary to control this exotic biotype.

An aeration and cooling extension program, targeted at growers and smaller grain merchants, has educated growers in the practice of using aeration and cooling to manage grain quality and insect control. Suppliers of aeration equipment have anecdotally reported increases in sales of aeration equipment above those expected, indicating that the information is reaching its targets effectively.

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CASE STUDY

Lupins nibbling away at soy

Lupins have demonstrated potential as a substitute for soy in the food ingredient market. However, mostly due to extensive international soybean production, soy products dominate the global food ingredient market. This situation creates both an opportunity and a challenge to increase the use of lupins as a food ingredient for domestic and international markets, particularly in Europe and Asia.

Lupins are unlikely to break the dominance of soy products – the use of soy flour and grits in Europe alone is healthy and growing, and forecast to reach 140,600 tonnes or US$169 million by 2007. The angustifolius lupin share of the market is less than 10,000 tonnes, but this has grown rapidly from nil just five years ago. Making further inroads into this market would lead lupins beyond animal feed and into higher value, decommoditised food grade products, thus delivering added value to growers.

With this goal in mind, the GRDC is supporting a collaborative project between the Western Australian Department of Agriculture and a leading international specialty food ingredients company to develop new lupin varieties with the best processing characteristics, based on specifications sought by food ingredient manufacturers.

Breeding programs associated with the project are developing high-protein lupins, having demonstrated that protein can be extracted from lupin flour for use as an ingredient just as it can be taken from milk (casein and whey) or egg whites. In addition to protein, the researchers have found that lupin flour contains non-starch polysaccharides that act like both soluble fibre (as in oat fibre) and insoluble fibre (as in wheat bran). Previous research suggests that lupin kernel fibres can lower blood cholesterol and that lupin fibre has a high satiating factor, which means it lengthens the time before people feel hungry after eating. These findings suggest that lupins also have potential for use as functional foods and/or dietary aids.

Department of Agriculture WA researcher, Sophia Sipsas is identifying lupin varieties suited to the food ingredients market.

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As part of GRDC-funded research into alternative grain fumigants, CSIRO Entomology has been studying the use of ethyl formate mixtures. Ethyl formate is a naturally occurring compound found in a wide range of fruit, vegetables, cheese and grain products.

The research has led to the development of a cylinderised mixture of ethyl formate and carbon dioxide known as Vapormate™, which has recently been registered in Australia.

Further developments by CSIRO include the licensing of BOC Ltd to commercialise Vapormate™, the specification of a full safety profile for ethyl formate, and the establishment of optimal exposure times to control grain insects, with the latter information forming the basis for the label.

Vapormate™ is for use in sealed silos and currently can be applied by a licensed fumigator only. Discussions with regulatory authorities about the label content will be ongoing, with the aim of eventually allowing Vapormate™ to be used by growers for on-farm grain storage.

Registration and safe use of grain storage chemicals

The GRDC invests in research into storing grain cleanly and safely. The coordinated registration of grain storage chemicals is designed to complement those research activities by ensuring that industry registration requirements and priorities are identified and presented to regulatory authorities. The loss of maximum residue limits (MRLs) for any existing chemical could have serious consequences for the Australian grains industry, so it is essential that Australia has input into any international changes that might be made to MRLs for chemicals used in Australia.

This investment, as part of the New Products Program, seeks to report on the annual outcomes of the international Codex Committee on Pesticide Residues, and produce and maintain a consolidated Codex – Australian MRL listing. Significant achievements in this project have included preserving MRLs for dichlorvos, fenitrothion, methoprene and pirimiphos-methyl.

The GRDC invests in research into storing grain cleanly and safely.

High moisture harvesting

A major investment in optimising grain yield and quality by exploring the use of integrated high-moisture harvesting and grain storage strategies is continuing. Research in this area has the potential to reduce the risk of harvest downgrading, resulting in an overall positive impact on grower profitability.

Harvest bags

Another endeavour in relation to grain storage is the investigation of novel storage technologies such as harvest bags. Novel storage has the potential to deliver greater flexibility to growers and can form part of an important, integrated grain harvest-storage strategy.

COMMERCIALISATION

Commercialisation is one way of securing technology adoption. In some cases, the benefits of GRDC research investments can be delivered to our growers only through the commercial production of the research outputs. The GRDC's primary aim is to make new technology available to graingrowers as quickly and as cost-effectively as possible.

Usually the GRDC is only one of a number of organisations investing in the development of new technologies by public and/or private organisations. Investment partnerships are desirable and necessary, as they reduce the risk to the GRDC in the funding of new technologies, and because partner organisations can bring benefits – apart from financial resources and research capability – such as market knowledge and access to complementary technologies.

Where the GRDC is a member of a consortium using public and private sector funds, it has influence over the terms of commercialisation, and determines these in collaboration with the other investors to ensure that a proper balance is struck among the needs of all members of the research consortium.

The GRDC continues to seek new business opportunities that arise from its research portfolio, and to seek to provide benefit to growers, to the businesses undertaking the commercial development of new products, and to the GRDC and its research partners. For each commercial business opportunity, the GRDC seeks investment of resources from partners that will profit from the development and widespread uptake of the new technology.

This is an important part of using GRDC investment funds to leverage funds from other sources – including commercial investment funds – for the benefit of growers.

Every commercialisation task is unique and commercialisation work must be undertaken on a project-by-project basis.

Soil biology technology

Through its soil biology research program, the GRDC and its research partners are seeking to develop both management solutions and new soil inoculant products to increase plant productivity through suppressing soil-borne disease and promoting plant growth.

The GRDC is currently leading the effort to commercialise new potential soil inoculant products, having:

Bundled together seven new potential soil inoculant products developed by six research partners.

Undertaken an expression of interest process seeking proposals to commercialise this suite of new products.

Carefully evaluated the replies received, and the technology, expertise and resources that each company might provide.

Following a detailed negotiation process, the GRDC has

entered into a joint venture agreement to undertake the preliminary commercial evaluation of potential inoculants in the research pipeline. The joint venture partner brings resources including:

Capacity to undertake the commercialisation, including the development of commercial formulations, of new soil inoculant products.

Expertise in, and capacity to undertake, manufacturing.

Inoculant on-farm delivery technology.

Expertise in the development of new inoculant markets.

It is anticipated that the earliest of the new inoculant products will be ready for commercial release in 2006–07.

New fumigants to treat insect infestation

A series of potential grain fumigant products have been undergoing R&D for a number of years, and new fumigants, including carbonyl sulphide (COS) and mixtures of ethyl formate and other gases, are now ready for commercialisation.

Efforts to commercialise COS to replace methyl bromide (an ozone layer-depleting gas that is being phased out under the Montreal Protocol) have been undertaken by the GRDC, CSIRO (the research partner) and bulk-handling companies involved in the project for the past few years.

To date it has not been possible to overcome the two main barriers to commercialisation: the difficulty of sourcing supplies of COS in the quantities and at the price required; and the risks and costs associated with registration of the new food fumigants.

However, continued work by the partners in this project has recently resulted in a breakthrough, as a major international company has expressed interest in the commercialisation of a suite of new fumigants. The company will source gas supplies from manufacturers around the world and is willing to undertake the registration of the new fumigants. An agreement to undertake commercialisation is currently being negotiated.

New tools to measure grain qualities objectively

Quick, inexpensive measurement of grain qualities at grain receival terminals is important to graingrowers, bulk handlers and customers. The GRDC, BRI Australia Ltd and CSIRO are currently undertaking a project to take a fresh look at objective quality measurement technologies.

In addition to improving the use of current measurement techniques, such as near-infrared, the particular purpose of this project is to look for opportunities to combine measurement outputs from different technologies, including technologies that have not previously been applied to measuring grain properties, to provide the required new tools. To ensure that the outputs from this project are useful to the grains industry, interactions with bulk-handling companies were commenced early in the project, and these contacts are being strengthened as the research results begin to flow.

Once the key measurement technology combinations required have been determined, discussions will commence with the most appropriate commercial partners to ensure that the commercialisation of the new instruments can proceed as quickly as possible.

Cost-effective control of heliothis moth

The GRDC and research and commercial partners invested in two projects to develop a more reliable and cheaper method of producing a biological control agent for the heliothis moth. The research work included screening for effective naturally occurring virus isolates, and assessing new technology to enable the biological agent to be incorporated into a new commercial production system.

Measuring soil and grain properties on-farm

Over the past few years, the GRDC has invested in research to develop new techniques to measure the useful properties of soil and grain (in particular, feed grains). While industry organisations such as animal feed manufacturers have the resources to use this technology, it is difficult to deliver it to individual graingrowers on-farm in a timely, cost-effective manner.

Initial investigation is underway to determine whether suitable commercial delivery technologies have been developed elsewhere, and whether there are existing technologies that can be adapted for use on-farm. If suitable candidate technologies are found, the GRDC will consider investing in projects to enable those technologies to be adapted or further developed for use by growers.

New grain varieties

The GRDC's research partners have developed several new grain varieties. The GRDC took an active role in selecting the most appropriate licensee to undertake the commercial release of the most promising new varieties.

The GRDC invests in research conducted by several wheat-breeding entities and unincorporated joint ventures, including SunPrime Seeds Pty Ltd, Australian Grain Technologies Pty Ltd, Enterprise Grains Australia and Grain gene. Those entities and joint ventures all underwent significant structural change in 2004–05 and the GRDC continues to invest in their research under the new arrangements. The companies commercialise the varieties they release, as detailed in their annual reports.

The use of End Point Royalties (EPRs) – levies charged for the use of commercial varieties, usually collected at the off-farm delivery point – is increasingly seen by plant breeders as a way of recovering some of their costs. In 2004–05 the GRDC began a review of its policy towards use of EPRs on varieties partially funded by growers through the GRDC. ■

The GRDC's research partners present a suite of high performing grain varieties to Australian growers.

Communication, customer services & capacity building

OBJECTIVES

To deliver targeted and integrated information on research outputs arising from the GRDC's total R&D investment to all stakeholders.

To facilitate effective communication of GRDC's R&D outcomes to all its identified customer segments.

To build critical mass in research capacity in collaboration with GRDC's research providers that is able to maintain high-quality research standards and deliver against current and future needs of the Australian grains industry.

To identify the best means to attract and retain talented students and researchers in agricultural disciplines- – such as breeding, agronomy and entomology which benefit the grains industry.

Investment budget for 2005–06: $9.70 million

ACHIEVING THE OBJECTIVES

A strategic review of the GRDC research portfolio carried out in 2004 reinforced the case that maximum benefits are delivered to Australian graingrowers via two distinct pathways:

- Through having better crop varieties adopted faster; and,
- Through having better farming practices adopted faster.

Effective communication of information on these two key pathways is essential to facilitate faster adoption.

Accordingly, the Communication, Customer Services & Capacity Building group strives to deliver information on new crop varieties, new farming practices and other products and services that arise from all GRDC research activities.

The GRDC also recognises that graingrowers are very diverse in their communication and extension needs, and that information has to be tailored to meet the specific reguirements of growers in different regions. Accordingly, the business group has established a series of GRDC Communication Catchments throughout the Australian grain belt that reflect industry demographics, farming systems and production attributes unique to each catchment. These allow specific pieces of information, relevant to particular regions, to be bundled together as information packages and delivered in a targeted way to specific segments of the GRDC's large customer base.

The GRDC seeks to attract and retain talented young rural leaders and research students.

The business group is also responsible for developing and implementing strategies to build research capacity in the agricultural disciplines of breeding and agronomy, as these are the two areas that most benefit the grains industry.

Other important disciplines such as entomology are targeted as required.

Capacity-building activities supported through this business group include PhD and post-doctoral research scholarships, grains industry training and research awards, short-term courses, conference sponsorships, and travel awards to allow individuals to attend national and international conferences.

All of these activities assist in allowing the best use to be made of the latest research.

INVESTMENT STRATEGIES

Communication and customer services

Australian grain growers are the GRDC's main target audience for the delivery of information on R&D outcomes. But it's becoming increasingly important to build relationships with the growing network of intermediaries who can act as extension agents and so help achieve faster adoption of GRDC supported research.

This network includes agribusinesses, private consultants, farm advisers and grower groups who provide technical and strategic agronomic advice alongside traditional public sector providers. Opportunities to develop closer alliances between the GRDC and these organisations are being further explored in 2005–06. Alliances are being forged with:

Individual growers through the improved delivery of packaged information;

Agribusinesses and advisers through the distribution of products and services and targeted adviser research updates; and,

State agencies and private organisations through the development and distribution of products and services.

This existing resource base is also well suited, and must be utilised more effectively, to test and promote the adoption

of new varieties and practices at the regional level. This will add value to the GRDC's total R&D investment by bringing together a range of complementary skills and resources in new combinations from the existing network to enhance technology transfer on farm.

Building research capacity

During 2005–06 the business group aims to develop and implement a new strategy to build critical mass in research capacity to support the grains industry. The steps involved include carrying out a review of existing research capacity, identifying what is needed to strengthen existing capacity, and finally, developing and implementing a strategy to deliver what is needed.

An essential part of this work will be to gain a better understanding of why talented individuals are less inclined to pursue careers in agricultural disciplines and to identify the best means to address any disincentives. This is a prerequisite for being able to attract and retain talented students and researchers in agriculture.

Another key objective for 2005–06 is to encourage growers to take advantage of the travel and training programs to enhance learning, the sharing of experiences and communication between growers.

PRODUCTS AND SERVICES

Spreading the word

Each year a diverse range of high-quality products and services, such as the *Ground Cover* newspaper, field research manuals, *Ute Guides*, on-farm evaluation tools and update seminars for growers and advisers are produced. An integrated program that builds industry capacity and knowledge through support for conferences, travel and education, complements these initiatives.

A focus of the GRDC communications group will be to gain a better understanding of why talented individuals are less inclined to pursue careers in agriculture.

Women in rural industries

The GRDC continues to assist women in rural industries, through the Industry Partnerships–Corporate Governance for Rural Women Initiative and the GRDC's Partners in Grain project, to gain additional financial, technical, risk management and marketing skills and knowledge that will support them in their business enterprises.

Grains Research Updates

The GRDC's Grains Research Updates are held twice a year in February–March and August–September. During 2005, 45 workshops were held across the Australian grain belt. In a survey of the more than 5000 attendees, 97 percent of those surveyed told the GRDC that the presentations and information they had received would or may assist them to evaluate new options for their clients or their own farming enterprises.

In consultation with local growers and agronomists, topics for the Updates are chosen for their relevance to a region.

The GRDC also includes international keynote speakers

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PLANNED OUTPUTS

Effective communication infrastructure in place, including a range of newly developed and existing mechanisms that can deliver targeted information to different stakeholder groups as required
Information, products and services that maintain or increase GRDC's competitive advantage and are considered relevant and timely by GRDC's segmented customer base
Critical mass of research capacity in Australia that is dedicated to meeting the current and future research needs of the Australian grains industry – this includes consideration of R&D facilities and infrastructure, but is particularly focused on building human research capacity
Strong links between domestic agricultural research centres, including state departments of agriculture, universities, Cooperative Research Centres, the CSIRO, breeding companies and public–private joint ventures
Strong links between researchers and their target audiences – such as grower groups, other R&D extension agents and individual growers – in order to facilitate learning and allow the industry to make the best use of research outcomes
Talented students and researchers being attracted to and staying in agricultural disciplines

PERFORMANCE INDICATORS FOR 2005–06

An increasing proportion of growers adopting new varieties and practices over the past two years due to GRDC activities, identified through an ongoing tracking survey of graingrowers
An increasing level of customer satisfaction with GRDC organisational performance as a whole, and with the delivery of new and relevant information, products and services in particular, assessed by annual survey of GRDC stakeholders
Greater utilisation of GRDC training and travel awards, and enhanced communication and extension of the knowledge and experiences gained
Successful completion of an audit of skills, capabilities and research capacity presently available to support the domestic grains industry
Publication of an audit report that accurately maps existing research capacity and identifies future needs, to include details of the levels and types of support available from all parties (the GRDC and research partners) that contribute to existing research capacity
A new strategy in place to address the research capacity needs of the industry, specifying how research capacity is to be strengthened, by whom (responsibility) and by when (timeline); the milestones to be achieved along the way; and resourcing issues
The research capacity requirements of GRDC stakeholders and research partners identified via consultation and incorporated into the new strategy

SECTION 5
GRDC REPORT TO INDUSTRY

in the adviser updates. This provides a unique opportunity for Australian grains industry participants to keep up to date with the latest and best of grains research from around the world.

The February–March 2006 series of Crop Updates have just been completed with thousands of growers and advisers attending from all areas of the national grain belt.

Change agent survey

A survey of approximately 250 leading growers and agronomists was conducted in recognition of the important role they play as agents for change. The aim was to gain a better understanding of how these important industry sectors can assist the GRDC to facilitate adoption of research outcomes.

The survey found that these change agents rate the GRDC's performance highly; they have a strong desire to develop a closer working relationship with the corporation; and they have a strong reliance on accessing information and advice from the GRDC. As a result, strategies will be developed in order to engage this group to drive the adoption of GRDC research outcomes, to the benefit individual growers and the wider industry.

Communication catchments

Recognising that the traditional 'one size fits all' approach to marketing and communication is no longer appropriate for an industry that has become highly segmented, the GRDC has taken steps to further identify and understand its customer base. The result was the establishment of a series of 'communication catchments', throughout the grainbelt, that reflect a diverse industry segmented by different demographics, farming systems and production attributes in various regions.

By grouping graingrowers according to their location, the communication catchments assist the GRDC to target the needs of particular customers.

While the GRDC's main target for product and service delivery is Australian graingrowers, it is becoming increasingly important to build relationships with other users of GRDC investment outputs to further encourage increased on-farm adoption of GRDC research outputs. These users include farm advisers, consultants and resellers who operate alongside traditional public sector providers and offer a range of technical and strategic advice on agronomy and farm inputs.

Accordingly, the GRDC is endeavouring to make better use of the services provided by networks that already operate within its communication catchments, and might act as extension agents for the corporation.

