Australian Government

Cotton Research and Development Corporation

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# Annual Report 2008–2009

*"An Environment of Change"*

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Australian Government

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# Annual Report 2008–2009

Australian Government
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# LETTER OF TRANSMITTAL

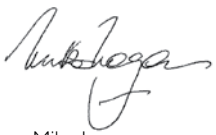
5 October 2009

The Hon Tony Burke MP
Minister for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600

Dear Minister

It is with great pleasure that I submit the Corporation's Annual Report for 2008–09, prepared in accordance with the provisions of section 28 of the *Primary Industries and Energy Research and Development Act 1989* and section 9 of the *Commonwealth Authorities and Companies Act 1997*. Under section 9 of the *Commonwealth Authorities and Companies Act 1997*, CRDC Directors are responsible for the preparation and content of the Annual Report being made in accordance with the Finance Minister's orders. The report of operations has been prepared in accordance with a resolution of the Directors on 18 August 2009.

Yours sincerely



Mike Logan
**Chair**

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# Executive Summary

## FROM THE CHAIR AND EXECUTIVE DIRECTOR

### *"An Environment of Change"*

The 2008–2009 year was the first directed by the CRDC Strategic R&D Plan 2008–2013. The five years of R&D investment under the previous R&D Plan were conducted entirely under the influence of the longest and increasingly severe drought on record. In retrospect, though, it is clear that these harsh conditions brought their own opportunities to institute R&D-driven adaptations and improvements that will forge a future for the industry, based on a new sustainable competitive advantage, which is distinctly different but perhaps equally bright.

#### Challenging Times

During the period of the previous plan, 2003–2008, cotton farming systems became significantly more complex because of the need to respond to new operating conditions such as climate change, water availability and the boom in soft commodities (other crops). While total production waned, the industry achieved remarkable productivity growth, with yield gains totalling 25 per cent. Farms are now typically more energy efficient, using finely tuned management and agronomic decisions that derive increasingly greater efficiency of water use under irrigation or rain-fed (dryland) systems. Best practice across a farm is now more likely to include varying row spaces, annual irrigation practices and crop agronomy throughout the season in response to changing water allocations, seasonal rainfall and the market prices for cotton relative to other crops on the farm. Best practice also commenced an evolution to extend beyond environmental performance to assure the high quality of Australian cotton throughout the industry supply chain.

#### Lower production

Historically low cotton production over the period also meant a large reduction in the funds CRDC has had to invest in R&D over the past several years, inhibiting the capacity to meet the growing R&D needs. Despite this, prudent management by CRDC has ensured core R&D capacity was retained, while at the same time the Corporation met the financial challenges by improving the efficiency and effectiveness of its operations.

The reporting year saw the first signs of a recovery in the area planted to cotton across the industry. The accumulated impact of persistent drought across the regions where Australia's cotton is grown resulted in the 2007–08 cotton crop being the smallest in over 30 years. Improved rainfall during the 2008-09 season saw the planted area bounce back to 160,000 hectares. While that was still less than half pre-drought levels, yields of irrigated and dryland crops continued to trend upwards in all districts. This recovery in area planted, together with continued improvements in productivity, serve to highlight the great resilience and adaptive capacity that underpins the Australian industry as it prepares for the new challenges of climate change.

#### New Strategic Plan

Under the new Strategic Plan, a three-part R&D strategy strategically addresses future cotton farming systems, a responsive value-chain beyond the farm gate that delivers greater value to industry participants and an industry that has the human capacity to apply and adopt the technologies and knowledge in which it invests.

#### Human Capacity aiding adoption

CRDC's attention has also turned to how R&D outputs of new technologies, practices and knowledge could be better delivered, and through which channels, as key considerations in maximising the effectiveness of future R&D investments.

In 2008–09 a stronger emphasis was placed on the development of human capacity to better facilitate R&D adoption. Improving education, professional development and training raises the skills necessary to achieve this.

CRDC invested in industry participation in skills-related processes, particularly by young people, women and cotton communities (including indigenous members of those communities). Skills development is an important element of a strategy that seeks to result in attraction, retention and development of the best and brightest for our agricultural sector and, in particular, cotton production.

## Value Chain

CRDC investment in value-chain R&D during 2008–09 was principally for the outcome of better intelligence on cotton-mill and market needs. New conversations, leading to a shared and greater understanding throughout the industry of its value-chain, are vital early steps in facilitating the application of R&D innovations in creating greater value to stakeholders. The opportunity to conduct R&D with international spinning mills and brand owners in demonstrating the value of the Australian cotton industry world's best production practices, its unique fibre qualities and R&D technologies is now widely recognised.

## Farming Systems

R&D investments in 2008–09 within farming systems have successfully targeted the need for continuous improvement in productivity growth, environmental performance and biosecurity. A background of global financial crisis, water scarcity, climate change and increasing concerns for food and fibre security has placed rising importance on the outcomes of R&D in meeting industry, community and national challenges. Collaboration has grown in recognition of these linkages and benefits in developing integrated R&D responses.

## Outcomes

The results of this first year of the plan, 2008–09, have been both concrete and promising, from the exciting development of new technologies, practices and knowledge gained, to capacity built through new alliances and more skilled people. Throughout, the partnership in R&D between the Australian cotton industry and Australian Government has underpinned the capacity of the cotton industry and its communities to adapt to the ongoing environment of change with optimism.

**Mike Logan**
Chair

**Bruce Finney**
Executive Director

CRDC's Chair, Mike Logan, and Executive Director, Bruce Finney

# THE YEAR'S HIGHLIGHTS

## CORPORATE HIGHLIGHTS

### A new strategic plan in action

In 2008–09, CRDC staff and Directors had the responsibility and privilege of commencing the implementation of the Strategic Plan 2008–2013: a plan that broadly considers the challenges and opportunities for the industry's future. The new plan was developed through a comprehensive consultative process that involved participants throughout the industry supply chain and incorporated Government and industry R&D priorities, in addition to advice from the Minister and the Australian Government Department of Agriculture, Fisheries and Forestry.