These and other measures to reinvigorate the corporation's contact database will help to ensure that the GRDC achieves its goal to more effectively communicate and deliver research investment results. ■

CASE STUDY

Harvest Radio tunes into spray drift

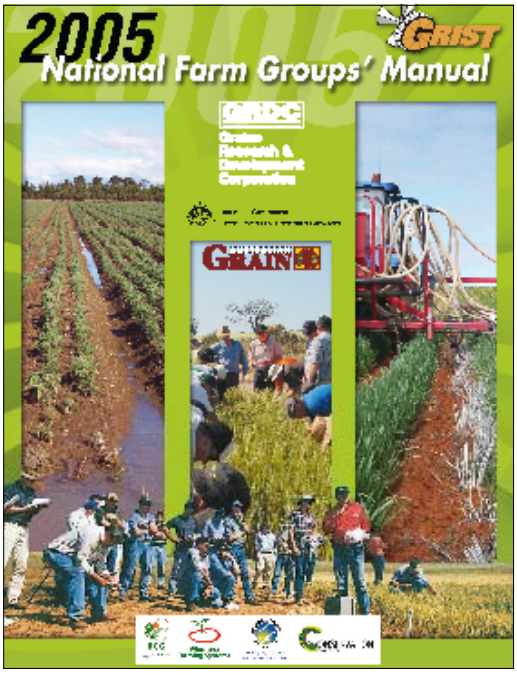
In 2004–05 the GRDC embarked on a new web-based initiative known as *Harvest Radio*. The initiative provides technical information in an online audio format, including updates on research, trials, new varieties and farmer activities, and case studies. The bimonthly programs present insights into some of the latest research reported in the GRDC's *Ground Cover* newspaper, straight from the researchers and growers involved. The programs are hosted on the GRDC's website GrainZone and can be accessed through www.grdc.com.au/radio/main.htm.

The timing and focus of programs are also coordinated to mirror on-farm decision points during the cropping year, or to cover topical issues. For example, following reports of damage to 2005 summer grain crops in the northern region caused by herbicides drifting away from targeted cotton crops growing nearby, the GRDC coordinated an intensive localised campaign to raise awareness of the loss and ways to minimise the risk of it happening again. The GRDC used *Harvest Radio* to examine spray drift from a grower's viewpoint, looking at ways to reduce risk, and the latest developments in spray technology.

The spray drift edition of *Harvest Radio* was just one component of the GRDC's collaborative effort with the cotton industry to minimise herbicide spray drift. Other activities included:

- The targeted use of emails to over 100 growers, advisers and government staff in central Queensland, to improve awareness of the likelihood and potential cost of spray drift in unsuitable weather conditions.
- The production and distribution of detailed information and guidelines on the process of spray application and ways to minimise drift, through the GRDC's *Ground Cover* newspaper and the 2005 Paddock Diary, which were both sent to over 44,000 growers, advisers and researchers.
- The 'BYO nozzle' tour hosted by Conservation Farmers Inc., which visited farms around Dalby in Queensland for demonstrations of sprayers, rate controllers and spray nozzles.

An intensive localised campaign raised awareness of spray drift problems and practical means of overcoming them.



Another GRDC initiative has been the publishing of field trials undertaken by grower groups across the country. The result is greater communication between groups and individual growers with less research duplication.

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
WHEAT	
Breeding technology and variety evaluation	
Australian Winter Cereals Molecular Marker Program — Wheat Genome Sequencing Consortium	Prof R Appels, Murdoch Univerisity, 08 9368 3544, rappels@agric.wa.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Towards the application of perfect markers for broad spectrum disease resistance in wheat	Dr E Lagudah, CSIRO Plant Industry, 02 6246 5392, evans.lagudah@csiro.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Wheat marker implementation/validation for AGT	Dr R Eastwood, Australian Grain Technology, 03 5362 2148, russell.eastwood@nre.vic.gov.au, 30-Jun–07
Develop a business plan analysis and recommendations for wheat breeding in Western Australia	Mr R Fellowes, Agribusiness Consultant, 03 9347 8728, ross.fellowes@optusnet.com.au, 31-Jul–05
Develop a business plan for a proposed joint Northern Region wheat breeding organisation for QDPI, NSW-DPI and GRDC	Mr R Fellowes, Agribusiness Consultant, 04 9347 8728, ross.fellowes@optusnet.com.au, 31-Jul–08
Development of ICIS for Australian wheat breeding programs	Prof K Basford, University of Queensland, 07 3365 2810, k.e.basford@uq.edu.au, 30-Dec–05
Enhanced evaluation of CIMMYT spring bread wheat germplasm in Australia	Dr T Payne, CIMMYT, 0011 52 555 7267503, t.payne@cgiar.org, 31-Dec–05
Exploitation of the genetic resources of synthetic wheats — QDPI Component	Mr J Sheppard, Queensland Primary Industries and Fisheries, 07 4639 8888, john.sheppard@dpi.qld.gov.au, 30-Jun–06
Gene expression induced by root mechanical impedance in wheat	Dr J Maselle, Australian National University, 02 6125 4410, masle@rsbs.anu.edu.au, 30-Nov–05
Technologies for the targeted exploitation of the N I Vavilov Institute of Plant Industry (VIR), ICARDA and Australian bread wheat landrace germplasm for the benefit of the wheat breeding programs of the partners	Dr K Street, Intrn'l Cent for Ag Resrch in Dry Areas, 0011 963 21 221343, K.Street@cgiar.org, 30-Jun–06
Wheat germplasm with improved yield performance under drought for Australian breeding programs	Dr D Rebetzke, CSIRO Plant Industry, 02 6246 5153, greg.rebetzke@csiro.au, 30-Jun–06
Wheat Breeding for the Northern Region	Ms M Blackburn, SunPrime Seeds Pty Limited (SPS), 02 6881 6210 30-Jun–06
Wheat traits, genes and germplasm for adoptation to water limited environments in the Northern Region	Dr R Shorter, CSIRO Plant Industry, 07 3214 2239, ray.shorter@csiro.au, 28-Feb–09
Germplasm development for durum improvement in southern Australia	A/Prof D Mares, University of Adelaide, 08 8303 7480, daryl.mares@adelaide.edu.au, 30-Jun–08
The cell biology of cold-induced male sterility in wheat	A-Prof R Overall, University of Sydney, 02 9351 3285, roverall@mail.usyd.edu.au, 31-Dec–06
Wheat breeding for the High Rainfall Zones of Australia	Mr R Richards, CSIRO Plant Industry, 02 6246 5090, richard.richards@csiro.au, 30-Jun–07
Disease and pest management	
CIMMYT Alliance — Protecting the Australian wheat industry form Karnal bunt through the development and implementation of molecular markers	Dr R Trethowan, CIMMYT, 52 5 804 7503, r.trethowan@cgiar.org, 30-Jun–06
Enhancing the detection of *Tilletia indica*, the cause of Karnal Bunt	Dr M Tan, CRC for National Plant Biosecurity, 02 4640 6445, mui-keng.tan@dpi.nsw.gov.au, 30-Jun–08
Epidemiology and pathogenicity of Fusarium in relation to crown rot	Dr S Chakraborty, CSIRO Plant Industry, 07 3214 2677, sukumar.chakraborty@csiro.au, 30-Nov–06
Evolution of Russian wheat aphid virulence and resistance sustainability	Dr O R Edwards, CRCfor National Plant Biosecurity, 08 9333 6401, Owain.Edwards@csiro.au, 30-Jun–08
Durum Industry Development — Fast tracking genetic solutions to crown rot	Dr S Simpfendorfer, NSW Primary Industries, 02 6763 1261, steven.simpfendorfer@agric.nsw.gov.au, 30-Jun–08
Durum Industry Development — Molecular maker assisted selection for crown rot resistance	A/Prof M Sutherland, University of Southern Queensland, 07 4631 2360, marksuth@usq.edu.au, 30-Jun–09
Advancement of new genes for stem and leaf rust resistance from uncultivated relatives of wheat	Dr I Dundas, University of Adelaide, 08 8303 7238, ian.dundas@adelaide.edu.au, 30-Jun–08
Crown rot management in durum and bread wheats for the Southern Region	Dr H Wallwork, S A Research & Development Institute, 08 8303 9382, wallwork.hugh@saugov.sa.gov.au, 30-Jun–06

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
WHEAT	
Fast-tracking of rust resistant Stylet replacements for growers in southern Australia	Dr S Jefferies, Australian Grain Technology, 08 8303 7835, stephen.jefferies@adelaide.edu.au, 30-Jun–07
New disease protection for wheat — a block of genes for resistance to BYDV, RLN and rusts plus potential yield boost	Dr P Larkin, CSIRO Plant Industry, 02 6246 5060, Philip.Larkin@csiro.au, 31-Dec–06
Exploiting Septoria and Stagonospora resistance in wheat	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Addressing rust resistance and other key traits in wheat breeding for the Western Region	Dr R Loughman, Department of Agriculture Western Australia, 08 9368 3691, rloughman@agric.wa.gov.au, 30-Jun–07
Enhancing resistance to *Stagonospora nodorum* in Australian wheat germplasm	Dr M Francki, Department of Agriculture Western Australia, 08 9368 3324, m.francki@agric.wa.gov.au, 30-Jun–08
Improving on-farm productivity	
CIMMYT Alliance — Enhancement of stress tolerance in wheat through the expanded development and use of synthetic wheat and other alien introgressions	Dr R Trethowan, CIMMYT, 0011 52 5804 7503, r.trethowan@cgiar.org, 30-Jun–06
CIMMYT Alliance — Improving the stress tolerance of wheat genotypes of relevance to the Australian production environment	Dr R Trethowan, CIMMYT, 0011 52 5804 7503, r.trethowan@cgiar.org, 30-Jun–08
Development of preharvest sprouting resistant breadwheats using resistances from *Triticum tauchii*	Dr F Ogbonnaya, Victorian Department of Primary Industries, 03 5362 2111, Fc.Ogbonnaya@nre.vic.gov.au, 30-Jun–07
Evaluation of transgenic wheats for frost tolerance	A/Prof G Daggard, University of Southern Queensland, 07 4631 2228, daggard@usq.edu.au, 30-Jun–06
Genetic variation for improved frost tolerance in wheat	Mr J Eglinton, University of Adelaide, 08 8303 6531, jason.eglinton@adelaide.edu.au, 30-May–07
Increasing farm profits in the High Rainfall Zone using mixed cropping/ grazing systems based on winter wheats	Mr H Dove, CSIRO Plant Industry, 02 6246 5078, hugh.dove@csiro.au, 30-Jun–06
Delivering high yields of milling wheats in the High Rainfall Zone of WA	Mr M Poole, CSIRO Plant Industry, 08 9333 6603, michael.poole@csiro.au, 30-Jun–08
Improving wheat yields and quality in Western Australian sandplain farming systems	Mr M Poole, CSIRO Plant Industry, 08 9333 6603, michael.poole@csiro.au, 30-Jun–07
Root systems for Australian soils: Root traits for hardpan penetration and water extraction in wheat	Prof L Wade, The University of Western Australia, 08 6488 1959, lwade@cyllene.uwa.edu.au, 30-Jun–08
Variety specific agronomy for wheat yield and quality in the Western Region	Dr WK Anderson, Department of Agriculture Western Australia, 08 9690 2192, wanderson@agric.wa.gov.au, 30-Jun–06
Industry issues	
International adaptation trial: Investigating adaptation of Australian & CIMMYT wheat germplasm	Dr S C Chapman, CSIRO Plant Industry, 07 3214 2254, Scott.Chapman@csiro.au, 31-Dec–05
Durum Industry Development — Collaboration with ICARDA to accelerate cultivar improvement for adaptation across all production regions	Dr R Hare, NSW Primary Industries, 02 67631232, ray.hare@agric.nsw.gov.au, 30-Jun–08
Australian Durum Industry Development Officer	Mr J Sykes, NSW Primary Industries, 02 6881 1270, johnsykes@agric.nsw.gov.au, 31-Mar–08
Delivering outputs from wheat germplasm research to breeding entities	Dr J Brown, Victorian Department of Primary Industries, 03 5362 2111, john.brown@nre.vic.gov.au, 30-Jun–06
Marketing and grain quality	
Australian Wheat Quality Improvement Program	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Australian Wheat Quality Improvement Program — Coordination and Forum	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–07
Australian Wheat Quality Improvement Program — Product and Market Knowledge	Mr R Williams, Australian Wheat Board, 03 9209 2055, rwilliams@awb.com.au, 30-Jun–05
Australian Wheat Quality Improvement Program — Wheat Quality Laboratory Network	Dr M Southan, BRI Australia Limited, 02 9888 9600, m.southan@bri.com.au, 30-Jun–06
Characterisation and recombination of wheat grain components that determine colour and colour stability in Asian noodles	A/Prof D Mares, University of Adelaide, 08 8303 7480, daryl.mares@adelaide.edu.au, 30-Jun–06

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
WHEAT	
Defect elimination in wheat	A/Prof D Mares, University of Adelaide, 08 8303 7480, daryl.mares@adelaide.edu.au, 30-Jun–07
Development of optimal noodle specifications for a major Asian noodle manufacturer	Dr K J Quail, BRI Australia Ltd, 02 9888 9600, k.quail@bri.com.au, 30-Sep–06
Improving stability of xanthophyll pigments and noodle colour via reduction in wheat grain lipoxygenase activity	A/Prof D Mares, University of Adelaide, 08 8303 7480, daryl.mares@adelaide.edu.au, 30-Jun–06
Making wheat starch more competitive with maize or potato starches by improving its viscosity	Dr M Morell, CSIRO Plant Industry, 02 6246 5074, Matthew.Morell@csiro.au, 30-Jun–07
Molecular Plant Breeding CRC: Germplasm wheat quality — genetic ideotype for pre-harvest sprouting tolerance	Dr F Ogbonnaya, Molecular Plant Breeding CRC, 03 5362 2111, Fc.Ogbonnaya@nre.vic.gov.au, 30-Jun–06
National approach to wheat quality research for variety development	Mr R Fellowes, Agribusiness Consultant, 05 9347 8728, ross.fellowes@optusnet.com.au, 30-Jun–06
National Wheat Quality Evaluation Program	Dr B Osbourne, BRI Australia Limited, 02 9888 9600, b.osborne@bri.com.au, 30-Jun–06
New baking process for Australian wheat in Asia	Mr J Thorne, New Products, 02 6272 5525, j.thorne@grdc.com.au, 30-Jun–06
Value Added Wheat CRC	Dr R Brettell, GRDC, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Wheat quality for Asian markets	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Defect elimination in wheat	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–07
Develop methods to determine protein level in wheat delivered in WA	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Measurement of paddock-based greenhouse gas emissions from wheat production to improve life cycle assessment of wheat-products	Mr B Porter, Australian Greenhouse Office, 08 9368 3677, bporter@agric.wa.gov.au, 01-Jan–08
Nutrition	
TRINOC™: Tri-inoculation for enhanced wheat growth under disease limiting conditions	Dr K Ophel-Keller, S A Research & Development Institute, 08 8303 9368, ophelkeller.kathy@saugov.sa.gov.au, 30-Jun–06
Poor nitrogen uptake efficiency of wheat — can we fix it?	Dr I R P Fillery, CSIRO Plant Industry, 08 9333 6681, Ian.Fillery@csiro.au, 31-Aug–05
Risk management (climate and price)	
Can we forecast seasonal wheat grain yields and protein in Western Australia?	Dr S Asseng, CSIRO Plant Industry, 08 9333 6615, Senthold.Asseng@csiro.au, 30-Sep–06
Soils and water use	
Development of a salt-tolerant cereal using 'wide crosses' of wheat with 'wild' Hordeum species — CRC Salinity	Dr T Colmer, University of Western Australia, 08 9380 1993, tdcolmer@cyllene.uwa.edu.au, 30-Jun–07
Development of salt tolerance wheat for commercial production	Dr S McNeil, Grain BioTech Australia Pty. Ltd., 08 9360 7409, scottm@grainbiotech.com.au, 31-Dec–05
Development and delivery of salt tolerance and water use efficiency traits for durum with diversified genetic background	Dr T Condon, CSIRO Plant Industry, 02 6246 5034, Tony.Condon@csiro.au, 30-Jun–08
Improving adaptation of wheat to hostile soils: Quantifying the importance of traits and targeted germplasm development	Dr G McDonald, University of Adelaide, 08 8303 7358, glenn.mcdonald@adelaide.edu.au, 31-Dec–09
Weeds and weed control	
Development and evaluation of weed competitive wheat cultivars	Dr G Gill, University of Adelaide, 08 8303 7744, gurjeet.gill@adelaide.edu.au, 30-Jun–08
COARSE GRAINS	
Breeding technology and variety evaluation	
Australia China collaboration on barley genetic resources	Dr M Zhou, University of Tasmania, 03 6336 5204, meixue.zhou@dpiwe.tas.gov.au, 31-Dec–06
Coordinator for Barley Breeding Australia	Mr M Perry, Mike Perry Consultancy, 08 9367 4129, mickperry@bigpond.com, 31-Dec–06