During the reporting year it was clear that this widespread consultative process has meant that the industry sees itself as a genuine stakeholder in achieving the plan's vision of *'a globally competitive and responsible cotton industry'* by facing the new challenges of competition for land and water, issues relating to a changing climate and the market demands for better fibre quality.

### A change in industry stakeholder

A merger during the year between the CRDC's gazetted industry stakeholder, the Australian Cotton Growers Research Association (ACGRA), and the industry representative body, Cotton Australia, saw the 'new' Cotton Australia formally take over all CRDC industry stakeholder roles. While ACGRA had reviewed all 2008–09 R&D proposals on behalf of the industry earlier in 2008, in early 2009 Cotton Australia reviewed planned activities for the 2009–10 year.

### A new Board appointed

The reporting year saw the appointment by the Minister for Agriculture, Fisheries and Forestry, the Hon Tony Burke MP, of a new Board in October 2008. Leith Boully was appointed Vice Chair with Mike Logan continuing his role as Chair. New Directors between them bring a wide range of skills and experience that will enable the Corporation to implement the Strategic R&D Plan 2008–2013 effectively and meet the industry's future directions and challenges as they arise. CRDC thanks retiring Directors Dick Browne, David Conners and Dr TJ Higgins for their immense contribution to the previous Board.

### A review of collaboration opportunities

CRDC and GRDC completed a preliminary investigation of the opportunities for greater collaboration in R&D, focusing on opportunities for improved R&D outcomes. This review considered options ranging from enhancing current research interactions to the formal merger of the entities. The investigation concluded that for grains and cotton there are significant areas of commonality where R&D collaboration would reap benefits but, equally, there are crop and industry-specific research needs, particularly relating to the supply (value) chain, where it would not. The Australian cotton industry, represented by Cotton Australia, did not support the option of a full merger of CRDC and GRDC on the basis that it may undermine

A Board meeting in Geelong gave new and reappointed CRDC Directors the chance to familiarise themselves with the progress within CRDC Value Chain R&D investments at CSIRO Materials Science and Engineering

the focus, responsiveness and effectiveness of cotton grower investment in R&D. Separately, the investigation did not identify a cost-benefit from structural changes such as establishing a new entity, or the partial and full merger options. CRDC and GRDC are addressing the opportunities identified for improvement to existing collaboration through better alignment of planning and investment processes at a management level in farming systems research, discussed on page 6.

Additionally, CRDC was involved with all RDCs in an investigation of the opportunities to harmonise the efficiency and effectiveness of administration resources and practices between RDCs and, in general, within public sector research, development and extension. CRDC actively supports the ongoing development of approaches to issues such as improving administration, standardising contracts, intellectual property management, program management and information systems.

### A new program manager

Tracey Farrell began work at CRDC in December 2008 as Manager for Farming Systems Investment. Tracey, a 2008 Australian Cotton Industry Awards Finalist, brings a wealth of experience to the role, having worked with the Office of the Gene Technology Regulator. Most recently, she was a District Agronomist for the NSW Department of Primary Industries (now Industry & Investment NSW) for five years, providing advice and support to cotton growers and the local industry.

New Farming Systems Program Investment Manager, Tracey Farrell

## RESEARCH AND DEVELOPMENT HIGHLIGHTS

### Skills, education and uptake of technology

Our Human Capacity program produced exciting developments in 2008–09. The year saw scoping exercises translate the heightened awareness of the need for skills enhancement and professional development to extend beyond cotton producers to people involved in the entire value chain. This, in turn, led to plans of action. The scoping studies have identified key needs, which will be extended through new delivery channels for knowledge, with more streamlined processes. Innovation forums have served to identify research gaps and ensure a cohesive industry-wide approach to R&D.

The reporting year saw significant moves towards best practice communication. CRDC's major industry communication tool, *Spotlight* magazine has moved well beyond its initial objective of informing the industry about CRDC activities to being a strategic communication tool within a wider integrated learning environment that will increasingly include e-Learning.

Five Indigenous students from Narrabri and Wee Waa High School continue to undertake paid work experience at the Australian Cotton Research Institute and CRDC in Narrabri as part of a school-based traineeship program developed by CRDC, with the assistance of the Aboriginal Employment Strategy and the Cotton CRC.

### Contemporary market intelligence

New industry supply chain partnerships were developed with CRDC's support in 2008–09. The participants collectively explored and built new market knowledge of the opportunities to add value to the Australian cotton industry with premium products and new market segments into the future. Bringing together Australian cotton growers, agribusiness, researchers, international spinners and brand owners to explore product and market innovation continues to be a significant capacity building initiative.

## Integrating grain and cotton farming systems R&D

The CRDC R&D investment and Grains R&D Corporation (GRDC) Practices Program management teams met to consider opportunities for a broad range of collaborations. These included progress with current and planned joint or collaborative investments: for example, existing collaborations including the National Program for Sustainable Irrigation, Farm Health and Safety, CCRSPI, greenhouse gas emissions, monitoring *Helicoverpa* resistance, management of glyphosate resistance in cotton/grain systems and participation in the glyphosate sustainability working group, as well as two new projects to be contracted for commencement in the 2009–10 financial year on reducing spray drift, and potassium and phosphorus nutrition R&D.

Opportunities were also identified for new collaborative programs or projects and extending programs beyond those that are only focused on cotton or grains at present. Some of the key areas where opportunities exist for greater collaboration include Central and North Queensland grain/cotton/sugar farming systems, the National Invertebrate Pest Initiative (NIPI), national integrated weed management initiative, best management practices packages, sabbaticals for senior researchers, extension programs and sharing methodology on program evaluation and impact analysis. Over 30 issues were identified for development in 2009–10.

## New role in irrigation R&D

With the closure of Land and Water Australia announced, CRDC successfully sought to take on the Managing Agent role for the National Program for Sustainable Irrigation and will begin this role in 2009–10. CRDC believes a long-term plan and commitment to irrigation R&D that services the broad needs of agriculture is of national significance and looks forward to this role.

## Industry leadership – looking to the future

The Australian cotton industry has always been well served by its leadership; however, CRDC identified the need, in particular, to support younger industry participants – tomorrow's leaders – in enhancing their skills that will take the industry forward. Based on the success of the inaugural Australian Future Cotton Leaders Program in 2007–08, CRDC has made an ongoing commitment to leadership development through this proven approach. A further ten young people began the course in May 2009 and will complete it in the coming year.

Half of the competitively selected participants in the Future Leaders Program are women, reflecting the growing leadership role taken by women in the cotton industry and wider agricultural sector. In 2008–09, CRDC also sponsored a female cotton grower to participate in the Australian Rural Leadership Program, four women in the CSIRO Field to Fabric course and continued sponsorship of one to complete the Cotton Catchment Communities CRC Cotton Production Course at The University of New England.

CRDC's Executive Director, Bruce Finney, with administrative staff, Dianne Purcell, Margaret Wheeler and Lee-Anne Melbourne. Chloe Pokarier (front) is gaining paid work experience at CRDC as part of a school-based traineeship program developed by CRDC with the Aboriginal Employment Strategy and Cotton CRC

# EFFICIENCY AND EFFECTIVENESS

'Improving accountability for expenditure on research and development activities' is an object of the *Primary Industries and Energy Research and Development Act 1989*. CRDC is committed to the optimisation of its business practices and use of resources in maximising the outcomes from its investments in research, development and its application. CRDC considers the balance of efficiency and effectiveness in its expenditure by taking a holistic business approach that recognises not only the costs, but also the risks and returns in proactively managing R&D investments for defined outcomes.

During the year, CRDC reduced its employee and supplier costs by 12 per cent in alignment with reduced total R&D expenditure and activity. Concurrently, a strategy of leveraging CRDC investment in a broader portfolio of rural R&D ensured the Corporation could continue to maximise the delivery of R&D outputs and outcomes sought by Government and industry stakeholders under the CRDC Strategic Plan 2008-13.

## Delivering return on investment

One of the Corporation's Principles of Operation is to strive to maximise return on investment of industry and public funds invested through our Corporation.

With significant taxpayer dollars invested in industry R&D through the 16 Rural Research and Development Corporations, the Council of Rural Research and Development Corporations' Chairs developed a rigorous external process in 2006 to determine the value of these R&D investments to the industries involved and to the Australian taxpayers. CRDC submitted two projects for analysis: the deployment of *Bt* transgenic cotton and related research inputs across a number of scientific areas and the development of tools and techniques to measure irrigation water use efficiency more accurately. Reports released in December 2008 confirmed a high level of return on public and industry investment in these areas, as reported in the last Annual Report.

CRDC has now submitted three randomly selected strategies from the previous Strategic R&D Plan for 2003–2008 for analysis under this process:

- The People and Knowledge Program, Strategy 1: Support and coordinate a highly trained, efficient and effective Cotton Extension Team
- The Farming Systems Program, Strategy 1: Improve water use efficiency on farms using existing and new infrastructure, new tools and technologies
- The Value Chain Program, Strategy 2: Promote agronomic and management practices, including the Best Management Practices (BMP) program, which preserve and protect optimal fibre quality characteristics

The return on investment analyses for these areas are not yet available and will be reported in 2009–10.

In 2008, CRDC engaged the BDA Group to conduct a triple bottom line evaluation of R&D investments over the period of the previous strategic plan (2003-2008). The independent study, released in December 2008, found that a key to success was the collaborative approach taken by CRDC in managing R&D investments. Over the five years to 2008, CRDC funded around 20 per cent of the total expenditure in cotton industry R&D but was involved in around 60 per cent of all cotton R&D undertaken in Australia through investment, collaboration and partnerships. Cross-industry collaboration between cotton and broader rural industry R&D activity also grew substantially during the period.

The BDA study sampling major projects managed by CRDC in the five years found that one in four projects demonstrated a major economic, social or environmental impact. The BDA analysis showed $500 million returned to stakeholders from the major projects studied and a minimum return of $813 million from all projects over the period.

Results from this study highlighted the ongoing impact of R&D as a key driver in productivity growth and improved environmental performance. An important aspect of improved performance measured at the farm level was the capacity of producers to adapt to climate change, economic and environmental challenges.

BDA highlighted major impacts from CRDC's investment as being the developments in BMP, water use efficiency, Fusarium wilt management, *Bt* resistance stewardship, EMS Pathways and cotton breeding, and identified a further 13 important project impacts.

Approximately half the increases in yield and productivity resulted from the CRDC investments in the CSIRO plant breeding program; however, it is important to note that the remaining half was due to cotton farmers' management and application of the improved knowledge and technology available as a result of CRDC R&D investments. These technologies span the areas of water use efficiency, improved agronomy and nutrition, disease and pest management and the rotations of cotton with other crops. This led the study to conclude that investment in R&D provided the main impetus to the continued improved productivity of the cotton industry.

Beyond the farmgate, the report identified continuous improvement in cotton fibre quality as consolidating the market for Australian cotton, with improvements to contamination status, together with improved fibre performance metrics of length, strength and maturity.

## Collaboration and Cooperation

CRDC continued to seek to build collaborative links and partnerships in 2008–09, where these are likely to maximise investment outcomes or where there is a need to respond to a broader issue or challenge facing agriculture or the cropping sector.