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RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
COARSE GRAINS	
Map-based cloning of quantitative trait loci in barley	Prof P Langridge, University of Adelaide, 08 8303 6812, peter.langridge@adelaide.edu.au, 30-Dec–07
Molecular biology support for barley improvement — Northern Region	Dr E Mace, Queensland Primary Industries and Fisheries, 07 4660 3629, emma.mace@dpi.qld.gov.au, 30-Jun–07
Barley breeding	Ms B MacLean, GRDC, 02 6272 5525, b.maclean@grdc.com.au, 30-Jun-10
Identifying candidate genes for stay-green in sorghum	Dr A K Borrell, Queensland Primary Industries and Fisheries, 07 4661 2944, andrew.borrell@dpi.qld.gov.au, 30-Jun–08
Breeding for frost tolerance in barley	Mr J Eglinton, University of Adelaide, 08 8303 6531, jason.eglinton@adelaide.edu.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Validation / Implementation — Barley, Western Region	Dr C Li, Department of Agriculture Western Australia, 08 9368 3843, cli@agric.wa.gov.au, 30-Jun–07
Barley breeding in the West	Mr K T Alcock, Department of Agriculture Western Australia, 08 9368 3300, kalcock@agric.wa.gov.au, 30-Jun–06
Barley improvement through germplasm introduction, evaluation and enhancement	Prof L Wade, The University of Western Australia, 08 6488 1959, lwade@cyllene.uwa.edu.au, 30-Jun–08
Disease and pest management	
Identification of resistance mechanisms to barley black point and effects of black point on malting quality	Dr A Able, University of Adelaide, 08 8303 7245, amanda.able@adelaide.edu.au, 31-Dec–05
Cloning of an insect resistance gene from sorghum	Dr A Hardy, Queensland Primary Industries and Fisheries, 07 4688 1310, Adam.Hardy@dpi.qld.gov.au, 30-Jun–07
Managing mycotoxin contamination of maize	Dr B J Blaney, Queensland Primary Industries and Fisheries, 07 3362 9470, Barry.Blaney@dpi.qld.gov.au, 30-Jul–06
The biological control of two-spotted mite in irrigated maize	Dr A H Nicholas, NSW Primary Industries, 02 6763 1283, Adrian.Nicholas@agric.nsw.gov.au, 31-Dec–05
Incorporating new sources of stem and leaf rust resistance from wild oat species into cultivated oat varieties	Dr P Zwer, S A Research & Development Institute, 08 8303 9435, zwer.pamela@saugov.sa.gov.au, 30-Jun–06
Managing and identifying resistance against barley scald	Dr C L Linde, Australian National University, 02 6125 7682, celeste.linde@anu.edu.au, 30-May–08
Mechanisms of resistance during interactions between barley and different forms of *Pyrenophora teres*	Dr A Able, University of Adelaide, 08 8303 7245, amanda.able@adelaide.edu.au, 30-Jun–06
Variation in barley scald and effective resistance gene deployment	Dr H Wallwork, Molecular Plant Breeding CRC, 08 8303 9382, wallwork.hugh@saugov.sa.gov.au, 30-Jun–07
Virulence and genetic variability in the spot-type net blotch pathogen of barley in Western Australia	Dr S Gupta, Murdoch Univerisity, 08 9360 6499, sanjiv@central.murdoch.edu.au, 31-Dec–05
Improving on-farm productivity	
Barley improvement and industry development	Dr N Fettell, NSW Primary Industries, 02 6895 2099, neil.fettell@agric.nsw.gov.au, 30-Jun–06
Crop improvement of grain sorghum in Australia — Core breeding	Dr RG Henzell, Queensland Primary Industries and Fisheries, 07 4661 2944, bob.henzell2dpi.qld.gov.au, 31-Dec–05
Maize germplasm enhancement and productivity improvement for tropical Australia	Mr I Martin, Queensland Primary Industries and Fisheries, 07 4095 8419, Ian.Martin@dpi.qld.gov.au, 30-Jun–08
Investigation of cause and extent of lodging and yield loss associated with stubble-retention in irrigated maize	Dr P Harvey, CSIRO Land and Water, 08 8303 8589, Paul.Harvey@csiro.au, 01-Jan–07
Oat agronomy and industry development for the Western Region	Mr BH Paynter, Department of Agriculture Western Australia, 08 9690 2115, bpaynter@agric.wa.gov.au, 30-Jun–07
Industry issues	
Barley Improvement and Industry Development	Dr B Eisemann, Queensland Primary Industries and Fisheries, 07 4639 8888, bob.eisemann@dpi.qld.gov.au, 30-Jun–05
National Triticale Improvement Program	Dr S Jefferies, Australian Grain Technology, 08 8303 7835, stephen.jefferies@adelaide.edu.au, 30-Jun–08
Barley Improvement and Quality Program for Southeastern Australia	Dr S Venkatanagappa, NSW Primary Industries, 02 6938 1971, shoba.venkatanagappa@agric.nsw.gov.au, 30-Jun–06

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
COARSE GRAINS	
Barley Improvement and Industry Development	Mr D Moody, Victorian Department of Primary Industries, 03 5362 2156, david.moody@nre.vic.gov.au, 30-Jun–06
Dual Purpose Triticale Improvement Program — University of Sydney	Dr N Darvey, Value Added Wheat Cooperative Research Centre, 02 9351 8828, normd@camden.usyd.edu.au, 30-Jun–06
Marketing and grain quality	
Malting Barley Development Council — Understanding market requirements	Mr B Gill, ADM, 08 8238 5291, w.gill@ausbulk.com.au, 31-Dec–05
Pilot brewing evaluation for malting barley lines destined for export	Dr L C MacLeod, Barrett Burston Malting Co Pty Ltd, 03 9425 2316, macleod@bbmalt.com.au, 31-Dec–05
Understanding and market targeting the fermentability of Australian malt	Dr E Evans, University of Tasmania, 03 6226 2638, eevans@utas.edu.au, 30-Jun–06
National screening for barley grains defects including black point, staining and preharvest sprouting	Mr G Fox, Queensland Primary Industries and Fisheries, 07 4639 8830, glen.fox@dpi.qld.gov.au, 30-Jun–08
Improved oat varieties for milling, feed and hay/feed end use in the Southern Region Oat Breeding Program	Dr P Zwer, S A Research & Development Institute, 08 8303 9435, zwer.pamela@saugov.sa.gov.au, 30-Jun–08
Malting Barley Quality Improvement Program	Mr B Marshall, Malting Barley Quality Improvement Program, 03 9419 7411, marshall@joewhitemaltings.com.au, 30-Jun–08
OILSEEDS	
Breeding technology and variety evaluation	
Australian participation in the multinational Brassica Genome Project	Prof GC Spangemberg, Victorian Department of Primary Industries, 03 9479 3851, german.spangemberg@nre.vic.gov.au, 01-Jan–08
Canola Molecular Marker Proposal	Prof GC Spangemberg, Victorian Department of Primary Industries, 03 9479 3851, german.spangemberg@nre.vic.gov.au, 31-Dec–06
Evaluation and selection of high quality Brassica breeding lines for short season environments of Western Australia	Mr G Walton, Department of Agriculture Western Australia, 08 9368 3285, gwalton@agric.wa.gov.au, 30-Jun–07
Disease and pest management	
Determining the cause, extent, impact and potential control measures for an unidentified disorder in sunflower crops in Central QLD	Mr R Routley, Queensland Primary Industries and Fisheries, 07 4622 3930, richard.routley@dpi.qld.gov.au, 30-Jun–07
Implementing technologies and strategies to maintain resistance to sunflower rust	Dr G A Kong, Queensland Primary Industries and Fisheries, 07 4688 1319, gary.kong@dpi.qld.gov.au, 30-Jun–07
Fungal pathology developments for management of diseases of oilseed Brassicas in Australia	A-Prof B Howlett, University of Melbourne, 03 8344 5062, bhowlett@unimelb.edu.au, 30-Jun–06
Integrated disease management in field crops with emphasis on Scolerotinia stem rot in canola	Dr G Murray, NSW Primary Industries, 02 6938 1879, gordon.murray@agric.nsw.gov.au, 30-Jun–07
Monitoring populations of the blackleg fungus to develop strategies for deployment of resistance genes in oilseed Brassicas	A-Prof B Howlett, University of Melbourne, 03 8344 5062, bhowlett@unimelb.edu.au, 30-Jun–07
Strategies to ensure longevity of blackleg disease resistance genes in canola	Mr S Marcroft, University of Melbourne, 03 5362 2111, steve.marcroft@nre.vic.gov.au, 28-Feb–07
Biology of diamondback moth (DBM) in Western Australia	Dr H Spafford Jacob, University of Western Australia, 08 9380 3590, hsjacob@agric.uwa.edu.au, 31-Mar–06
Determination of histological and biochemical resistance mechanisms for the identification of molecular markers for blackleg resistance in oilseed Brassicas	Prof K Sivasithamparan, University of Western Australia, 08 9380 2497, siva@cyllene.uwa.edu.au, 30-Jun–04
Improving the management of diamondback moth in canola in the Western Region	Mr K Walden, Department of Agriculture Western Australia, 08 9956 8555, kwalden@agric.wa.gov.au, 31-Dec–05
Source and resistance status of outbreak populations of diamondback moth in Western Australian canola	Ass Prof S McKechnie, Monash University, 08 9905 3863, s.mckechnie@sci.monash.edu.au, 30-Jun–06
Improving on-farm productivity	
Tool kit for BMP in peanuts — development extension for rapid adoption of decision support using commercial industry networks	Mr G Mills, Queensland Primary Industries and Fisheries, 07 4160 0742, greg.mills@dpi.qld.gov.au, 30-Jun–07
Canola yield decline: Expanding the regional focus and disease emphasis using surveys, simulation studies and targeted soil/plant analysis	Ms K Condon, FarmLink Research Pty Ltd, 02 6942 1341, kirrily@farmlink.com.au, 30-Jun–06

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RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
OILSEEDS	
Continued identification and overcoming constraints to canola production on growers' paddocks	Mr D W Eksteen, United Farmers Co-Operative, 08 9072 1155, davide@unitedfarmers.com.au, 30-Jun–07
Industry issues	
Alternative oilseed crops as potential production platforms for high-value industrial oils in Austraila	Ms S Knights, S E Knights Consulting, 03 5384 0370, 28-Feb–06
Australian Peanut Improvement Program	Dr G Wright, Queensland Primary Industries and Fisheries, 07 4160 0734, Graeme.Wright@dpi.qld.gov.au, 30-Jun–07
Canola and mustard in northern NSW	Mr J F Holland, NSW Primary Industries, 02 6763 1100, john.holland@agric.nsw.au, 30-Jun–06
CRC for Sustainable Cotton Communities	Mr M Blumenthal, Practices, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–07
National Soybean Improvement Program	Dr A James, CSIRO Plant Industry, 07 3214 2278, Andrew.James@csiro.au, 30-Jun–06
National Brassica Improvement Program — Component 2, Stage 3: NSW Agriculture	Mr N Wratten, NSW Primary Industries, 02 6938 1849, neil.wratten@agric.nsw.gov.au, 30-Jun–07
National Brassica Improvement Program — DPI Victoria and Lead Agency	Dr P Salisbury, Victorian Department of Primary Industries, 03 9884 8068, psalisbury@optushome.com.au, 30-Jun–07
National Brassica Improvement Project — South Australia Component	Mr T D Potter, S A Research & Development Institute, 08 8762 9132, potter.trent@saugov.sa.gov.au, 30-Jun–07
Oilseeds Industry Development Officer — Expansion of oilseed crops (with a focus on canola and soybean) for the irrigation and dryland areas of southern NSW and Victoria	Mr B Clark, ICF, 02 6963 0815, bryan@irec.com.au, 30-Jun–09
Contribution to ACIAR project — Oilseed Brassica improvement in China, India and Australia	Dr C Piggin, Australian Centre For International Agriculture Research, 30-Jun–07
Assessing the direction and potential of the soybean industry in Australia	Mr R Colton, (consultant), 02 6361 8964, bob.colton@cww.octec.org.au,30-Jun–06
Canola industry extension in WA	Ms B MacLean, Varieties, 02 6272 5525, b.maclean@grdc.com.au, 30-Jun–07
Nutrition	
Interaction of nitrogen with other nutrient elements for production of canola grain and oil	Mr R Brennan, Victorian Department of Primary Industries, 08 9892 8444, rbrennan@agric.wa.gov.au, 31-Dec–05
Soils and water use	
Environmental impacts of herbicide tolerant canola and associated agronomic practice on soil biological processes	Dr V S R Vadakattu, CSIRO Land and Water, 08 8303 8579, gupta.vadakattu@csiro.au, 31-Dec–06
PULSES	
Breeding technology and variety evaluation	
Strategic acquisition of germplasm and information for lentil and chickpea, and their crossable wild relatives, for priority trait breeding	Dr R J Redden, Victorian Department of Primary Industries, 03 5362 2159, David.mcneil@nre.vic.gov.au, 31-Dec–06
Northern Desi Chickpea Breeding Program	Mr T Knights, NSW Primary Industries, 02 67631100, ted.knights@agric.nsw.gov.au, 31-Dec–07
National Pulse Initiative — Pulse germplasm enhancement	Ms B MacLean, Varieties, 02 6272 5525, b.maclean@grdc.com.au, 30-Jun–07
Albus Lupin Breeding	Dr D Luckett, NSW Primary Industries, 02 6938 1835, david.luckett@agric.nsw.gov.au, 30-Jun–07
Breeding field peas for the Western Region	Dr TN Khan, Department of Agriculture Western Australia, 08 9368 3602, tkhan@agric.wa.gov.au, 31-Dec–05
Cultivar evaluation and management of pulses in southern NSW	Mr E Armstrong, NSW Primary Industries, 02 6938 1999, eric.armstrong@agric.nsw.gov.au, 31-Dec–05
Pulse Breeding Company	Ms B MacLean, Varieties, 02 6272 5525, b.maclean@grdc.com.au, 30-Jun–06
Faba Bean Breeding — Southern and Western Regions	Dr J Paull, University of Adelaide, 08 8303 6564, jeffrey.paull@adelaide.edu.au, 31-Dec–07

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
PULSES	
An international collaboration to develop interspecific hybrids between chickpea and its wild annual relatives	Dr K Siddique, University of Western Australia, 08 9380 7012, ksiddiqu@agric.uwa.edu.au, 31-Dec–08
Breeding of chickpea for the Western Region	Dr TN Khan, Department of Agriculture Western Australia, 08 9368 3602, tkhan@agric.wa.gov.au, 31-Dec–05
Development and implementation of molecular markers for lupin breeding	Dr B Buirchell, Department of Agriculture Western Australia, 08 9368 3653, bbuirchell@agric.wa.gov.au, 30-Jun–07
Development of molecular marker and mapping technology for lupin breeding: UWA Component. Comparative mapping across lupin species and between legume genera	Ass Prof W Cowling, University of Western Australia, 08 9380 7979, wcowling@cyllene.uwa.edu.au, 31-Aug–05
International collaboration to advance doubled haploid production in field pea and chickpea	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–07
International collaboration to develop robust protocols for doubled haploid production in field pea and chickpea	Dr K Siddique, University of Western Australia, 08 9380 7012, ksiddiqu@agric.uwa.edu.au, 21-Oct–05
Interspecific hybridisation of lupins	Dr J Clements, University of Western Australia, 08 9380 1342, clem@cyllene.uwa.edu.au, 01-Jan–09
Lupin (NLL) breeding — capital component	Dr B Buirchell, Varieties, 08 9368 3653, bbuirchell@agric.wa.gov.au, 30-Jun–09
Lupin germplasm characterisation	Dr B Buirchell, Department of Agriculture Western Australia, 08 9368 3653, bbuirchell@agric.wa.gov.au, 30-Jun–08
Pearl lupin — development of the first Australian cultivar for commercial evaluation	Dr M Sweetingham, University of Western Australia, 08 9368 3298, msweeting@agric.wa.gov.au, 30-Jun–08
Western Lupin Technology: Narrow-leafed lupin breeding for southern Australia	Dr B Buirchell, Department of Agriculture Western Australia, 08 9368 3653, bbuirchell@agric.wa.gov.au, 30-Jun–07
Disease and pest management	
Integrated pest management for pulses in northern Australia — Sustainable production in a changing cropping environment	Mr H B Brier, Queensland Primary Industries and Fisheries, 07 4160 0740, hugh.brier@dpi.qld.gov.au, 30-Jun–08
Minimising the impact of pulse diseases in Queensland	Dr M Ryley, Queensland Primary Industries and Fisheries, 07 4688 1316, malcolm.ryley@dpi.qld.gov.au, 30-Jun–06
More profitable chickpeas through disease management — Northern Region	Dr K Moore, NSW Primary Industries, 02 6763 1133, kevin.moore@agric.nsw.gov.au, 30-Jun–07
Aschochyta and botrytis management in lentils with pre and post emergent fungicides	Mr W Long, Agricultural Consulting & Communication, 08 8837 3793, bill@agconsulting.com.au, 01-Jul–05
Emidemiology and control of Botrytis grey mould in lentils	Dr R Ford, University of Melbourne, 03 8344 9753, rebeccaf@unimelb.edu.au, 31-May–08
Management of Etiella in lentils in southern Australia	Mr D Hopkins, S A Research & Development Institute, 08 8303 9542, hopkins.dennis@saugov.sa.gov.au, 31-May–06
Pathology support for pulse crops in the Southern Region — SA module	Ms J Davidson, S A Research & Development Institute, 08 8303 9389, davidson.jenny@saugov.sa.gov.au, 30-Jun–06
Victorian pulse pathology and virology support program	Dr A Freeman, Victorian Department of Primary Industries, 03 5362 2111, Angela.freeman@nre.vic.gov.au, 30-Jun–06
Improving on-farm productivity	
Agronomic solutions for Queensland pulse growers	Mr K McCosker, Queensland Primary Industries and Fisheries, 07 4983 7400, Kevin.McCosker@dpi.qld.gov.au, 30-Jun–06
Development of chickpea genotypes and improved agronomic practices for chickpea, faba bean and mungbean in northern NSW	Mr D McCaffery, NSW Primary Industries, 02 6391 3648, don.mccaffery@agric.nsw.gov.au, 30-Jun–06
Improved vetch varieties for Australian farmers and end-users	Mr R Matic, S A Research & Development Institute, 08 8303 9377, matic.rade@saugov.sa.gov.au, 30-Jun–08
Pulse agronomic research for the development of variety specific management packages in south eastern Australia	Mr J Brand, Victorian Department of Primary Industries, 03 5362 2111, jason.brand@dpi.vic.gov.au, 30-Jun–07
Lupin agronomic improvement in the Western Region — Enhancing the profitability of the lupin/wheat rotation	Dr P White, Department of Agriculture Western Australia, 08 9368 3508, pfwhite@agric.wa.gov.au, 30-Jun–07
Pulse Industry Extension — Expanding pulse cropping by targeted extension of improved varieties and management packages	Dr P White, Department of Agriculture Western Australia, 08 9368 3508, pfwhite@agric.wa.gov.au, 30-Jun–07