Collaboration with other Rural R&D Corporations (RDCs) at both strategic and conceptual levels is an important means by which CRDC leverages higher returns from its investments. CRDC participates in activities including joint national strategic R&D planning with the Primary Industries Standing Committee (PISC), communication and impact evaluation (see page 7 for further information on joint return on investment activities). A great deal of collaboration and cooperation takes place through the Council of Rural Research & Development Corporations' Chairs, which is a forum for supporting the RDCs to collectively maximise their ongoing contribution to a sustainable and profitable Australian agricultural sector.

This collaboration extends well beyond co-investment: cooperation, coordination and communication are equally important to avoiding duplication in research and maximising the impact of research outcomes. The scale of this collaboration extends from large national research programs to small local projects and administration, to bring a national focus in dealing with climate change, soil health, irrigation, crop protection, farm safety and human capacity. CRDC has participated in joint activities that include national strategic R&D planning with the Primary Industries Standing Committee, impact evaluation and communication. A broad outline of CRDC's joint activities with other RDCs can be found in the table opposite.

In 2008–09, recognising that cotton is almost always grown as part of an integrated farming system involving grains, CRDC and GRDC established a formal investigation exploring collaboration opportunities. The results of the investigation are continuing to be implemented with R&D building on a range of existing collaborations in farming systems areas such as nutrition, pest management, irrigation efficiency and spray management.

As in the previous year, CRDC's largest financial collaborative investment in collaboration in 2008–09 was through the Cotton Catchment Communities CRC. CRDC invested four million dollars in the

Dr Paula Jones, Cotton CRC, Rohan Boehm, CRDC, Gordon Stone, National Primary Industry Centre for Science Education (PICSE) program manager, and Associate Professor David Russell, national director, PICSE

CRC, with all but $100,000 of that tied to specific projects which were required to directly address both CRDC's and the CRC's strategic objectives through this collaborative research framework. At the local level community collaboration in 2008–09 included continuation of an Aboriginal school-based traineeship program, developed by CRDC with assistance from the Aboriginal Employment Strategy. CRDC collaborated with external organisations such as Rotary in supporting a range of science-related activities for primary and secondary school students.

Below is a table summarising CRDC collaboration with other Rural Research and Development Corporations.

Further information about collaborations can be found in 'Climate Change', beginning on page 12.

## Collaboration with Rural R&D Corporations 2008–09

| Theme, Program or Project | Nature of Collaboration |
|---|---|
| Council of Rural RDC Chairs | Collaboration with all RDCs in communication, coordination and collaboration between RDCs at the broadest level. Development of a common R&D Evaluation Framework. |
| Communications Managers | Using cross-RDCs communication opportunities to promote our rural industries and R&D achievements. |
| Business managers | Cooperation with all RDCs to improve administration, contracts, program management systems and Intellectual Property management in alignment with the Council of RDCs harmonisation project. |
| Support of the Australian Agricultural and Natural Resources Online (AANRO) Database | CRDC continues to invest in the Australian Agriculture and Natural Resources On-line (AANRO) database in 2008–09. AANRO is an integrated knowledge discovery tool for agriculture and natural resources and is a joint initiative of the RDCs, PISC and the Natural Resource Management Standing Committee (NRMSC). |
| Climate Change | The National Climate Change Research Strategy for Primary Industries (CCRSPI) involves all RDCs, PISC agencies, CSIRO and affiliations with several universities. CCRSPI has played an important role in identifying cross industry issues in relation to climate change that require further R&D investment.<br>CCRSPI has also played an important role in coordinating the establishment of successful broad R&D collaborative programs and projects dealing with carbon emission and adaptation to climate change funded under the Australian Government Department of Agriculture, Fisheries and Forestry's Climate Change Research Program. |
| National Program for Sustainable Irrigation (NPSI) | NPSI involves GRDC, Horticulture Australia Ltd (HAL), the Sugar R&D Corporation (SRDC), Land & Water Australia and 12 other public and private sector partners and allows the establishment of cross-industry investment opportunities for irrigated agriculture. CRDC has benefited directly from investments in training and improved capacity to measure and manage water efficiently. The partnership has allowed targeted co-investment with GRDC in particular. |

| Theme, Program or Project | Nature of Collaboration |
|---|---|
| Collaborative Partnership for Farming and Fishing Health and Safety | CRDC continued this co-investment with the Rural Industry R&D Corporation (RIRDC), GRDC, SRDC, the Fisheries R&D Corporation and the Australian Government Department of Health and Ageing in this program which began in 2007–08, replacing the joint venture Farm Health and Safety R&D Program, which focused on cropping-based industries. The Partnership invests in research and development to improve the physical and mental health of farming and fishing workers and their families and improve the safety of the environment and work practices in these industries. |
| Value Chain | During the year CRDC collaborated with Australian Wool Industries (AWI), Cotton Australia and the Department of Agriculture, Fisheries and Forestry to promote 2009 as the International Year of Natural Fibres.<br>CRDC initiated discussions with AWI regarding opportunities for product innovation collaboration using Australian wool and cotton, as well as building contemporary textile market knowledge (including an assessment of likely climate change impacts on global markets.) |
| Life Cycle Assessment – developing a common methodology for Agriculture | CRDC, RIRDC, Dairy Australia, Sugar Research and Development Corporation (SRDC), Australian Pork Limited, RIRDC Chicken Meat Program and Meat and Livestock Australia collaborated during the year to scope what would be required to develop more standardised life cycle assessment methodology for Australian rural industries. The project included literature review, a stakeholder workshop to discuss LCA methodology and a final report with recommendations. |
| Impact of emissions trading on agriculture | CRDC, AWI and Dairy Australia commissioned the Australian Farm Institute to lead an initial study into the potential broad economic impacts of an Emissions Trading Scheme on Agricultural industries in Australia. |
| Collaboration and R&D investment opportunities for cotton and grain | During the year CRDC and GRDC commissioned a joint study into how stronger or more formal collaborative links could be established between the two corporations. It concluded that the most effective approach was to encourage biannual meetings of the key program managers of both corporation to discuss, identify, develop and implement closer collaborative investments and actions particularly in the areas of most common interest such as farming systems and capacity building. The first meeting of the two program management teams took place in May 2009. |
| Spray Drift Minimisation | As the areas under conservation farming practices and GM herbicide tolerant crop technology increase in cotton/grain producing regions so too does the potential for spray drift damage to susceptible crops. During the year CRDC and GRDC co-invested in maps to indicate the location of farms where cotton is grown and in delivering spray application management training workshops to growers and agronomic advisors. |