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
PULSES	
Yellow lupin improvement	Dr M Sweetingham, Department of Agriculture Western Australia, 08 9368 3298, msweeting@agric.wa.gov.au, 30-Jun–09
Industry issues	
Business plan for the Australian canola industry	Mr D Hudson, SGA Solutions Pty Ltd, 03 5428 4990, rock@sgasolutions.com.au, 31-Jul–05
Contribution to ACIAR pulse project with ICARDA	Dr K Makkouk, Australian Centre For International Agriculture Research, 0011 96 321 2213433, k.makkouk@cgiar.org, 30-Jun–07
National Pulse Strategic Initiative	Mr B MacLean, Varieties, 02 6272 5525, b.maclean@grdc.com.au, 30-Jun–08
National Mungbean Improvement Program	Dr M Fordyce, Queensland Primary Industries and Fisheries, 07 4660 3610, merrill.fordyce@dpi.qld.gov.au, 30-Jun–08
Northern Faba Bean Improvement Program	Dr I A Rose, NSW Primary Industries, 02 6799 1574, ian.rose@agric.nsw.gov.au, 30-Jun–07
Australian coordinated Field Pea Improvement Program Agriculture Victoria (Lead Agency)	Mr T Leonforte, Victorian Department of Primary Industries, 03 5362 2111, tony.leonfort@nre.vic.gov.au, 31-Dec–05
Coordinated improvement of chickpea in Australia — South East Region	Mr M Materne, Victorian Department of Primary Industries, 03 5362 2111, michael.materne@nre.vic.gov.au, 31-Dec–05
Coordinated improvement program for Australian lentils	Mr M Materne, Victorian Department of Primary Industries, 03 5362 2111, michael.materne@nre.vic.gov.au, 31-Dec–05
Lupin evaluation — SA/Victoria node	Mr J P Egan, S A Research & Development Institute, 08 8688 3424, egan.jim@saugov.sa.gov.au, 30-Jun–07
Marketing and grain quality	
Objective quality assessment to facilitate pulse trading	Mr J Thorne, Value Chain Program, 02 6272 5525, j.thorne@grdc.com.au, 30-Jun–06
Improved lupin grain quality and yield through genetic manipulation of key physiological traits	Dr J Clements, University of Western Australia, 08 9380 1342, clem@cyllene.uwa.edu.au, 31-Dec–05
Nutrition	
Reduction in nitrogen fixation by legumes following ALS herbicide application: Susceptibility of common pasture and grain legumes and mode of impact	Dr J Baldock, CSIRO Land and Water, 08 8303 8537, jeff.baldock@csiro.au, 30-Nov–05
Weeds and weed control	
Improved herbicide tolerance for pulses in the Western Region	Dr M Sweetingham, University of Western Australia, 08 9368 3298, msweeting@agric.wa.gov.au, 30-Jun–08
PASTURE RESEARCH	
Breeding technology and variety evaluation	
Breeding improved lucernes for cropping systems in eastern Australia — Phase II	Dr R Williams, NSW Primary Industries, 02 6763 1205, rex.williams@agric.nsw.gov.au, 30-Jun–07
Breeding lucerne for Southern Australian cropping districts	Mr A Humphries, S A Research & Development Institute, 08 8303 9601, humphries.alan@saugov.sa.gov.au, 31-Dec–06
The seed increase and distribution of perennial legumes to support sustainable and productive farming systems	Mr S Hughes, S A Research & Development Institute, 08 8303 9408, hughes.steve@saugov.sa.gov.au, 30-Jun–06
Germplasm collection of Trifolium and other pasture legume species from short season, low latitude regions in the Mediterranean	Mr R Snowball, University of Western Australia, 08 9368 3517, rsnowball@agric.wa.gov.au, 30-Jun–06
Improving the utilisation of pasture germplasm by the development of a core collection using ecogeographical and molecular techniques	Dr S Bennet, University of Western Australia, 08 9380 7353, sarita@cyllene.uwa.edu.au, 30-Jun–06
Disease and pest management	
Evaluation and further development of biocontrol for the ARGT causal organisms	Dr J Allen, Department of Agriculture Western Australia, 08 9368 3466, jgallen@agric.wa.gov.au, 01-Jul–06
Genetic dissection of fungal disease resistance in legumes using *Medicago truncatula*	Dr K Singh, University of Western Australia, 08 9333 6320, karam.singh@csiro.au, 30-Jun–07
Pathology support for lucerne improvement including germplasm enhancement	Prof J Irwin, University of Queensland, 07 3365 1904, j.irwin@tpp.uq.edu.au, 30-Jun–06

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
PASTURE RESEARCH	
Medicago truncatula — Australian Centre for Necrotrophic Fungal Pathogens — Disease resistance	Prof R Oliver, Murdoch Univerisity, 08 9360 7404, roliver@central.murdoch.edu.au, 30-Jun–07
Pathology support for annual pasture legumes	Mr R Ballard, S A Research & Development Institute, 08 8303 9388, ballard.ross@saugov.sa.gov.au, 30-Jun–06
Farming systems and rotations	
National field evaluation and selection of new pasture plants from the salinity CRC to improve hydrologic stability of farming systems — CRC Salinity	Dr B Dear, University of Western Australia, 02 6938 1856, brian.dear@agric.nsw.gov.au, 30-Jun–06
Sequencing crop rotations that best utilise lucerne biopores to control groundwater recharge and maintain dry catchments	Dr P Eberbach, Charles Sturt University, 02 6933 2830, peberbach@csu.edu.au, 31-Mar–06
More effective integration of pastures into cropping systems	Mr M Blumenthal, Practices, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–08
Industry issues	
National Annual Pasture Legume Improvement Project — Phase II — Acid Soils (East) Zone	Dr B Dear, NSW Primary Industries, 02 6938 1856, brian.dear@agric.nsw.gov.au, 30-Nov–05
National Annual Pasture Legume Improvement Project — Western Australia	Dr C Revell, University of Western Australia, 08 9690 2117, crevell@agric.wa.gov.au, 30-Jun–06
Soils and water use	
Pasture Soil Biology Program	Mr R Hannam, Meat and Livestock Australia, 08 8364 5005, rhannam@ozemail.com.au, 30-Jun–07
How much deep drainage actually occurs in vertosols under fallows and lucerne?	Mr R Young, NSW Primary Industries, 02 6763 1117, rick.young@agric.nsw.gov.au, 31-Dec–05
Weeds and weed control	
Developing annual medics tolerant to residues of sulfonylurea herbicides	Mr J H Howie, S A Research & Development Institute, 08 8303 9407, howie.jake@saugov.sa.gov.au, 30-Jun–06
Evaluation and cultivar selection for herbicide tolerance in annual legume pastures	Dr C Revell, Department of Agriculture Western Australia, 08 9690 2117, crevell@agric.wa.gov.au, 30-Jun–06
Improving weed management with biserrula in the pasture phase of WA cropping systems	Dr C Revell, Department of Agriculture Western Australia, 08 9690 2117, crevell@agric.wa.gov.au, 30-Jun–06
MULTI COMMODITY PROJECTS	
Breeding technology and variety evaluation	
Australian Centre for Plant Functional Genomics	Prof P Langridge, Aust. Centre for Plant Functional Genomics, 08 8303 7423, peter.langridge@acpfg.com.au, 30-Jun–07
Australian Winter Cereal Molecular Marker Program — Curation of wheat and barley maps	Prof R Appels, Murdoch Univerisity, 08 9368 3544, rappels@agric.wa.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Adding value to Diversity Arrays Technology (DArT)	Mr A Kilian, Diversity Arrays Technology Pty Limited, 02 6246 4519, a.kilian@cambia.org, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Association Mapping	Dr K Chalmers, University of Adelaide, 08 8303 6812, ken.chalmers@adelaide.edu.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Genetic analysis and marker-trait linkages — South and West	Dr H Wallwork, Molecular Plant Breeding CRC, 08 8303 9382, wallwork.hugh@saugov.sa.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Implementation, Grain Biotech Australia	Dr PN Fox, Grain BioTech Australia Pty. Ltd., 08 9360 7566, paulf@grainbiotech.com.au, 01-Jul–05
Australian Winter Cereals Molecular Marker Program: Implementation/ Validation of Molecular Marker DAWA	Prof R Appels, Murdoch Univerisity, 08 9368 3544, rappels@agric.wa.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Implementation/ Validation of Molecular Markers EGA	Dr S Thomas, NSW Primary Industries, 02 6391 3649, stephen.thomas@agric.nsw.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Markers for rust resistance in cereals	Dr H Bariana, University of Sydney, 02 9351 8809, harbansb@camden.usyd.edu.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: MBQIP implementation and validation	Mr J Eglinton, University of Adelaide, 08 8303 6531, jason.eglinton@adelaide.edu.au, 30-Jun–07

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Australian Winter Cereals Molecular Marker Program: Multiplex PCR technologies to accelerate the use of CCRs in cereal breeding and genetic research	Dr M Hayden, University of Adelaide, 08 8303 7158, matthew.hayden@adelaide.edu.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Pedigree-based genome mapping for marker assised selection and recurrent parent recovery in wheat and barley; Phase II	Dr E Mace, Queensland Primary Industries and Fisheries, 07 4660 3629, emma.mace@dpi.qld.gov.au, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Phenotyping complex quality traits for marker identification and validation: Phase 2	Dr M Francki, Value Added Wheat Cooperative Research Centre, 08 9368 3324, m.francki@agric.wa.gov.au, 01-Jan–07
Australian Winter Cereals Molecular Marker Program: Rice-wheat-barley comparative genomics for key agronomic traits	Prof R Appels, Murdoch Univerisity, 08 9368 3544, rappels@agric.wa.gov.au, 01-Jul–07
Best Practices for Breeding — Consultancy — Don Marshall	Mr D Marshall, Plant Breeding Solutions, 02 4962 1671, marshallpbs@aol.com, 31-Jan–06
Best Practices for Breeding — Consultancy — Steven Jones	Mr S Jones, Aglign Pty Ltd, 03 9985 7007, smjones@aglign.com.au, 31-Jan–06
Cereal Functional Genomics Centre	Prof G Fincher, University of Adelaide, 08 8303 7109, geoff.fincher@adelaide.edu.au, 30-Jun–06
Costing of breeding programs	Mr J Brennan, NSW Primary Industries, 02 6938 1851, john.brennan@dpi.nsw.gov.au, 31-Dec–06
Discovery of genes involved in transmitting the long distance RNA silencing signal	Mr N Gursanscky, University of Queensland, 07 3365 4871, s4029415@student.uq.edu.au, 09-Jan–09
Enhanced evaluation of CIMMYT germplasm for Australia	Prof K Basford, University of Queensland, 07 3365 2810, k.e.basford@uq.edu.au, 30-Dec–05
Enterprise Grains Australia	Mr D Crawford, Export Grains Centre Ltd, 08 9368 8752, dcrawford@egc.net.au, 31-Oct–04
Grain protection genes	Mr S Jain, CSIRO Entomology, 02 6246 4033, cbo@ento.csiro.au, 30-Jun–07
Hybrid cereal technologies	Mr D Marshall, Plant Breeding Solutions, 02 4962 1671, marshallpbs@aol.com, 16-Feb–06
Molecular Plant Breeding CRC: Association mapping	Dr K Chalmers, Molecular Plant Breeding CRC, 08 8303 6812, ken.chalmers@adelaide.edu.au, 30-Jun–06
Molecular Plant Breeding CRC: New markers, genetic mapping and QTL analysis	Dr K Williams, Molecular Plant Breeding CRC, 08 8303 9369, williams.kevin@saugov.sa.gov.au, 30-Jun–06
National Statistics Project (KP3) — Molecular markers and statistical genetics	Dr B Cullis, NSW Primary Industries, 02 6938 1855, brian.cullis@agric.nsw.gov.au, 30-Jun–08
Plant Genetic Resources: Enhancing germplasm conservation for Australian agriculture	Mr G Auricht, S A Research & Development Institute, 08 8303 9498, auricht.geoff@saugov.sa.gov.au, 30-Jun–07
Study in the area of crop plant improvement by induced mutagenesis	Dr J Huppatz, (consultant), 02 6254 1764, jhuppatz@bigpond.net.au, 31-Jan–06
Transformation in Functional Genomics and Cereal Improvement Programs	Prof G Fincher, University of Adelaide, 08 8303 7109, geoff.fincher@adelaide.edu.au, 30-Jun–08
Triticarte Pty Ltd	Dr E Huttner, Value Added Wheat Cooperative Research Centre, 02 6246 4514, e.huttner@cambia.org, 30-Jun–07
Strategic investment in the development of Diversity Arrays Technology	Dr A Kilian, Cent for Applic of Mol Biol to Int'l Agr, 02 6246 4519, a.kilian@cambia.org, 30-Jun–07
Australian Winter Cereals Molecular Marker Program: Molecular markers for high priority traits in winter cereals for the Northern Region	A/Prof M Sutherland, University of Southern Queensland, 07 4631 2360, marksuth@usq.edu.au, 30-Jun–07
Integrating crop improvement technologies for rapid genetic advance	Dr D Jordan, Queensland Primary Industries and Fisheries, 07 4661 2944, David.R.Jordan@dpi.qld.gov.au, 01-Oct–07
A novel male sterility system for canola and wheat	Prof R Parish, La Trobe University, 03 9479 2228, r.parish@latrobe.edu.au, 30-Jun–07
Australian Grain Technologies — Independent Directors	Dr S Jefferies, Australian Grain Technology, 08 8303 7835, stephen.jefferies@adelaide.edu.au, 30-Jun–09
Integrating crop improvement technologies for rapid genetic advance	Dr D Jordan, Queensland Primary Industries and Fisheries, 07 4661 2944, David.R.Jordan@dpi.qld.gov.au, 01-Oct–07

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Whole genome selection in wheat and barley: The practical application of whole genome analysis	Dr K Chalmers, University of Adelaide, 08 8303 6812, ken.chalmers@adelaide.edu.au, 30-Jun–07
Identification of novel resistance sources and mechanisms in plants	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–09
Analysis of the regulation of plant defence/stress gene expression	Dr K Singh, CSIRO Plant Industry, 08 9333 6320, k.singh@ccmar.csiro.au, 30-Nov–07
Disease and pest management	
Adult plant resistance and pathogen variability in cereal rust: Cereal host pathosystems	Prof R Park, University of Sydney, 02 9351 8806, robertp@camden.usyd.edu.au, 30-Jun–07
Australian Cereal Rust Control Program	Prof R Park, University of Sydney, 02 9351 8806, robertp@camden.usyd.edu.au, 30-Jun–07
Australian Cereal Rust Control Program — Molecular Discovery	Dr A Pryor, CSIRO Plant Industry, 02 6246 5494, tony.pryor@csiro.au, 30-Jun–07
Australian Cereal Rust Control Programs — Adult plant resistance and introgression of new and novel genes	Dr R Singh, CIMMYT, 52 55 5804 2004, r.singh@cgiar.org, 30-Jun–07
Biological control of mice — Immunocontraception	Dr M Hardy, Invasive Animals Co-operative Research Centre, 02 6246 4375, chris.hardy@csiro.au, 30-Jun–06
CIMMYT Alliance — Root diseases	Mr P J Ninnes, International Maize and Wheat Improvement Centre. CIMMYT, 0011 5255 5804 7503, p.ninnes@cgiar.org, 31-Dec–07
Crown Rot Strategic Initiative	Mr J Sandow, GRDC, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–06
Curation and development of invertebrate collections within the Australian National Insect Collection	Dr RJ La Salle, CSIRO Entomology, 02 6246 4262, John.LaSalle@csiro.au, 30-Jun–08
Determination of a No Observable Effect Level (NOEL) for corynetoxins (CTs)	Dr S M Colegate, CSU, 03 5227 5739, steve.colegate@csiro.au, 31-Oct–06
Development of specific microbial and transgenic technology to control fungal pathogens	Dr M Nayudu, Australian National University, 02 6125 3643, Murali.Nayudu@anu.edu.au, 08-Sep–07
Exploring a model system to develop controls for plant parasitic nematodes	Dr C A F Behm, Australian National University, 02 6125 2203, Carolyn.Behm@anu.edu.au, 31-Aug–08
Extension/training component of the National Invertebrate Pest Initiative	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–07
Farm biosecurity and incursion management framework for the Australian grain industry	Mr J Sandow, GRDC, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–08
Field studies and management of crown rot in the Northern Region	Dr D Backhouse, University of New England, 02 6773 2341, dbackhou@pobox.une.edu.au, 30-Jun–07
Genetic approaches to resistance to Fusarium and Bipolaris in wheat and barley	Dr G Wildermuth, Queensland Primary Industries and Fisheries, 07 4639 8805, Graham.Wildermuth@dpi.qld.gov.au, 30-Jun–07
Integrated management of Pythium root disease complexes to improve sustainability and productivity of crop rotations	Dr P Harvey, CSIRO Land and Water, 08 8303 8589, Paul.Harvey@csiro.au, 31-Aug–06
Management of Fusarium diseases and common root rot of cereals in the northern cropping zone	Dr S Simpfendorfer, NSW Primary Industries, 02 6763 1261, steven.simpfendorfer@agric.nsw.gov.au, 30-Jun–07
Molecular Plant Breeding CRC: Disease genetics — Pathogen variation and host interactions	Dr F Keiper, Molecular Plant Breeding CRC, 08 8303 7173, keiper.felicity@saugov.sa.gov.au, 30-Jun–06
Molecular Plant Breeding CRC: Improved disease resistance in cereals	Dr A Able, Molecular Plant Breeding CRC, 08 8303 7245, amanda.able@adelaide.edu.au, 30-Jun–06
Stragonospora Nodorum — Australian Centre for Necrotrophic Fungal Pathogens	Prof R Oliver, Murdoch Univerisity, 08 9360 7404, roliver@central.murdoch.edu.au, 30-Jun–09
Cropping options to limit root lesion nematodes	Dr J P Thompson, Queensland Primary Industries and Fisheries, 07 4639 8806, john.thompson@dpi.qld.gov.au, 30-Jun–06
Effective and safe rodent management in grain cropping systems	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Mar–09
Emerging foliar wheat disease issues in the Northern Region	Dr J Kochman, Queensland Department of Primary Industries and Fisheries, 07 4688 1245, joe.kochman@dpi.qld.gov.au, 30-Jun–08

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Facilitating adoption of IPM in Northern Region broadacre farming systems	Dr D A H Murray, Queensland Primary Industries and Fisheries, 07 4688 1326, Dave.Murray@dpi.qld.gov.au, 30-Jun–07
Integration of biopesticides into IPM against sucking pests	Dr C Hauxwell, Queensland Primary Industries and Fisheries, 07 3896 9362, caroline.hauxwell@dpi.qld.gov.au, 30-Jun–08
Mouse management research in Queensland	Ms J Farrell, Queensland Natural Resources and Mines, 07 4688 1142, julianne.farrell@nrm.qld.gov.au, 31-Mar–06
Population genetics of Heloithis migration, recruitment and origins	Dr K Scott, The University of Queensland, 07 3365 1863, kscott@sols.uq.edu.au, 30-Jun–06
The molecular and biological characterisation of ascovirus as a potential biological control for Helicoverpa	Dr D Merritt, University of Queensland, 07 3365 2455, dmerritt@zen.uq.edu.au, 30-Jun–06
Trichogramma incidence in grains and cotton growing regions of Australia — consequences for helicoverpa management	Dr K Scott, The University of Queensland, 07 3365 1863, kscott@sols.uq.edu.au, 30-Jun–06
Viruses and vectors in the Northern Region: Support for resistance breeding and information for integrated control	Dr M W Schwinghammer, NSW Primary Industries, 02 6763 1136, schwinm@agric.nsw. gov.au, 30-Oct–05
Natural enemy evaluation of the silverleaf whitefly and ecological processes affecting SLW dispersal	Dr P De Barro, CSIRO Entomology, 07 3214 2811, paul.debarro@csiro.au, 30-Jun–07
National Pest Initiative	Dr G Fitt, CSIRO Entomology, 07 3214 2828, Gary.Fitt@csiro.au, 30-Jun–07
Assessment of IPM strategies to control insects in rotational farming systems of the Southern Region	Mr G Hollaway, NSW Primary Industries, 03 5362 2111, grant.hollaway@nre.vic.gov.au, 31-Dec–08
Cereal Cyst Nematode screening and management	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–06
Control of cereal fungal diseases	Dr H Wallwork, S A Research & Development Institute, 08 8303 9382, wallwork.hugh@saugov.sa.gov.au, 30-Jun–09
CRC for Weeds Managemenr,	Dr R McFadyen, CRC Weed Management Systems, 08 8303 6590, crcweeds@adelaide.edu.au, 30-Jun–08
Developing and demonstrating IPM in broadacre cropping	Dr P Horne, IPM Technologies Pty Ltd, 03 9710 1554, paulahorne@bigpond.com, 30-Jun–08
Diagnostic support to the Crown Rot Strategic Initiative	Dr A McKay, S A Research & Development Institute, 08 8303 9375, mckay.alan@saugov.sa.gov.au, 30-Jun–06
Molecular relationships in the rust fungi particularly the family Pucciniaceae	Dr M Burdon, CSIRO Plant Industry, 02 6246 5200, J.Burdon@csiro.au, 18-Jun–06
Registration for minor use chemicals for the grains industry	Mr K Bodnaruk, AKC, 02 9499 3833, akc_con@zip.com.au, 20-Jun–07
The application of novel genetic approaches to pest land snails — a feasibility study	Dr R J Mahon, CSIRO Entomology, 02 6246 4082, Rod.Mahon@csiro.au, 31-Dec–08
Victorian cereal pathology support with emphasis on crown rot management	Dr G J H Hollaway, Victorian Department of Primary Industries, 03 5362 2111, grant.hollaway@dpi.vic.gov.au, 30-Jun–07
Biological Hazard — Predicting and managing spread of diseases and insects	Dr A Diggle, WADA, 08 9638 3669, adiggle@agric.wa.gov.au, 31-Dec–05
Crop pest management for farming systems in high rainfall areas of Southern Australia	Mr G Strickland, WADA, 08 9368 3756, gstrickland@agric.wa.gov.au, 30-Jun–08
Grains pest management for farming systems in high rainfall areas of Southern Australia	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–08
Insecticide resistance and sustainable management of aphids	Dr O Edwards, CSIRO Entomology, 08 9333 6401, Owain.Edwards@csiro.au, 30-Jun–07
Managing disease constraints in Western Region farming systems	Dr R Loughman, Department of Agriculture Western Australia, 08 9368 3691, rloughman@agric.wa.gov.au, 30-Jun–07
Rotations to reduce impact of nematodes in Western cereal cropping systems	Dr V Vanstone, Department of Agriculture Western Australia, 08 9368 3141, vavanstone@agric.wa.gov.au, 30-Jun–07
Engineering and precision agriculture	
Managing diseases using Precision Agriculture	Dr A McKay, S A Research & Development Institute, 08 8303 9375, mckay.alan@saugov.sa.gov.au, 30-Jun–07
Preparation of Precision Agriculture Manual	Ms Emma Leonard, AgriKnowHow, 08 8834 1233, emma.leonard@bigpond.com, 31-Dec–05

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
SIP09 Precision Agriculture Initiative	Prof A McBratney, University of Sydney, 02 9351 3214, alex.mcbratney@acss.usyd.edu.au, 30-Aug–07
SIP09 Precision Agriculture Initiative — Eye in the sky to revolutionise northern crop production	Dr R Kelly, Queensland Primary Industries and Fisheries, 07 4688 1254, rob.kelly@dpi.qld.gov.au, 20-Jun–06
Strategies for deep sowing chickpeas and wheat	Mr M Burgis, Conservation Farmers Inc, 07 4638 5356, michael.burgis@cfi.org.au, 30-Jun–06
Precision Agriculture Initiative — Farming Systems Research Group (Northern Region)	Mr M Smith, Conservation Farmer Inc, 02 6754 6816, tarnee@bigpond.com, 30-Jun–06
Agricultural Engineering Initiative	Mr M Blumenthal, Practices, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–06
Environmental impacts of raised bed cropping systems in south west Victoria	Mr T J Johnston, Victorian Department of Primary Industries, 03 5226 4723, Tim.Johnston@dpi.vic.gov.au, 30-Jun–06
Improvement of nutrient management through effective use of Precision Agriculture technologies in the Southern Australian grains industry	Dr A K Mayfield, SPA, 08 8842 3230, mayfield@capri.net.au, 30-Jun–07
Permanent beds for sustainable farming on irrigated farms	Mr G Beecher, NSW Primary Industries, 02 6951 2725, geoff.beecher@agric.nsw.gov.au, 31-Dec–06
Diagnostic support and training for Precision Agriculture	Dr M Dracup, Department of Agriculture Western Australia, 08 9368 2785, mdracup@agric.wa.gov.au, 30-Jun–07
The use and impact of deep drains on improving salt affected soils used for grain cropping in the WA wheatbelt	Dr R J George, Department of Agriculture Western Australia, 08 9780 6296, rgeorge@agric.wa.gov.au, 30-Sep–08
Using Precision Agriculture and soil inoculants to improve crop performance and grower returns	Mr P McBeath, Corrigin Farm Improvement Group Inc., 08 9062 9024, cfig@wn.com.au, 01-Jun–07
Using Precision Agriculture tools to design and manage profitable Mallee agroforestry systems: A preliminary assessment of the technology	Dr R A Sudmeyer, Department of Agriculture Western Australia, 08 9083 1129, rsudmeyer@agric.wa.gov.au, 31-Aug–06
Farming systems and rotations	
EMS in agriculture: A comparative analysis of initiatives in the European Union and Australia	Dr A Greig, Australian National University, 02 6125 4913, Alastair.Greig@anu.edu.au, 30-Apr–07
High water-use farming systems that integrate crops with perennial pastures — CRC Salinity	Dr R Latta, University of Western Australia, 08 9821 3333, rlatta@agric.wa.gov.au, 30-Jun–06
Sustainable grain and grazing farming systems	Prof P Flood, University of New England, 02 6773 2303, deansci@metz.une.edu.au, 31-Dec–07
Zonal management in the Riverine Plains	Mr A Inchbold, Riverine Plains Inc, 03 5743 1749, inchbold@cnl.com.au, 01-Jan–06
Integrated farming systems	Mr S Kearns, Practices, 02 6272 5525, s.kearns@grdc.com.au, 30-Jun–08
Flexible farming systems to meet the challenges of farming the southern Mallee and northern Wimmera	Mr B Jones, Birchip Cropping Group, 03 5492 2787, ben@malleefocus.com.au, 31-Jan–09
High yielding irrigated grains in cotton systems — A review and scoping study	Mr G Roth, Cotton Catchment Communities CRC, 02 6799 1500, guy.roth@csiro.au, 31-Mar–06
Sustainable farming systems for Central Queensland	Mr R Routley, Queensland Primary Industries and Fisheries, 07 4622 3930, richard.routley@dpi.qld.gov.au, 30-Jun–07
Viable and sustainable farming systems on Ferrosols	Dr M Bell, Queensland Primary Industries and Fisheries, 07 4160 0730, mike.bell@dpi.qld.gov.au, 30-Jun–07
A profitable future: New rotations for low rainfall environments	Dr M J Unkovich, Victorian Department of Primary Industries, 08 8303 7827, murray.unkovich@adelaide.edu.au, 31-Dec–05
Citrate-secreting break crops to unlock the fixed-P bank in rotations	Mr P Hocking, CSIRO Plant Industry, 02 6246 5049, Peter.Hocking@csiro.au, 31-Mar–06
Developing systems/management practices to enhance the impact of beneficial organisms in rotational farming systems of the Southern Region	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–08
Development of best practice farming systems for medium rainfall alkaline soils	Mr W Long, SYP, 08 8837 3993, wjjalong@netyp.com.au, 01-Jan–06
Farming systems improvement in the Upper North of South Australia	Mr M Wurst, S A Research & Development Institute, 0418 818995, cummins.jay@saugov.sa.gov.au, 30-Jun–08

Southern Region | Western Region

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Farming systems options and catchment salinity response	Dr H P Cresswell, CSIRO Land and Water, 02 6246 5933, hamish.cresswell@csiro.au, 01-Jan–08
Improving sustainable grain production through increased adoption of no-till farming	Mr K I'Anson, South Aust. No-Tillage Farming Ass. Inc. (SANTFA), 08 8842 4278, admin@santfa.com.au, 30-Jun–06
Improving winter cropping systems in the Riverine Plains	Mr A Inchbold, Riverine Plains Inc, 03 5743 1749, inchbold@cnl.com.au, 30-Jun–08
Investigating stubble management systems to reduce dependence on burning in the HRZ region of Southern Australia	Mr C Hacking, Southern Farming Systems, 03 5229 0566, sfso@pipeline.com.au, 30-Jun–08
Maintaining the productivity of soils under continuous intensive cropping	Dr P Fisher, Victorian Department of Primary Industries, 03 5833 5222, Peter.Fisher@nre.vic.gov.au, 30-Jun–06
Novel farming systems to increase productivity and reduce risk in the Mallee	Mr B Jones, Victorian Department of Primary Industries, 03 5091 200, ben.jones@nre.vic.gov.au, 31-Dec–05
Developing and extending innovative, profitable and sustainable no-till farming systems	Mr N Young, WA No Till Farmers Association, 08 9821 0026, neil.young@wn.com.au, 31-Dec–05
Farming Systems Analysis Service. Enhancing profitability — a collaborative, diagnostic approach to cropping systems research	Mr A Bathgate, Farming Systems Analysis Service, 08 9841 5126, bathgate@netconnect.com.au, 28-Feb–06
Grower groups	
Evaluation research: An innovative approach to assessing impact and building evaluation capability in farming systems groups	Ms B McDonald, Victorian Department of Primary Industries, 03 5624 2222, bron.mcdonald@dpi.vic.gov.au, 30-Jun–07
The Grain & Graze Program	Mr R Price, Land and Water Australia, 02 6295 6300, richard.price@kiri-ganai.com.au, 30-Jun–08
Grower Group support	Mr M Blumenthal, Practices, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–08
Networking innovation in grower groups	Dr D N Lawrence, Queensland Primary Industries and Fisheries, 07 4681 1617, David.Lawrence@dpi.qld.gov.au, 31-Dec–06
Validation and integration of new technology through grower groups in north-west NSW and south-west Queensland grain growing zones	Mr G L Rummery, Northern Grower Alliance, 02 6828 2077, greg@wsag.com.au, 01-Jul-10
Central West Farming Systems — Extension and Development	Mr G McDonald, Central West Farming Systems, 02 6895 1013, cwfs@agric.nsw.gov.au, 30-Jun–08
Enhancing TOPCROP and GRDC extension in Tasmania	Mr P Ball, Tasmanian Dept of Primary Industries, 03 6336 5360, Peter.Ball@dpiwe.tas.gov.au, 30-Jun–08
Eyre Peninsula Farming Systems Project II	Dr A McNeill, University of Adelaide, 08 8303 7418, ann.mcneill@adelaide.edu.au, 30-Jun–08
FarmLink: Supporting the establishment of a new farming systems groups for southern NSW	Ms K Condon, FarmLink Research Pty Ltd , 02 6942 1341, kirrily@farmlink.com.au, 30-Jun–08
Mallee Sustainable Farming project	Mr D Roget, Mallee Sustainable Farming Systems, 08 8303 8528, david.roget@csiro.au, 31-Oct–08
Southern Mallee and northern Wimmera farming systems	Dr H Van Rees, Birchip Cropping Group, 03 5492 2787, harm@cropfacts.com.au, 01-Apr–06
Straight to the Hart — Profitable farming for the future	Mr PJ Hooper, Hart Fieldsite Group Inc, 08 8842 3230, pjhooper@sa.chariot.net.au, 30-Jun–08
The REAL project — Relevant, Experienced, Applied Learning	Dr H Van Rees, Birchip Cropping Group, 03 5492 2787, harm@cropfacts.com.au, 30-Jun–07
Topcrop	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 30-Jun–06
Topcrop State Focus	Mr C Sounness, Victorian Department of Primary Industries, 03 6336 5360, chris.sounness@nre.vic.gov.au, 30-Jun–06
Improving the adoption of technology by neighbourhood grower groups	Ms C Richardson, University of Western Australia, 08 9380 2480, Christine.Richardson@uwa.edu.au, 30-Jun–06
The Grower Group Alliance — Innovation through grower groups	Ms T Gianatti, Grower Group Alliance, 08 6488 3410, tracey.gianatti@agric.uwa.edu.au, 30-Jun–07
WANTFA technology demonstration site	Ms G Bessen, WA No Till Farmers Association, 08 9381 7886, gae.bessen@wantfa.com.au, 30-Jun–07

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Improving on-farm productivity	
ACAS — Australian Crop Accreditation System Ltd	Mr A Bedggood, Australian Crop Accreditation Systems Limited, alan@acaslimited.com.au, 30-Jun–09
Crop Biofactories Initiative	Dr J Daly, CSIRO Entomology, 02 6246 4025, joanne.daly@csiro.au, 30-Jun–08
Knowledge management in irrigated cotton and grains	Mr D Williams, Land and Water Australia, 02 6881 1209, david.williams@dpi.nsw.gov.au, 30-Jun–07
National Statistics Project (KP1) — Statistical support for crop improvement and National Variety Trials	Dr B Cullis, NSW Primary Industries, 02 6938 1855, brian.cullis@agric.nsw.gov.au, 30-Jun–08
National Statistics Project (KP2) — Strategic statistical research for crop improvement	Dr B Cullis, NSW Primary Industries, 02 6938 1855, brian.cullis@agric.nsw.gov.au, 30-Jun–08
Quantifying the effect of hydrogen gas on soil biota and crop performance	Dr M Peoples, CSIRO Plant Industry, 02 6246 5244, mark.peoples@csiro.au, 30-Jun–06
National Variety Trials (NVT)	Mr A Betzner, Gene Discovery, 02 6272 5525, a.betzner@grdc.com.au, 30-Jun–09
Guiding growers to a more profitable and sustainable cropping systems in the western districts of the Northern Region	Mr M Burgis, Conservation Farmer Inc, 07 4638 5356, michael.burgis@cfi.org.au, 01-Jun-10
Improved performance of cereal roots in Australian farming systems — matching roots to cropping systems in the northern cropping region	Prof G L Hammer, The University of Queensland, 07 3346 9463, g.hammer@uq.edu.au, 30-Jun–08
New resources for breeding for heading date and improved frost tolerance	Dr J B Trevaskis, CSIRO Division of Plant Industry, 02 6246 5045, ben.trevaskis@csiro.au, 01-Oct–08
Novel approaches to in-head frost tolerance	Dr A K Borrell, Queensland Primary Industries and Fisheries, 07 4661 2944, andrew.borrell@dpi.qld.gov.au, 31-Dec–05
Crop support for the Northern and Southern Region	Mr G Gibson, Pulse Australia Limited, 02 9232 6366, ggibson@pulseaus.com.au, 30-Jun–07
CropCheck for irrigated and dryland cropping	Mr J Lacy, NSW Primary Industries, 02 6951 2738, john.lacy@agric.nsw.gov.au, 30-Jun–06
Genotype and management combinations for highly productive cropping systems in the High Rainfall Zone	Ms P A Riftkin, Victorian Department of Primary Industries, 03 5573 0926, penny.riffkin@dpi.vic.gov.au, 30-Jun–07
Increasing crop yields on Kangaroo Island and in the South East of South Australia	Mr T D Potter, MacKillop Farm Management Group, 08 8762 9132, potter.trent@saugov.sa.gov.au, 30-Jun–08
Management of high rainfall cropping to improve quality and productivity	Mr D Nash, Victorian Department of Primary Industries, 03 5624 222, David.Nash@dpi.vic.gov.au, 30-Jun–09
Agronomy Reference Group — Western Panel	Mr M Blumenthal, GRDC, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–06
Capacity building in crop agronomy	Prof B Lindner, University of Western Australia, 08 9380 2563, blindner@agric.uwa.edu.au, 30-Jun–07
Delivering a world-class root model to Australian grains researchers	Dr V M Dunbabin, University of Tasmania, 03 6226 2651, Vanessa.Dunbabin@utas.edu.au, 09-Jan–09
Frost Initiative	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–08
Growing western canola technology	Mr J Duff, CAA, 08 9475 0753, jd@consultag.com.au, 01-Jul–06
Industry issues	
ABARE — Australian Agricultural and Grazing Industries Survey	Mr V O'Donnell, Australian Bureau of Agricultural and Resource Economics, 02 6272 2255, vodonnell@abare.gov.au, 30-Jun–06
CIMMYT Alliance	Dr R Trethowan, CIMMYT, 0011 52 5 804 7503, r.trethowan@cgiar.org, 30-Jun–08
Contribution to Premium Grains for Livestock Program	Ms K Spencer, Value Chain Program, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
CRC for an Internationally Competitive Pork Industry	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Global Crop Diversity Trust	Mr P Reading, GRDC, 02 6272 5525, p.reading@grdc.com.au, 30-Jun–08