| Theme, Program or Project | Nature of Collaboration |
|---|---|
| Crop Nutrition | In preparation for a new collaborative project on Phosphorous and Potassium nutrition to be established in 2009–10, CRDC and GRDC co-invested in 2008–09 to increase soil sampling in a range of sites in southern Queensland and Northern NSW. |
| Insecticide Resistance Monitoring and Management | During the year CRDC and GRDC continued to co-invest in R&D to monitor resistance in *Helicoverpa armigera* and *Helicoverpa punctigera* to a range of pesticides commonly used on both crops. |
| Shared Insect management issues | During the year the relevant program investment managers from CRDC, GRDC and HAL met to discuss areas where closer collaboration would benefit all our industries. Opportunities identified include: management of Silverleaf Whitefly and potential for greater integration of pest programs through initiatives such as GRDC's National Invertebrate Pest Initiative. |
| Shared weed management issues | CRDC is collaborating with GRDC on a weed management project in southern Queensland. In particular, close interaction has begun within this project on the issue of glyphosate resistance management. |
| Education | CRDC is collaborating broadly with rural RDCs and universities through the National Primary Industry Centre for Science Education (PICSE). This national program is building on a decade of success in attracting high school students into science education, and beyond that, to careers in science that support agriculture. Other rural RDCs co-investing in PICSE are GRDC, FRDC, Dairy Australia, RIRDC and HAL. The universities involved are University of Tasmania, University of Western Australia, University of New England, University of Southern Queensland, University of Sunshine Coast and Flinders University. |

Discover natural fibres 2009

Brenda McGahan, CEO of Australian Wool Innovations, with Adam Kay, CEO of Cotton Australia, at Sydney's National Maritime Museum for the Australian launch of the International Year of Natural Fibres

# CLIMATE CHANGE

In seeking to improve profitability, the Australian cotton industry recognises the connections between improved productivity, natural resource management and addressing climate change. The first Australian Government National Research Priority, 'An Environmentally Sustainable Australia', has a specific priority goal of responding to climate change and variability; however, a range of its other priority goals relating to issues such water use, industry transformation and the reduction and capturing of emissions have enormous applicability to the CRDC R&D effort to adapt to and/or mitigate the impacts of climate change within the Australian cotton industry. Similarly, this R&D addresses two of the Government's Rural R&D Priorities: Climate Variability and Climate Change, and Natural Resource Management. Hence, CRDC investment in climate change is embedded across the breadth of its investments and not simply the discrete climate-focused projects reported in the tables starting on page 13.

Cotton farmers, and thus the CRDC research effort, have always had to adapt to climate variability as a normal part of their business. This means the focus on climate change has enhanced and broadened, rather than fundamentally changed, R&D directions that have been followed for a number of years. This applies particularly since the introduction and ongoing expansion of the industry's environmental management system, Best Management Practices (BMP).

The CRDC Strategic R&D Plan 2008–2013 contains a specific strategy within the Farming Systems program addressing climate change issues (as did the Integrated Natural Resource Management program in the previous Strategic Plan). While the Farming Systems program remains the principal program in this respect, each program is contributing to this important subject.

## Program One: Value Chain

The Value Chain program is extending BMP beyond the farmgate to ginning, classing and storage, handling and shipping. For example, the development of improved ginning technology will lead to more energy-efficient ginning and reduced greenhouse gas emissions.

## Program Two: Farming Systems

On-farm, cotton greenhouse gas emission abatement opportunities are addressed through a range of current R&D projects that include improving fertiliser use, more efficient irrigation practices, better soil management (such as stubble retention and use of legume rotations crops) and energy use efficiency.

A range of decision support tools currently assisting in greenhouse gas abatement, developed with CRDC investment and involvement, include an on-line cotton greenhouse gas and energy use calculator for producers, NutriLOGIC to aid in efficient fertiliser use, NUTRIpak to identify nutritional problems in soils and plants, and WATERpak to improve irrigation practices.

The National Climate Change Research Strategy for Primary Industries (CCRSPI), which involves all RDCs, Primary Industries Standing Committee agencies, CSIRO and several universities, has played an important role in identifying cross-industry climate change issues that require further R&D investment. It has also played an important role in coordinating the establishment of successful broad R&D collaborative programs and projects dealing with carbon emission and adaptation to climate change funded under the Australian Government Department of Agriculture, Fisheries and Forestry's Climate Change Research Program.

## Program Three: Human Capacity

The Human Capacity program seeks to enhance the capacity of people in the cotton industry and community. It is extremely important to develop and empower the people within the industry to ensure best practice implementation and management of R&D outcomes in general, including those that impact on climate change mitigation or adaptation. For example, irrigation training courses and programs address the important issue of water use efficiency. The 2008–09 year has seen scoping and industry endorsement of new and innovative methods of providing training and education, including enhanced e-Learning. These new approaches will now be implemented.

CRDC is a foundation sponsor of the biennial Australian Cotton Conference. The name of the conference held in August 2008, *New Beginnings – Cotton in a Climate of Change*, speaks for itself as to the commitment of the cotton industry in relation to climate change issues. It was an invaluable means of disseminating CRDC research information to the many producers and cotton consultants who attended.

Below is the range of 2008–09 projects or programs across the R&D investment portfolio where planned outputs and outcomes will have an impact on climate variability and climate change:

| Project/Program | Key Collaborators/ Partners | Contribution in relation to climate change |
|---|---|---|
| Postgraduate: Subsoil nutrient management and stratification in cotton/grain rotations | LaTrobe University, GRDC, Cotton Catchment Communities CRC (Cotton CRC) | Will help researchers understand sub–soil nutritional changes linked to farming systems changes in nutrition and crop rotations to better adapt to climate change and reduce greenhouse gas emissions. |
| Postgraduate: Is the source of mirids in cotton derived from local dispersal or long distance migration? | University of Queensland (UQ), CSIRO Entomology, Cotton CRC | Will provide knowledge to improve future capacity to monitor changes in a key pest due to changes in factors such as climate/host range. |
| Postgraduate: benefits of establishing and managing native vegetation on cotton farms in the Namoi Catchment | The University of New England (UNE), Cotton CRC | Will provide landholders and CMAs with better information on how to improve the management of native vegetation and riparian areas on farm. |
| Postgraduate: Quantifying effects of maize rotation on soil quality and nutrient availability on cotton growth and yield | UQ, Industry & Investment NSW (I&I NSW), Pioneer, Grains R&D Corporation (GRDC), Cotton CRC | Will help improve management of soils to reduce losses of soil carbon and improve Nitrogen management in a farming system that is undergoing modification to adapt to reduced water availability, improve nitrogen use efficiency and reduced greenhouse gas emissions. |
| Optimal production and water use of high retention cotton and other new technologies | CSIRO Plant Industry, Cotton CRC | Will contribute to improved management of irrigated cotton and to ongoing research aimed at investigating dynamic deficits that will allow growers to adapt their water management to seasonal variability in climate and evaporative demand. |
| New ginning technology for Australian Cotton | Materials Science and Engineering (CMSE), Cotton CRC | Will contribute to the development of improved ginning technology leading to more energy efficient ginning and reduced greenhouse gas emissions. |
| Maximising the efficiency of *Bt* refuge crop | CSIRO Entomology, Cotton CRC | Refuge crops are designed to slow the potential for pest resistance to *Bt* cotton. Maintaining the efficacy of *Bt* cotton keeps pesticide use to a minimum, thus reducing greenhouse gas emissions from their manufacture and from reduced fuel used for spraying. |
| In–kind support for the adoption of BMP in the Cotton Industry in the Namoi Catchment | Cotton CRC, Namoi Catchment Management Authority (CMA) | The Cotton BMP program encourages improved water and nitrogen use efficiency. |
| Postgraduate: Subsoil nutrient management and stratification in cotton/grain rotations | LaTrobe University, GRDC, Cotton Catchment Communities CRC (Cotton CRC) | Will help researchers understand sub–soil nutritional changes linked to farming systems changes in nutrition and crop rotations to better adapt to climate change and reduce greenhouse gas emissions. |

| Project/Program | Key Collaborators/ Partners | Contribution in relation to climate change |
|---|---|---|
| Postgraduate: Is the source of mirids in cotton derived from local dispersal or long distance migration? | University of Queensland (UQ), CSIRO Entomology, Cotton CRC | Will provide knowledge to improve future capacity to monitor changes in a key pest due to changes in factors such as climate/host range. |
| Postgraduate: benefits of establishing and managing native vegetation on cotton farms in the Namoi Catchment | The University of New England (UNE), Cotton CRC | Will provide landholders and CMAs with better information on how to improve the management of native vegetation and riparian areas on farm. |
| Postgraduate: Quantifying effects of maize rotation on soil quality and nutrient availability on cotton growth and yield | UQ, Industry & Investment NSW (I&I NSW), Pioneer, Grains R&D Corporation (GRDC), Cotton CRC | Will help improve management of soils to reduce losses of soil carbon and improve Nitrogen management in a farming system that is undergoing modification to adapt to reduced water availability, improve nitrogen use efficiency and reduced greenhouse gas emissions. |
| Optimal production and water use of high retention cotton and other new technologies | CSIRO Plant Industry, Cotton CRC | Will contribute to improved management of irrigated cotton and to ongoing research aimed at investigating dynamic deficits that will allow growers to adapt their water management to seasonal variability in climate and evaporative demand. |
| New ginning technology for Australian Cotton | Materials Science and Engineering (CMSE), Cotton CRC | Will contribute to the development of improved ginning technology leading to more energy efficient ginning and reduced greenhouse gas emissions. |
| Maximising the efficiency of *Bt* refuge crop | CSIRO Entomology, Cotton CRC | Refuge crops are designed to slow the potential for pest resistance to *Bt* cotton. Maintaining the efficacy of *Bt* cotton keeps pesticide use to a minimum, thus reducing greenhouse gas emissions from their manufacture and from reduced fuel used for spraying. |
| In–kind support for the adoption of BMP in the Cotton Industry in the Namoi Catchment | Cotton CRC, Namoi Catchment Management Authority (CMA) | The Cotton BMP program encourages improved water and nitrogen use efficiency. |
| Delivering regional extension in the Darling Downs and Border Rivers | Cotton CRC, Queensland Department of Primary Industries and Fisheries (QDPIF) | Seeks to improve production efficiency, reduce environmental impacts and deal with climate variability. Improved water and nitrogen use efficiency, IPM and weed management are key focus areas for this and the following two following extension projects. |
| Delivering regional extension in NSW cotton farming systems | Cotton CRC, Cotton Seed Distributors Ltd (CSD), NSW DPI | Farming systems extension seeks to improve production efficiency, reduce environmental impacts and deal with climate variability. |
| Delivering regional extension in Central Queensland | QDPIFF, Cotton CRC | Farming systems extension seeks to improve production efficiency, reduce environmental impacts and deal with climate variability. |
| Delivering regional extension in St George/ Dirranbandi cotton farming systems | Cotton CRC | Farming systems extension seeks to improve production efficiency, reduce environmental impacts and deal with climate variability. Improved water and nitrogen use efficiency, IPM and weed management are key focus areas. |