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
GMOs — Guiding Meaningful Opinions	Ms P Fitzgerald, Agrifood Awareness Australia, 02 6273 9535, paulafitzgerald@afaa.com.au, 30-Jun–06
Improving understanding and awareness of intellectual property amongst grain growers in Australia	Prof B Sherman, The University of Queensland, 07 3365 6193, b.sherman@uq.edu.au, 30-Jun–08
Joint Farm Health and Safety Program	Ms J Fisher, Rural Research & Development Corporation, 02 6271 6498, jane.fisher@rirdc.gov.au, 30-Jun–07
Molecular Plant Breeding CRC: Education and training program	Dr A Able, Molecular Plant Breeding CRC, 08 8303 7245, amanda.able@adelaide.edu.au, 30-Jun–06
Paddock Diary 2005–2006	Ms L Kennedy, WDM Design & Advertising Pty Ltd, 08 8299 9133, lyn@wdmadvertising.com.au, 15-Jan–06
Reducing loss of nitrous oxide from grain-based production systems for greenhouse and production benefits	Dr R Ashburner, Victorian Department of Primary Industries, 03 5833 5222, roger.ashburner@nre.vic.gov.au, 31-Aug–05
Relationships with agribusiness	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 30-Jun–06
Single Vision Interim Board	Mr P Reading, GRDC, 02 6272 5525, p.reading@grdc.com.au, 30-Jun–07
Extension officer to link research and end-users for the Northern Region	Mr M Burgis, Conservation Farmer Inc, 07 4638 5356, michael.burgis@cfi.org.au, 01-Aug–07
Northern Region Communicator	Mr B Reppel, Bernie Reppel, 07 4681 3846, barney@flexi.net.au, 30-Jun–06
Professorial Chair in Crop Science and Innovation	Prof G L Hammer, The University of Queensland, 07 3346 9463, g.hammer@uq.edu.au, 01-Jun–08
Research Advisory Committee Northern Region	Mr J Lock, AgForce Queensland, 07 3236 3100, jeff.lock@agforceqld.org.au, 30-Jun–08
Bestwool	Mr A Sim, Victorian Department of Primary Industries, 03 5333 6633, anthony.sim@nre.vic.gov.au, 30-Jun–06
Coordination of GRDC's High Rainfall Zone investment	Mr C Hacking, Southern Farming Systems, 03 5229 0566, sfso@pipeline.com.au, 31-Mar–07
Grain Legume and Oilseed Evaluation in Tasmania	Dr N J Mendham, University of Tasmania, 03 6226 2598, N.Mendham@utas.edu.au, 30-Jun–06
Partners in Grain: A national professional development network for grain growers	Mrs J Long, Partners in Grain, 08 8837 3993, jeanette@agconsulting.com.au, 01-Jun–07
South Australian Research Advisory Committee	Mr B Gursansky, South Australian Farmers Federation, 08 8100 8710, bgursansky@saff.com.au, 30-Jun–06
Southern NSW Research Advisory Committee	Mr D Gordon, NSW Farmers Association, 02 8251 1700, gordond@nswfarmers.org.au, 30-Jun–06
Southern Region Communicator 2003–06	Ms L Kellaway, Porter Novelli, 08 8272 8699, lizk@porternovellisa.com.au, 30-Jun–06
Southern Region Crop Evaluation Program. Component 1 — South Australia	Mr R D Wheeler, S A Research & Development Institute, 08 8303 9480, wheeler.rob@saugov.sa.gov.au, 28-Feb–06
Victorian Research Advisory Committee	Mr I Hunter, Victorian Farmers Federation, 03 9207 55434, ihunter@vff.org.au, 30-Jun–06
Optimising cereal profitability in the high rainfall zone through the integration of disease management and canopy management principles	Mr N F Poole, c/- Col Hacking, Southern Farming Systems Ltd, 03 5229 0566, poolen@far.org.nz, 30-Jun–08
Assessment of the commercial potential of perennial grain crops	Mr M Blumenthal, Practices, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–06
Investment in the Export Grains Centre	Mr D Crawford, Export Grains Centre Ltd, 08 9368 8752, dcrawford@egc.net.au, 30-Jun–09
The Workboot Series — Wheat, the story of wheat in Australia & Resources Kit	Ms K Field, Kondinin Group, 08 9478 8328, kim@kondinin.com.au, 30-Nov–05
Western Region Communicator 2003–06	Mr B Cant, Brendon Cant & Associates, 08 9384 1122, brendon@iinet.net.au, 30-Jun–06

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Marketing and grain quality	
Coeliac friendly cereals: Developing germplasm	Dr G J Tanner, CSIRO Plant Industry, 02 6246 5044, Greg.Tanner@csiro.au, 31-Mar–06
Develop grains containing high levels of nutritionally important long-chain Omega-3 fatty acids, particularly EPA and DHA	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Development of cereals with altered carbohydrate digestibility (starches) for food and industrial applications	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Food Safety Risk Management Initiative	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Functional genomics in the growth and end-use quality of cereals	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–06
Go Grains	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Grain Foods CRC Limited	Dr G McMaster, CGF, 02 9888 9600, g.mcmaster@bri.com.au, 30-Jun-10
Grain Industries Centre for NIR: Coordination and support activities	Dr B Osbourne, BRI Australia Limited, 02 9888 9600, b.osborne@bri.com.au, 30-Jun–06
GRDC and AWB consultancy on assessment of the long term outlook for grain supply and demand in China	Mr R Wheatcroft, AWB Limited, 03 9209 2823, rwheatcroft@awb.com.au, 31-Jul–05
Late maturity alpha-amylase screening services	Mr B Rathmell, Value Added Wheat Cooperative Research Centre, 31-Dec–07
Market scoping study for gluten-free foods	Ms V Droulez, University of Wollongong, 0431 836267, droulez@uow.edu.au, 30-Sep–05
Objective grain quality testing	Dr B Osborne, BRI Australia Limited, 02 9888 9600, b.osborne@bri.com.au, 30-Jun–05
On-farm delivery to growers of cost effective, real time analysis of grain and soil properties	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Premium Grains for Livestock Program 2: Component 1. Coordination	Dr J Black, John L Black Consulting, 02 4753 6231, jblack@pnc.com.au, 30-Jun–06
Premium Grains for Livestock Program 2: Component 2. Production, storage and distribution of grain samples	Mr S G Moore, University of Sydney, Plant Breeding Institute, Narrabri, 02 6799 2203, stevem@mail.usyd.edu.au, 30-Jun–06
Premium Grains for Livestock Program: Technology transfer and commercialisation — Commercial evaluation of new measures of feed grain quality	Mr J Spragg, JCS, 03 9769 7027, jspragg@bigpond.net.au, 30-Nov–05
Statistical analysis and data mining for the Premium Grains for Livestock Program	Sharon Neilsen, NSW Department of Primary Industries, 02 6391 3899, sharon.neilsen@agriic.nsw.gov.au, 30-Jun–06
Objective quality assessment to facilitate feedgrain trading	Ms K Spencer, Value Chain Program, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–06
Conduct a study to identify the cause of mouldy grain at receival in WA	Mr K Young, GXE Crop Research Pty Ltd, 08 9072 1722, gxe@westnet.com.au, 30-Mar–06
Development of value-added plant protein products for the aquaculture feeds sector	Dr B Glencross, University of Western Australia, 08 9239 8103, bglencross@fish.wa.gov.au, 30-Jun–06
Grain defects in the southern area of WA	Mr J Sandow, GRDC, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–08

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Nutrition	
Aquaculture Nutrition Subprogram: Maintenance of strategic directions, project and infrastructure development, and facilitation of nutrition research and extension across all Australian aquaculture sectors	Ms S van Barneveld, Barneveld Nutrition Pty Ltd, 07 5547 8611, samantha@barneveld.com.au, 30-Jun–07
Developing improved capacity to predict N supply to crops	Dr J Baldock, CSIRO Land and Water, 08 8303 8537, jeff.baldock@csiro.au, 31-Dec–06
National Rhizobium Program — developing and delivering high quality rhizobial inoculants to the Australian grains and pasture industries	A/Prof J Howieson, Murdoch Univerisity, 08 9360 2231, jhowieso@central.murdoch.edu.au, 30-Jun–07
Adoption of improved nutrient management practices	Mr T Cowlrick, NMS, 07 3206 2124, tcowlrick@nutrientms.com.au, 30-Jun–08
Identifying and managing nutrient imbalances in high-yielding cropping systems on the Liverpool Plains, NSW	Mr G Brownhill, AMPS Research, 02 6747 3939, steve@ampscommercial.com.au, 31-Dec–05
Nutrient management in rainfed cropping systems of the Northern Region	Dr M Bell, Queensland Primary Industries and Fisheries, 07 4160 0730, mike.bell@dpi.qld.gov.au, 30-Jun–08
Biological cycling of P in farming systems — towards an improved capacity for managing P supply to grain crops	Dr A McNeill, University of Adelaide, 08 8303 7418, ann.mcneill@adelaide.edu.au, 30-Dec–06
Fluid fertilisers — the next step towards raising yield potentials	Dr M McLaughlin, CSIRO Land and Water, 08 8303 8433, Mike.McLaughlin@csiro.au, 31-Dec–06
Scoping study to review current research on microbe-plant interactions in the rhizosphere and identify priorities for future investment	Dr G Vadakattu, CSIRO Land and Water, 08 8303 8579, Gupta.Vadakattu@csiro.au, 30-Jun–06
Synchronising nutrient supply and crop demand in modern cropping systems	Dr R M Norton, University of Melbourne, 03 5362 2337, rnorton@unimelb.edu.au, 31-Mar–08
Determining the benefits of fluid fertilisers on neutral and acidic soils in eastern and Western Australia	Mr M McLaughlin, University of Adelaide, 08 8303 8433, michael.mclaughlin@adelaide.edu.au, 30-Mar–07
Addressing the soil supply factor to improve prediction of plant nutrient requirements	Dr R Hamon, CSIRO Land and Water, 08 8303 8489, rebecca.hamon@csiro.au, 30-Jun–06
Improving farm to catchment nutrient management for a more profitable and environmentally sustainable grains industry	Dr M Wong, CSIRO Land and Water, 08 9333 6299, mike.wong@csiro.au, 31-Dec–07
Profitable and sustainable nutrient management in the WA grain industry	Dr W M Porter, University of Western Australia, 08 9368 3677, bporter@agric.wa.gov.au, 01-Jan–08
Province, paddock or patch? Giving farmers tools to optimise the scale at which fertiliser decisions are made	Mr P J Stone, CSIRO Sustainable Ecosystems, 08 9333 6461, peter.stone@csiro.au, 31-Dec–07
Research adoption	
Australian Grain Yearbook (incorporating the GRDC Annual Report to Industry)	Mr L O'Connell, Berekua Pty Ltd, 07 4659 3555, grain@greenmountpress.com.au, 01-Apr–08
Farming Ahead articles	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 27-Dec–06
National Farm Groups Field Research (GRIST) Manual	Mr L O'Connell, Berekua Pty Ltd, 07 4659 3555, grain@greenmountpress.com.au, 01-Apr–08
Online technology dissemination	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 30-Jun–05
Ground Cover Newspaper	Mr B Collis, Coretext Pty Ltd, 03 9318 9362, bcollis@coretext.com.au, 30-Jun–06
Northern Region Grains Research Updates	Mr J Cameron, Independent Consultant Australia Network, 02 9482 4930, icanjohn@alphanet.com.au, 30-Jun–06
Publication of *COB* Magazine	Mr N Hutchins, The Maize Association of Australia, 02 6968 4280, hutchag@bigpond.com, 30-Jun–06
Ute Guides	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 30-Jun–06
Southern Region Grains Research Updates	Mr J Lamb, Jon Lamb Communications, 08 8362 5417, jlcom@chariot.net.au, 30-Jun–06
State Focus SA	Ms E Hancock, SA Research & Development Institute, 08 8568 6416, hancock.erica@saugov.sa.gov.au, 30-Jun–06

National | Northern Region

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Continuing the Crop Updates partnership	Ms V McAllister, Department of Agriculture Western Australia, 08 9956 8503, vmcallister@agric.wa.gov.au, 30-Jun–06
Topactive	Mr V Dobos, Communication & Customer Services, 02 6272 5525, v.dobos@grdc.com.au, 30-Jun–06
WA Agribusiness trial extension network	Mr S Kearns, Validation & Adoption, 02 6272 5525, s.kearns.com.au, 30-Jun–08
Risk management (climate and price)	
Managing the Climate Variability Program	Mr R Price, Land and Water Australai, 03 6295 6300, richard.price@kiri-ganai.com.au, 30-Jun–07
Delivering climate variability information through a farming systems context in Northern NSW	Dr P T Hayman, NSW Primary Industries, 02 6763 1256, peter.hayman@agric.nsw.gov.au, 01-Mar–06
Tools to reduce the impact of climate variability in southeastern Australia	Dr D Rodriguez, Victorian Department of Primary Industries, 03 5362 2323, Daniel.Rodriguez@dpi.vic.gov.au, 30-Jun–06
Better long-lead seasonal and crop forecasts for southern Australia	Dr D Stephens, Department of Agriculture Western Australia, 08 9368 3346, dstephens@agric.wa.gov.au, 31-Dec–06
Reducing the impact of climate variability	Ms M Rebbeck, S A Research & Development Institute, 08 8303 9639, rebbeck.melissa@saugov.sa.gov.au, 30-Jun–07
Climate change, wheat yield and cropping risks in Western Australia	Dr I Foster, Department of Agriculture Western Australia, 08 9368 3346, ifoster@agric.wa.gov.au, 30-Jun–07
On-farm evaluation of frost minimisation techniques and risk management strategies	Mr G Knell, ConsultAg trading as Dallard Pty Ltd, 08 9881 551, gk@consultag.com.au, 30-Jun–07
Soils and water use	
Biological indicators of soil quality initiative	Dr R Brettell, Germplasm Enhancement, 02 6272 5525, r.bretell@grdc.com.au, 30-Jun–06
Biological inputs for profitable farming	Mr J Thorne, New Products, 02 6272 5525, j.thorne@grdc.com.au, 30-Jun–07
Identification of soil biotic constraints in contrasting farming systems on vertosols of the Northern Grains Region	Dr M Bell, Queensland Primary Industries and Fisheries, 07 4160 0730, mike.bell@dpi.qld.gov.au, 30-Jun–06
Management of soil microbial function for improved productivity in intensive cropping systems	Mr D Roget, CSIRO Land and Water, 08 8303 8528, david.roget@csiro.au, 30-Jun–06
Managing the fallow period for optimum water use and nitrogen availability	Dr K Verburg, CSIRO Land and Water, 02 6246 5954, kirsten.verburg@csiro.au, 30-Jun–07
National Output Development and Evaluation Project — Soil Biology Initiative	Dr R Hannam, RJH, 0407 606383, rhannam@ozemail.com.au, 30-Jun–07
Overcoming soil biological constraints to yield	Dr D Murphy, University of Western Australia, 08 9380 7083, dmurphy@agric.uwa.edu.au, 19-Jun–06
Physiological based screening for identifying novel salt-tolerant germplasm in wheat and barley	Prof M Tester, University of Adelaide, 08 8303 7159, mark.tester@acpfg.com.au, 30-Jun-10
Soil Biology R&D Initiative	Dr K Ophel-Keller, S A Research & Development Institute, 08 8303 9368, ophelkeller.kathy@saugov.sa.gov.au, 15-Jul–06
Combating subsoil constraints	Dr R C Dalal, Queensland Natural Resources and Mine, 07 3896 9895, Ram.Dalal@dnr.qld.gov.au, 30-Jun–07
Direct and indirect measurement of deep drainage in NW NSW cracking clays: Is there more drainage in cropping systems if lucerne is included?	Mr R Young, NSW Primary Industries, 02 6763 1117, rick.young@agric.nsw.gov.au, 30-Jun–06
Enhancing system water-use efficiency in the north eastern grains belt through participatory RD&E	Dr D N Lawrence, Queensland Primary Industries and Fisheries, 07 4681 1617, David.Lawrence@dpi.qld.gov.au, 30-Jun–07
Improving water quality in grain farming catchments	Mr D J Rattray, Queensland Natural Resources and Mine, 07 4688 1146, danny.rattray@nrm.qld.gov.au, 30-Jun–06
Which northern dryland farming systems are at high risk of deep drainage and salinity?	Mr M Silburn, Queensland Natural Resources and Mine, 07 4688 1281, mark.silburn@nrm.qld.gov.au, 30-Jun–06
BDI — Soil Biology Initiative	Mr M Blumenthal, GRDC, 02 6272 5525, m.blumenthal@grdc.com.au, 30-Jun–06