| Project/Program | Key Collaborators/ Partners | Contribution in relation to climate change |
|---|---|---|
| Assessing limited water management strategies in cotton farming systems | Cotton CRC, QDPIF | Seeks to maximise the effectiveness of irrigation management on farms where water allocation, availability or reliability means that there is seldom sufficient water to fully irrigate all the developed land. This project will help growers identify risks and inform better decisions for use of their limited water resources including how to better manage variability in its availability due to seasonal climatic conditions. |
| Diseases of cotton IX | Cotton CRC, NSW DPI | An annual disease survey is conducted as part of this project. This allows a set of representative cotton fields to be revisited using GPS co–ordinates to ensure consistency with previous years. Presence and absence of cotton diseases is noted thus allowing the impact of new cultivars, management and climatic conditions (such as any spread to previously cooler regions) to be monitored over time. |
| Improving cotton nutrition diagnosis and N fertiliser use efficiency | Cotton CRC, CSIRO PI | On average irrigated cotton crops receive approximately 40 kg N/ha in excess of requirements for optimal production. Over 99% of the N losses from cotton farming systems are in the form of Nitrogen gas and less than 1% the greenhouse gas Nitrous Oxide. Improved nitrogen efficiency is an important contributor to reducing fertiliser costs for growers and in reducing greenhouse emissions. |
| Promoting cotton BMP adoption – General Manager | Cotton CRC, Cotton Australia | BMP has been the cotton industry's environmental management system since 1997. This project is leading the program's revision and re–development. A major focus is on making the program more valuable to growers for their whole farming enterprise. Key target areas for improved performance are nitrogen, water and energy use including how the management of these areas on farm is linked to greenhouse emissions. |
| National cotton training coordinator | QDPIF, Cotton CRC | Investment in this area is critical to ensure training to develop skills and capacity to adapt to change are well targeted and prioritised. The project will improve integration of training within the BMP program and via extension activities. Water, nitrogen management, energy use efficiency and improved biosecurity awareness and management are all key areas being addressed. All are highly relevant areas for helping the industry adapt to climate variability and change. |
| Emerging pests: developing knowledge for Green Vegetable Bugs and Aphids | Cotton CRC, CSIRO PI | Focuses on pests that have become more prominent due to the very large reduction in pesticide use associated with the widespread adoption of *Bt* cotton. While the project was established to provide capacity to deal with anticipated shifts in pest status due to changes in farming systems practice, it also maintains research capacity that is essential for dealing with pest changes which may be due to changes in climate. |
| Maintaining profitability and soil quality in cotton farming systems III | Cotton CRC, NSW DPI | This project continues to support research to understand the changes in soil properties (sodicity, water infiltration and storage capacity, soil carbon, soil nitrogen etcetera.) that are influenced by different crop rotation programs involving cotton. |

| Project/Program | Key Collaborators/ Partners | Contribution in relation to climate change |
|---|---|---|
| Linking research, extension and BMP facilitation | Cotton CRC, CSIRO PI | This project helps to improve the integration into the BMP program of knowledge and technology derived from research. Key areas for adaptation to climate change include: water, nitrogen, energy use efficiency and soils management. |
| Industry evaluation series | Cotton CRC, Crop Consultants Australia (CCA) | Data collected in these and previous surveys assist in measuring and monitoring changes in practice and how growers and consultants respond to changing conditions, resources and challenges. The 2008 report included questions on grower and consultant knowledge and attitudes to climate change. |
| Benchmarking and reducing greenhouse gas emissions and improving resource use efficiency | Queensland University of Technology | This project has allowed the use of automated, continuous measurement of greenhouse gas emissions on cotton farms and has helped to put the scale of key emissions into perspective as well as demonstrating some of the key BMPs for reducing emissions. |
| Postgraduate: Optimal irrigation of cotton via real–time, adaptive control of large mobile irrigation machines | University of Southern Queensland (USQ) | By developing technology that allows more precise application of water according to soil or climatic conditions further improvement in water use efficiency with large mobile irrigation systems would be possible. |
| Implications of *Bt* resistance in *Helicoverpa armigera* | CSIRO Entomology | Maintaining the efficacy of *Bt* cotton is directly linked to maintaining lower levels of pesticide use in cotton production. Lower pesticide use is linked to reduced greenhouse gas emissions associated with chemical manufacture, transport and application. |
| National Program for Sustainable Irrigation (NPSI) Phase 2 | Department of Environment and Water Resources, Gascoyne Water Cooperative, Gascoyne Water Asset Mutual Cooperative, Goulburn–Murray Rural Water Corporation, GRDC, Harvey Water, Horticulture Australia Ltd, Land and Water Australia, Lower Murray Water, Ord Irrigation Asset Mutual cooperative, SRDC, SunWater, Western Australian Department of Water | Climate change will increase the challenges for Australia's irrigation industries to maintain or increase production with less or more variable water resources. The program seeks to identify cross industry priority areas as well as maintain R&D capacity in irrigation in Australia. Improved water management including water use efficiency and the impacts of irrigation practices on soils. |
| Standardising Life Cycle Assessment (LCA) methodology for agriculture | RIRDC, Australian Pork Limited, Meat and Livestock Australia, SRDC, Dairy Australia | The project sought to identify how standardisation of LCAs could be achieved in relation to agricultural applications. A report has been prepared. Further development of the recommendations and concepts identified are yet to be considered. |