MULTI COMMODITY PROJECTS

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
Combating subsoil constraints	Ms D O'Neill, Central West Farming Systems, 02 6895 1001, debbie.o'neill@dpi.nsw.gov.au, 30-Jun–06
CRC for Plant-based Management of Dryland Salinity	Mr K Goss, CRC for Plant Based Management of Dryland Salinity, 08 6488 8559, crcsalinity.com, 30-Jun–06
Defining agricultural management strategies that optimise water and nutrient use in Mallee environments of Southern Australia	Mr C Smith, CSIRO Land and Water, 02 6246 5960, chris.j.smith@csiro.au, 30-Dec–05
Delivering rapid soil tests to growers	Mr P Rampant, Department of Primary Industries, Victoria, 03 5430 4345, paul.rampant@dpi.vic.gov.au, 30-Jun–08
Evaluating the use of subsoil water by crops – is it the pipes or the pump?	Dr J Kirkegaard, CSIRO Plant Industry, 02 6246 5080, john.kirkegaard@csiro.au, 31-Dec–06
Exploiting genetic variation in wheat roots to promote beneficial interactions with soil organisms and thereby increase yield	Dr J Kirkegaard, CSIRO Plant Industry, 02 6246 5080, john.kirkegaard@csiro.au, 30-Jun–08
Feasibility for rapid soil-measurement using core scanning	Dr N J McKenzie, CSIRO Land and Water, 02 6246 5922, neil.mckenzie@csiro.au, 30-Jun–07
Identifying and evaluating 'primer crops' for hostile subsoils	Dr M Peoples, CSIRO Plant Industry, 02 6246 5244, mark.peoples@csiro.au, 30-Jun–06
Identifying and overcoming biophysical constraints limiting profitability of Mallee farming systems	Mr D Roget, CSIRO Land and Water, 08 8303 8528, david.roget@csiro.au, 31-Oct–05
Improved management of nutrient and soil water interactions in the northern grain zone	Prof P S Cornish, University of Western Australia, 02 4570 1376, p.cornish@uws.edu.au, 30-Jun–07
Improved wheat and barley germplasm for saline and sodic soils	Dr R Munns, CSIRO Plant Industry, 02 6246 5280, rana.munns@csiro.au, 30-Jun–09
Improving farming systems for the management of transient salinity and risk assessment in relation to seasonal changes in Southern Australia	Dr P Rengasamy, University of Adelaide, 08 8303 7418, pichu.rengasamy@adelaide.edu.au, 30-Jun–06
Improving the profitability of cropping on hostile subsoils	Mr R Armstrong, Victorian Department of Primary Industries, 03 5362 2111, roger.armstrong@nre.vic.gov.au, 30-Jun–08
Lifting irrigated cropping profitability and water use efficiency (NSW)	Mr P Draper, Irrigated Cropping Forum, 02 69601550, irec@irec.org.au, 30-Jun–08
Lifting irrigated cropping profitability and water use efficiency (Victoria)	Mr RO Fisher, Irrigated Cropping Forum, 03 5450 9558, Rob.Fisher@dpi.vic.gov.au, 30-Jun–08
Objective measures for managing the risk of deep drainage	Dr W Bond, CSIRO Land and Water, 02 6246 5948, warren.bond@csiro.au, 30-Jun–06
Residue management, soil organic carbon and crop performance	Mr J Skjemstad, CSIRO Land and Water, 08 8303 8427, jan.skjemstad@csiro.au, 30-Jun–06
Understanding subsoil constraints in the High Rainfall Zone	Mr R J MacEwan, Department of Primary Industries, PIRVic, 03 5430 4326, Richard. MacEwan@dpi.vic.gov.au, 31-Mar–06
Vigorous roots for hostile soils	Mr R Richards, CSIRO Plant Industry, 02 6246 5090, richard.richards@csiro.au, 30-Jun–07
Available Water Content — Workshop for growers	Mr N P Dalgliesh, CSIRO Sustainable Ecosystems, 07 4688 1376, neal.dalgliesh@csiro.au, 30-Jun–08
A sustainable dryland community achieved through proactive research on effective management of the soil resource	Mrs M Carlshausen, Liebe Group, 08 9664 2030, liebe.merrie@bigpond.com, 30-Apr–06
Biological indicators of soil quality	Dr D Murphy, University of Western Australia, 08 9380 7083, dmurphy@agric.uwa.edu.au, 19-Jun–06
Bringing it all together for the grains industry — A whole of catchment approach to integrated water management	Dr P J Stone, WWL, 08 9333 6461, peter.stone@csiro.au, 30-Jun–07
Combating subsoil constraints: Unlocking crop potential through innovative subsoil management	Mr C Gazey, University of Western Australia, 08 9690 2000, cgazey@agric.wa.gov.au, 31-Dec–08
Delivering rapid soil tests to growers	Mr C Gazey, University of Western Australia, 08 9690 2000, cgazey@agric.wa.gov.au, 30-Jun–08
Development and extension of new methodologies to treat subsurface acidity — Maximising the benefits of removing subsurface soil constraints	Mr C Gazey, Department of Agriculture Western Australia, 08 9690 2000, cgazey@agric.wa.gov.au, 31-Dec–05

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Development of a multi-sensor platform for real-time collection of field soil data	Dr R Viscarra Rossel, The Univesity of Sydney, 02 9351 5813, r.rossel@agec.usyd.edu.au, 01-Jul–08
Identifying soil constraints to crop production on the South Coast sandplain	Mr D Hall, Department of Agriculture Western Australia, 08 9083 1111, dhall@agric.wa.gov.au, 31-Jan–09
Innovative solutions to subsoil constraints for a profitable and environmentally sustainable grains industry in WA	Dr M Wong, CSIRO Land and Water, 08 9333 6299, mike.wong@csiro.au, 28-Feb–07
Optimising potassium cycling in soils and crops for improved grain production in WA	Prof Z Rengel, University of Western Australia, 08 9380 2557, zrengel@agric.uwa.edu.au, 31-Aug–07
Soil and surface water management for profitable crops and pastures on waterlogged and saline land	Mr GJ Hamilton, Department of Agriculture Western Australia, 08 9368 3276, ghamilton@agric.wa.gov.au, 30-Jun–06
Storage and handling	
A workshop to identify priorities for the Phosphine Resistance Initiative	Mr C Waterford, CSIRO Entomology, 02 6246 4204, colin.waterford@csiro.au, 30-Jun–05
Assessing limits of existing silo bag technology under Australian conditions	Mr C Waterford, CSIRO Entomology, 02 6246 4204, colin.waterford@csiro.au, 30-Jun–07
Coordination of registration of grain storage chemicals	Mr W Murray, WJ Murray Consulting Services, 03 9763 8396, murraywj@alphalink.com.au, 30-Jun–08
Innovations in stored grain technology for post-harvest value adding	Ms K Spencer, Value Chain Program, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–07
Modelling post-harvest grain development to deliver better storage outcomes for growers	Dr R Reuss, CSIRO Entomology, 02 6246 4210, rainer.reuss@csiro.au, 31-Oct–05
NIR spectroscopic changes in stored grain	Dr R Reuss, CSIRO Entomology, 02 6246 4210, rainer.reuss@csiro.au, 30-Oct–05
Phosphine fumigation of cool grain	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–08
Registration and extension of the use of new ethyl formate formulations on stored grain and for structural treatment	Dr Y Ren, CSIRO Entomology, 02 6246 4211, yonglin.ren@csiro.au, 31-Dec–08
Resistance Monitoring and Management — Northern Region	Dr P Collins, Queensland Primary Industries and Fisheries, 07 3896 9433, Pat.Collins@dpi.qld.gov.au, 30-Jun–08
Grain storage extension	Ms K Spencer, New Products, 02 6272 5525, k.spencer@grdc.com.au, 30-Jun–07
Optimising grain yield and quality: Integrating high moisture harvesting and grain storage strategies	Mr P J Hughes, Queensland Primary Industries and Fisheries, 07 4688 1564, peter.hughes@dpi.qld.gov.au, 30-Jun–07
Resistance management of stored grain insects in the Southern Region	Mr G Holloway, NSW Primary Industries, 03 5362 2111, grant.hollaway@nre.vic.gov.au, 30-Jun–08
Resistance Monitoring and Management — Western Region	Dr R Emery, Department of Agriculture Western Australia, 08 9368 3247, remery@agric.wa.gov.au, 30-Jun–05
Weeds and weed control	
National Branched Broomrape communication strategy	Mr J Lamb, Jon Lamb Communications, 08 8362 5417, jlcom@chariot.net.au, 30-Nov–06
Releasing agricultural weed seed dormancy through application of a novel smoke derived chemical	Dr K W Dixon, Botanic Gardens and Parks Authority, 08 9480 3614, kdixon@bgpa.wa.gov.au, 30-Nov–05
Robocrop — Construction of a prototype seedn'weed tillage bar	Mr M Taylor, AGR, 03 5872 2892, malcolmc.taylor@bigpond.com, 30-Jun–06
Advanced application technology to manage spray drift and improve the efficacy of weed management practices	Mr N Woods, University of Queensland, 07 5460 1293, nicholas.woods@uq.edu.au, 30-Jun–07
Best Management Practices for the application of atrazine	Mr S Kearns, Validation & Adoption, 02 6272 5525, s.kearns.com.au, 30-Jun–06
Delivering applied solutions to weed issues in Central Queensland	Mrs V Osten, Queensland Primary Industries and Fisheries, 07 4983 7406, vikki.osten@dpi.qld.gov.au, 30-Jun–06
Development of decision support models for weed containment and eradication	Prof H Possingham, University of Queensland, 07 3365 9796, hpossingham@zen.uq.edu.au, 31-May–06

Southern Region | Western Region

RESEARCH PROJECT	RESEARCHER, ORGANISATION PHONE, EMAIL, FINISH DATE
MULTI COMMODITY PROJECTS	
Modelling for sustainable glyphosate use in the Northern Region	Dr S R Walker, Queensland Primary Industries and Fisheries, 07 4639 8838, steve.walker@dpi.qld.gov.au, 01-Jan–08
Risk assessment and preventative strategies for herbicide resistance in the Northern Region (Phase II)	Mr A M Storrie, NSW Department of Primary Industries, 02 6763 1174, andrew.storrie@agric.nsw.gov.au, 30-Jun–08
Screening for differential herbicide tolerance in cultivars of winter cereals in the Northern Region	Dr S R Walker, Queensland Primary Industries and Fisheries, 07 4639 8838, steve.walker@dpi.qld.gov.au, 31-Dec–05
Control and eradication of a parastic weed, field trials	Prof D Coventry, University of Adelaide, 08 8303 7954, david.coventry@adelaide,edu.au, 30-Jun–07
Developing management systems for brome grass — a serious threat to production systems on fragile sandy textured soils in Southern Australia	Dr G Gill, University of Adelaide, 08 8303 7744, gurjeet.gill@adelaide.edu.au, 01-Jan–07
Differential herbicide tolerance of winter crops in SE Australia — Stage 2	Dr D Lemerle, NSW Primary Industries, 02 6938 1892, deirdre.lemerle@agric.nsw.gov.au, 30-Jun–07
Emerging mite pests in Southern Australia	Prof A A Hoffmann, University of Melbourne, 03 9479 2769, A.Hoffmann@latrobe.edu.au, 30-Jun–07
Improved techniques for managing herbicide resistant ryegrass	Dr H Van Rees, Birchip Cropping Group, 03 5492 2787, harm@cropfacts.com.au, 31-Mar–06
Managing the risks of trifluralin resistance in no-till cropping systems	Mr C Preston, University of Adelaide, 08 8303 7237, christopher.preston@adelaide.edu.au, 20-Dec–07
Understanding and management of weed resistance to glyphosate	Mr C Preston, University of Adelaide, 08 8303 7237, christopher.preston@adelaide.edu.au, 30-Jun–08
A systems approach to enhance the adoption of integrated weed management techniques in the Northern Agricultural Region of WA	Mr P Metcalfe, Department of Agriculture Western Australia, 08 9956 8555, pmetcalfe@agric.wa.gov.au, 30-Jun–09
An investigation into the hydrogeological transport of atrazine in soils of the Western Australian wheat-belt	Dr NK Rothnie, Chemistry Centre, W A, 08 9222 3038, nrothnie@ccwa.wa.gov.au, 30-Nov–05
Applied weed management in Western Australia	Dr A Hashem, Department of Agriculture Western Australia, 08 9690 2000, ahashem@agric.wa.gov.au, 30-Jun–07
Best Management Practices for the application of atrazine	Mr S Kearns, Validation & Adoption, 02 6272 5525, s.kearns.com.au, 30-Jun–06
Economic analysis of GRDC investment in herbicide use	Prof B Lindner, University of Western Australia, 08 9380 2563, blindner@agric.uwa.edu.au, 30-Jun–06
Evaluating herbicide tolerance with new crop varieties	Ms J Garlinge, Department of Agriculture Western Australia, 08 9368 3501, jgarlinge@agaric.wa.gov.au, 30-Jun–08
Integrated weed management in the Western Region	Mr J Sandow, Practices, 02 6272 5525, j.sandow@grdc.com.au, 30-Jun–08
Management of annual ryegrass using deleterious rhizobacteria	Dr S C Peltzer, Department of Agriculture Western Australia, 08 9892 8504, speltzer@agric.wa.gov.au, 30-Jun–08
Management of dodder — A new parasitic weed in WA cropping systems	Dr A Hashem, Department of Agriculture Western Australia, 08 9690 2000, ahashem@agric.wa.gov.au, 30-Sep–05
Western Australian Herbicide Resistance Initiative (WAHRI)	Prof S Powles, University of Western Australia, 08 9380 7833, spowles@agric.uwa.edu.au, 30-Jun–07

AGRICULTURAL CHEMICAL SUPPLIES

Agrichem Manufacturing Industries P/L: PO Box 4037, Loganholme 4129
Ph: 07 3801 4888; Fax: 07 3801 4296 www.agrichem.com.au

Bayer CropScience: 391-393 Tooronga Rd, East Hawthorn, VIC 3123
Ph: 03 9248 6888; Fax: 03 9248 6800 www.bayercropscience.com.au

C-Qentec Diagnostics: 51 Rawson Street, Epping NSW 2121
Ph: 02 8876 3000; Fax: 02 8876 3030 www.c-qentec.com

Crop Care: Portal North, Unit 15, 16 Metroplex Avenue, Murarrie, QLD 4172
Ph: 07 3909 2000; Fax: 07 3909 2010 www.cropcare.com.au

Dow AgroSciences: 26 Rodborough Road, Frenchs Forest, NSW 2086
Ph: 02 9776 3400; Fax 02 9776 3435 www.dowagrosciences.com.au

drumMUSTER: GPO Box 816, Canberra, ACT 2601
Ph: 02 6230 6712, Fax: 02 6330 6713 www.drummuster.com.au

DuPont Australia: 168 Walker Street, North Sydney, NSW 2060
Ph: 02 9923 6111; Fax: 02 9923 6009 www.dupont.com.au

Landmark – an AWB Company: 201 Sussex Street, Sydney, NSW 2000
Ph: 02 9335 6000; Fax: 02 9335 6275 www.landmark.com

Monsanto Australia: 600 St Kilda Road, Melbourne, VIC 3004
Ph: 03 9522 7122; Fax: 03 9525 2253 www.monsanto.com

Sumitomo Chemical: 501 Victoria Avenue, Chatswood, NSW 2067
Ph: 02 9412 8218; Fax: 02 9904 7499 www.sumitomo-chem.com.au

Syngenta: Level 1, 2-4 Lyon Park Road, North Ryde, NSW 2113
Ph: 1800 022 035; Fax: 1800 815 352 www.syngenta.com.au

Victorian Chemicals: 83 Maffra Street, Coolaroo, VIC 3048
Ph: 03 9301 7000; Fax: 03 9309 7966 www.vicchem.com

BANKS

Commonwealth Bank: Ph:13 19 98. www.commbank.com.au/business

Elders Rural Bank: 109 Melbourne Street, South Brisbane, QLD 4000
Ph: 07 3840 5550; Fax: 07 3844 2442 www.elders.com.au

Rabobank: 115 Pitt Street, Sydney, NSW 2000
Ph: 02 9234 4200; Fax: 02 9221 6218 www.rabobank.com.au

National Australia Bank: 800 Bourke Street, Melbourne, VIC 3000
Ph: 13 10 12; www.national.com.au

Suncorp: Albert Street cnr Turbot, Brisbane, QLD 4000
Ph: 13 11 55; Fax: 07 3362 1155 www.suncorp.com.au

EDUCATION & EMPLOYMENT

Agpeople: 15 Rossian Place, Cherrybrook, NSW 2126
Ph: 02 9875 4227, Fax: 02 9875 4227 www.agpeople.com.au

Dalby Agricultural College: PO Box 398, Dalby, QLD 4405
Ph: 07 4672 3000, Fax: 07 4662 4048 www.dac,qld.edu.au

Emerald Ag College: PO Box 257, Emerald, QLD 4720
Ph: 07 4982 8713; Fax: 07 4982 8788 www.eac.qld.edu.au

Agricultural Appointments: 84 Pitt Street, Sydney, NSW 2000
Ph: 02 9223 9944; Fax: 02 9223 9988 www.agappointments.com.au

Rimfire Resources: PO Box 2075, Milton BC QLD 4064
Ph: 07 3876 5567; Fax: 07 3876 5529 www.rimfireresources.com.au

Toowoomba Grammar School: PO Box 2900, Toowoomba, QLD 4350
Ph: 07 4687, Fax: 07 4687 2582

ELECTRONIC EQUIPMENT/PRECISION AG

Agelec Enterrpises Pty Ltd: 2 Schaefer Court, Mount Barker, SA 5257
Ph: 08 8391 6030, Fax: 08 8391 6031

AgGuide Pty Ltd: PO Box 121, Holland Park 4121
Ph: 07 3279 4344; Fax: 07 3279 4684 www.agguide.com.au

Farmscan: 6 Sarich Way, Bentley, WA 6102
Ph: 08 9470 1177; Fax: 08 9470 2844 www.farmscan.com

Farm Management 500: PO Box 189, Bendigo VIC 3552
Ph: 03 5441 6176; Fax: 03 5444 4299 www.fm500.com.au

gps–Ag: 22 Valentine Street, Bendigo, VIC 3550
Ph: 03 5442 8708; Fax: 03 5442 8704 www.gps-ag.com.au

Graintec Pty Ltd: 6 Rutledge Street, Toowoomba, QLD 4350
Ph: 07 4638 7677; Fax: 07 4638 1761 www.graintec.com.au

Kee Technologies: PO Box 28, Booleroo Centre, SA 5482
Ph: 08 8203 3300; Fax: 08 8203 3384 www.kee.com.au

NIR Technology: 56 Kitchener Parade, Bankstown, NSW 2200
Ph: 02 9790 6450; Fax: 02 9790 1552 www.nirtech.zip.com.au

Precision Cropping Technology Pty Ltd: 7 Ningadhuw Circuit, Narrabri, NSW 2390 Ph: 02 6792 2638, Fax: 02 6792 2542

SST Development Group: PO Box 18, Jerilderie, NSW 2716
Ph: 03 5886 0051; Fax: 03 5886 1710 www.sstdevgroup.com.au

TACS Australia Pty Ltd: Level 2/2A 197 Military Rd, Neutral Bay, 2089
Ph: 02 8900 5054; Fax: 02 9955 8622; www.dickey-john.com

FERTILISERS & SOIL HEALTH SUPPLIES

Incitec Pivot Ltd: 70 Southbank Boulevard, Southbank, VIC 3006
Ph: 03 8695 4400; Fax: 03 8695 4403 www.incitecpivot.com.au

Phosyn analytical Pty Ltd: PO Box 2594, Burleeigh MDC, QLD 4220
Ph: 07 5568 8700, Fax: 07 5522 0939 www.phosyn.com

Spraygro Liquid Fertilizers: 40 Bedford St, Gillman SA 5013
Ph: 08 8447 7266; Fax: 08 8240 1844 www.spraygro.com.au

Superior Fertilisers: PO Box 97, Fernvale, QLD 4306
Ph: 07 3282 7166; Fax: 07 3812 2689

Ultimate Fertilisers: 522 Princes Highway, Noble Park VIC 3174
Ph: 07 9701 0544 Fax: 03 9701 0655 www.ultimatefertilisers.com.au

YLAD Living Soils: Moppity Road, Young, NSW 2594
Ph: 02 6382 2165; Fax: 02 6382 5439

FUEL & LUBRICANTS

Caltex Australia: PO Box 40, Wynnum, QLD 4178
Ph: 07 3362 7319, Fax: 07 3362 7314 www.caltex.com.au

Castrol Australia: 132 McCredie Road, Guildford, NSW 2161
Ph: 02 9795 4800; Fax: 02 9795 4833 www.castrolagri.com.au

Mobil Agri: 417 St Kilda Road, Melbourne, VIC 3000
Ph: 1800 033 863; Fax: 03 9866 9079 www.mobil.com.au

Shell: PO Box 63, Parramatta, NSW 2124
Ph: 02 9897 8214; Fax: 02 9897 8211 www.shell.com.au

GRAIN TRADING & PROCESSING

Aust Grain Accumulation Service: PO Box 854, Goondiwindi, QLD 4390
Ph: 07 4671 3997

AWB Limited: Service Centre Hotline 1800 054 433 www.awb.com.au

Ausbulk: 124-130 South Terrace, Adelaide, SA 5000
Ph: 08 8211 7588; Fax: 08 8211 8087 www.ausbulk.com.au

Graincorp Ltd: 51 Druitt Street, Sydney, NSW 2000
Ph: 02 9325 9100; Fax: 02 9325 9180 www.graincorp.com.au

Ray Brooks Pty Ltd: Berrigan Road, Barooga, VIC 3644
Ph: 03 5873 4205; Fax: 03 5873 4926 www.raybrooks.com.au

Weston Milling: No 1 Munster Terrace, Nth Melb., VIC 3051
Ph: 03 9329 7188; or 1800 804 494; Fax: 03 9326 5118
www.westonmilling.com.au

IRRIGATION

Berendsen Fluid Power and EPG: Locked Bag 2011, Seven Hills, NSW 1730
Ph: 02 9830 2222, Fax: 02 9830 2384 www.epg.com.au

Valmont Australia: 8–10 Antimony Street, Carole Park, QLD 4300
Ph: 07 3879 3622; Fax: 07 3879 3655 www.valmont.com

Measuring & Control Equipment (MACE):
1/2A Pioneer Avenue, Thornleigh, NSW 2120
Ph: 02 9980 2692; Fax: 02 9980 2651 www.macequip.com.au

INSURANCE & LEGAL SERVICES

AON Risk Services: PO Box 200 Moree, NSW 2400
Ph: 02 6752 3133; Fax: 02 6752 3684 www.aon.com.au

The Law Company Pty Ltd: PO Box 1023, Tamworth, NSW 2340
Ph: 02 6767 2000; Fax: 02 6766 5027 www.thelawcompany.com.au

Wesfarmers Federation Insurance: Locked Bag 1, Bassendean WA 6934
Ph: 08 9273 5447; Fax: 08 9378 2172 www.wfi.com.au

MACHINERY MANUFACTURERS, SALES & SUPPLIERS

Agco: 615 Somerville Road., Sunshine, VIC 3020
Ph: 03 9313 0269; Fax: 03 9311 8171 www.agco.com.au

Bonfiglioli Transmission Aust: PO Box 1000, Plumpton, NSW 2761
Ph: 02 8811 8000; Fax 02 9675 6605 www.bonfiglioli.com.au

Bogballe Spreaders: PO Box 820, Bacchus Marsh, VIC 3340
Ph: 03 5367 5254; Fax: 03 5367 5305 www.bogballe.com

Cat Challenger: 615 Somerville Road., Sunshine, VIC 3020
Ph: 03 9313 0269; Fax: 03 9311 8171 www.agco.com.au

Case IH: Kurrajong Rd., St Marys, NSW 2760
Ph: 02 9673 7777; Fax: 02 9833 1031 www.cnh.com

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SECTION 6
SUPPLIERS' DIRECTORY

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DMS Auction Services: Schiller Street, Wagga Wagga, NSW 3650
Ph: 02 6921 7255; Fax: 02 6921 7256 www.dmsauctions.com.au

Finch Engineering: Moffatt Street, Kamkillenbun, QLD 4406
Ph: 07 4663 4221; Fax: 07 4663 4290

John Deere Limited: 166-170 Magnesium Drive, Crestmead, QLD 4132
Ph: 1800 800 981; Fax: 07 3803 6555 www.deere.com.au

Kelly Engineering: PO Box 100, Booleroo Centre, SA 5482
Ph: 08 8667 2253; Fax: 08 8667 2250 www.kellyengineering.com.au

MacDon Australia Pty Ltd: PO Box 243, Greensborough, VIC 3088
Ph: 03 9432 9982, Fax: 03 9432 9972

New Holland: Kurrajong Rd., St Marys, NSW 2760
Ph: 02 9673 7777; Fax: 02 9833 1031 www.newholland.com

T J Welding: PO Box 311, Pittsworth, QLD 4356
Ph: 07 4693 1747; Fax: 07 4693 1747

Vanderfield Machinery: 21 Carrington Road, Toowoomba, QLD 4350
Ph: 07 4633 4822, Fax: 07 4633 1853 www.vanderfield.co.au

TILLAGE MANUFACTURERS & SUPPLIERS

AgriSpares Pty Ltd: 104 Levels Road, Cavan, SA 5094
Ph: 08 8260 5419, Fax: 08 8260 5622

Bob C Healey: PO Box 50, Deniliquin, NSW 2710
Ph: 03 5884 3438; Fax: 03 5884 3676

CastPoints Pty Ltd: 3 Stonehaven Street, Toowoomba, QLD 4350
Ph: 07 4638 7024, Fax: 07 4638 7165

Chris Grow Engineering Pty Ltd: 1170 Greenhill Road, Uraidla, SA 5142
Ph: 08 8390 1759; Fax: 08 8390 1502

Crommelins Machinery Sales:
Ph: Perth 08 9350 5588; Syd 02 4567 0195; Melb 03 9859 9288;
Bris 07 5545 1469; Adel 08 8262 2022 www.crommelins.com.au

Daybreak Equipment: PO Box 735, Dalby, QLD 4405
Ph: 07 4332 1374, Fax: 07 4662 3645 www.daybreak.com.au

Dunstan Farmers Engineering Pty Ltd: PO Box 178, Kerang, VIC 3579
Ph: 03 5452 1488; Fax: 03 5452 1849 www.dunstanfamers.com.au

Ellis Equipment: 109 Kingaroy Street, Kingaroy, QLD 4610
Ph: 07 4162 1244; Fax: 07 4162 4682

Excel Agriculture: Cnr Buckland & Yaldwin Sts, Toowoomba QLD 4350.
Ph: 07 4636 9100; Fax: 07 4636 9140 www.excelagr.com.au

G & C Pty Ltd: 1921 Thunderbolt Street, Uralla, NSW 2358
Ph: 02 6775 5540; Fax: 02 6775 5595 www.gcagriculture.com.au

Gardner Denver Australia Pty Ltd: PO Box 3598, Nunawading, VIC 3131
Ph: 03 9874 2900; Fax: 03 9874 2899 www.syltone.com.uk

Gason Pty Ltd: Blake St, Ararat, 3377
Ph: 03 5352 2151; Fax: 03 5352 2581 www.gason.com.au

Gessner Industries: 20 Molloy Street, Toowoomba, QLD 4350
Ph: 07 4634 3477; Fax: 07 4633 1973 www.gessner.com.au

Great Western Tillage: PO Box 665, Toowoomba, QLD 4350
Ph: 07 4635 3091, Fax: 07 4635 0844 www.gtwtillage.com.au

Harper's Stubble Cruncher: 'Taravale', Ariah Park, NSW 2665
Ph: 02 6973 2130, Fax: 02 6973 2140 www.stubblecruncher.dragnet.com.au

Holland Hitch (Australia) Pty Ltd: PO Box 63, Melton, VIC 3337
Ph: 03 9743 6799, Fax: 03 9743 6763 www.hollandhitch.com.au

Landpower: 181 Boundary Road, Laverton North, VIC 3026
Ph: 03 9369 1188; Fax: 03 9369 1944 www.landpower.com.au

Manutec Pty Ltd: 30 Jonal Drive, Cavan, SA 5094
Ph: 08 8260 2277; Fax: 08 8260 2399 www.manutec.com.au

NDF Ag Design: PO Box 206, Narromine, NSW 2821
Ph: 0429 649 040, Fax: 02 6889 1293 www.ndf.com.am

Rod Frahm Machinery: Clifton, QLD 4361
Ph: 07 4697 3411; Fax: 07 4697 3191 www.rodfrahmmachinery.com.au

Spring Ridge Engineering: Darby Road, Spring Ridge, NSW 2343
Ph: 02 6747 3846, Fax: 02 6747 3900

Vin Rowe Farm Machinery: 3 Endeavour Street, Warragul, VIC 3820
Ph: 03 5623 1362; Fax: 03 5623 4314 www.vinrowe.com.au

MARKETING & INFORMATION SERVICES

ABB Grain Ltd: PO Box 1169, Adelaide, SA 5001
Ph: 08 8304 5189, Fax: 08 8124 0110 www.abb.com.au

Australian Crop Accreditation Services: (North) 0419 716 951;
(South) 03 5384 6272; (West) 08 9245 6891 www.acas.on.net

Australian Stock Exchange: PO Box H224, Australia Square, Sydney, NSW 1215 Ph: 02 9227 0848; Fax: 02 9227 0667 www.asx.com.au

ProFarmer Australia: Ph: 1300 302 143 www.profarmer.com.au

WheatCalc: Freecall: 1300 133 162 www.agcentric.com.au

MOTOR VEHICLES & TRUCKS

Brown and Hurley Group: 266 Summerland Way, Kyogle, NSW 2474
Ph: 02 6632 1155; Fax: 02 6622 1644 www.brown-hurley.com

Spraying Equipment & Supplies

Aerial Agriculture Association of Aust.: PO Box 647, Dickson, ACT 2602
Ph: 02 6262 8256; Fax: 02 6262 8257 www.aerialag.com.au

Felco Manufacturing: PO Box 440, Toowoomba, QLD 4350
Ph: 07 4630 2213; Fax: 07 4630 2183

Palombo Industries: Lot 2, Boggabilla Road, Moree, NSW 2400
Ph: 02 6752 8028; Fax 02 6752 3798

Rapid Plas: PO Box 7003, Tamworth, NSW 2348
Ph: 1800 816 299; Fax: 02 6766 1062

TeeJet Australasia: PO Box 7138, Geelong West, VIC 3218
Ph: 03 5223 3020; Fax: 03 5223 3015 www.teejet.com

REAL ESTATE

Ray White Rural: GPO Box 2433, Brisbane, QLD 4001
Ph: 07 3231 2237, Fax: 07 3831 9125

Serviced Offices International: Level 14, Lumley House,
309 Kent Street, Sydney NSW 2000
Ph: 02 9994 8000; Fax: 02 9994 8008 www.serviced.com.au

SEED SUPPLIERS & PLANT BREEDERS

Pacific Seeds: 268 Anzac Avenue, Toowoomba, QLD 4350
Ph: 07 4690 2666; Fax: 07 4690 2622 www.pacificseeds.com

Pioneer Hi-Bred Australia: 204 Wyreema Road, Toowoomba, QLD 4350
Ph: 07 4637 2966; Fax: 07 4637 2977 www.pioneer.com/australia

STORAGE & GRAIN HANDLING

Allied Grain Systems Pty Ltd: PO Box 1448, Young, NSW 2594
Ph: 02 6382 7474, Fax: 02 6382 5149 www.alliedgrainsystems.com.au

Assorted Bag Closer Services: PO Box 91, Williamstown, VIC 3016
Ph: 03 9399 9171; Fax: 03 9399 9013

Australian Grain Harvesters' Association: PO Box 555, Yenda, NSW 2681
Ph: 0427 614 549, Fax: 02 6968 1741

Beulah Enterprises: Boorowa Road, Cowra, NSW 2794
Ph: 02 6345 3270; Fax: 02 6345 3280

C E Bartlett Pty Ltd: Ring Road, Ballarat, VIC 3350
Ph: 1800 639 966; Fax: 03 5338 1241 www.bartlett.net.au

Finch Engineering: Moffatt Street, Kaimkillenbun QLD 4406
Ph: 07 4663 4221; Fax: 07 4663 4290

Geronimo Farm Equipment: PO Box 862, Cowra 2794
Ph: 02 6341 3369; Fax: 02 6342 1430 www.geronimo.com.au

Kotzur (Modern Engineering & Construction): 56-60 Commercial Street,
Walla Walla, NSW 2659
Ph: 02 6029 4700; Fax: 02 6029 2307 www.kotzur.com

MPH Rural: PO Box 15995, Brisbane City East, QLD 4002
Ph: 07 3210 0230; Fax: 07 3210 0346 www.mphrural.com

Muchea Rural Sheds: Great Northern Highway, Muchea, WA 6501
Ph: 08 9571 4173; Fax: 08 9571 4046 www.muchearuralsheds.com.au

Silo Bags Pty Ltd: 40 Mercer Road, Armadale, VIC 3143
Ph: 03 5726 5251; Fax: 03 5726 5324

Silo Sealing & Waterproofing: RSD Sandy Ck Road, Maldon VIC 3463
Ph: 03 5475 1333; Fax: 03 5475 1333 www.silosealing.com

Wahroonga Enterprises Pty Ltd: PO Box 45, Marnoo, VIC 3387
Ph: 03 5359 2362; Fax: 03 5359 2205

Westfield Augers: PO Box 541, Dalby, QLD 4405
Ph: 07 4663 5199; Fax: 07 4663 5205

TARPS & WORKSHOP SUPPLIES

Darling Downs Tarps: Industrial Avenue, Toowoomba West, QLD 4350;
Ph: 07 4634 2166; Fax: 07 4634 7725 www.ddt.com.au

Jaylon Grain Covers: 11 Hunt Street, Malaga, WA 6090
Ph: 08 9249 2088; Fax: 08 9249 3690 www.jaylon.com.au

Quee Holdings: 69 Pangee Street, Nyngan, NSW 2825
Ph: 02 6832 2144; Fax: 02 6832 2155 www.bolts.com.au

SPRAYERS

Goldacres Trading Pty Ltd: 1-3 Northwestern Road, St Arnaud, VIC 3478
Ph: 03 5495 1166, Fax: 03 5495 2239 www.goldacres.com.au

Moree Spray Equipment: Lot 2 Boggabilla Road, Moree, NSW 2400
Ph: 02 6752 8028; Fax: 02 6752 3798

Rizziole Sprayers Australasia Pty Ltd: 'Ngahuia', Pittsworth, QLD 4356
Ph: 07 4693 8122, Fax: 07 4693 8124

WORKSHOP/SHEDS

Nut & Bolt Factory: 20 Pechey Street, Toowoomba, QLD 4350
Ph: 07 4659 8855, Fax: 07 4659 8088 www.nutandboltfactory.com.au

Tri-Steel Industries: PO Box 7001, South Dubbo, NSW 2830
Ph: 02 6885 6478, Fax: 02 6885 2399 www.tri-steel.com.au

TRAVEL & RECREATION

Preston's Inland & Coastal Fishing Charters & Tours:
Ph:/Fax: 08 8931 0777 www.icfish.com.au

Charlton's Tackle 'n' Bait: Ph: 07 3818 1677; Fax: 07 3818 1153

Dinner Plain Central Reservations: Victorian Alps ski & summer resort.

Dinner Plain (Mt Hotham) Ph: 1800 670 019; www.dinnerplain.com.au

WEATHER FORECASTING

Lamond Weather Services: 78 Oceanic Avenue, Floreat, WA 6014
Ph: 08 9284 1222; Fax: 08 9285 8616 www.austweather.com.au

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