| Project/Program | Key Collaborators/ Partners | Contribution in relation to climate change |
|---|---|---|
| Silverleaf whitefly insecticide resistance monitoring 2007–2010 | QDPIF | Silverleaf whitefly was introduced into Australia in the early 1990s. Since then it has become a serious pest in some tropical and sub–tropical cotton and horticultural cropping areas. It continues to spread to 'cooler' production areas, possibly as a result of adaptation but also possible because of increasing temperatures due to climate change. This project will help to monitor the spread of this pest and could provide an insight into how other pest species might spread as our climate warms. |
| Implications of agriculture for greenhouse policies | Australian Farm Institute, Australian Wool Industries, Dairy Australia, Centre for International Economics | The project aimed to identify what the impacts of and ETS on a range of agricultural industries might be in comparison to a "business as usual" case in which no adaptation to climate change or greenhouse gas mitigation had taken place. The study puts the potential scale of impact of an ETS into perspective in terms of whether agriculture was included or not included in the scheme. |
| Implementing the 'Delivery of Uptake' component of the EMS Pathways project | Australian Government Department of Agriculture, Fisheries and Forestry, Natural Solutions | Monitoring of water use efficiency and greenhouse gas emissions were among the indicators tested. |
| Postgraduate: Energy study – cotton ginning | USQ National Centre for Engineering in Agriculture | Improved energy use efficiency in cotton gins would not only reduce costs but also reduce greenhouse gas emissions |
| Monitoring for resistance to *Bt* toxins | CSIRO Entomology | Maintaining the efficacy of *Bt* cotton is directly linked to maintaining lower levels of pesticide use in cotton production, and thus reduced greenhouse gas emissions associated with chemical manufacture, transport and application. |
| Contribution to National Climate Change Research Strategy for Primary Industries (CCRSPI) | All rural R&D Corporations (RDCs) and PISC Agencies, CSIRO | The strategy is directly aimed at identifying key areas for R&D investment to assist primary industries. The strategy was developed in 2008 and released in 2009. Further development of the CCRSPI initiative continues to be supported by partners as a key communications vehicle as well as a driver to identify and initiate generic or cross–cutting research. |
| Water Smart cotton and grains in NSW | Land and Water Australia, GRDC, NSW DPI | This project builds on previous investments in knowledge management for irrigated cotton and grains. Benchmarking associated with the project shows that cotton farmers continue to adopt technology that has led to improved water use efficiency and that there is scope for further improvement. The current project will develop similar bench marking measures for grains crops. |
| Qualitative analysis of the BMP trial evaluation | Cotton Australia, Cotton CRC | It is important to deliver the most effective and valued package with the new BMP product. This project assessed grower feedback on an initial evaluation of the product. |
| Implications of no–till irrigated farming systems, Keytah | NCEA, Keytah | The project showed that there could be significant reductions in fuel and machinery costs associated with the adoption of reduced and near–zero till production practices. Significant reductions in greenhouse gas emissions are also associated with these practices. |

# ECOLOGICALLY SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PERFORMANCE

CRDC has integrated the principles of ecologically sustainable development under s.516A of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* into its planning framework and developed contributions to Strategic Plan Measures of Success within each program for the broader triple bottom line outputs contained in the CRDC Strategic R&D Plan 2008–2013. In line with this, the Annual Operating Plan 2008–09 was designed to ensure strategic research initiatives that provide measurable environmental, economic and social benefits to the cotton industry and the wider community.

The principles contained in the EPBC Act include:

- integrating long-term and short-term economic, environmental, social and equitable considerations into decision making processes;
- not using lack of full scientific certainty as a reason to postpone measures to prevent environmental degradation if there is the threat of serious or irreversible environmental damage; maintaining or enhancing the health, diversity and productivity of the environment for future generations;
- ensuring the conservation of biological diversity and ecological integrity is a fundamental consideration in decision-making; and,
- promoting valuation, pricing and incentive mechanisms.

Each of the three programs contains research investments that support these principles. Program One extends environmental sustainability and best practice beyond the farmgate into the areas of classing and ginning.

Program Two contributes research that enhances on-farm sustainability and catchment health, and addresses the adaptation to, and mitigation of, climate change.

Program Three addresses the skills and education, health and wellbeing and economic sustainability of industry participants and cotton communities. Within this program, CRDC also addresses the development of the capacity of women, through support of Wincott (Women's Industry Network – Cotton) in particular, and indigenous participants (through investment in a school-based traineeship program, developed by CRDC with the help of the Aboriginal Employment Strategy and the Cotton Catchment Communities CRC), and farming families. The development of leadership skills for the industry and wider agricultural communities is a priority, with a high take up of these opportunities by women a notable feature in recent years.

To ensure sustainably produced cotton, CRDC developed, and continues to broaden and update, the cotton industry's environmental management system, Best Management Practices (BMP). BMP facilitates continuous improvement in farm and environmental risk management throughout the value chain – 'from field to fabric'.

These environmental and social objectives also underpin the economic viability of the industry. Improvements in the efficient use of resources (water, nutritional supplements and chemicals), crop yields per hectare, and efficient farming methods aid the economic performance of cotton growers. The industry's performance with respect to these factors has been assessed rigorously through the CRDC-supported Boyce Cotton Comparative Analysis. A new three-year contract with Crop Consultants Australia is gathering information across the industry, which CRDC will then analyse. Opportunities for future analysis of economic viability in the context of the Strategic Plan 2008–2013 are under review.

The industry also submitted itself to two CRDC-initiated external audits – the first major agricultural industry to do so. The second audit in 2003 assessed the industry's response to the previous (1991) audit recommendations, identified the environmental issues facing the industry and recommended strategies and priorities to address these. The second audit found that '… the industry has developed and implemented a wide range of improvements in its operations and environmental management practices.' These improvements have continued in the period since 2003, aided by CRDC R&D investments in environmentally significant areas and guided, in part, by *Taking Responsibility for our Future: The Australian cotton industry action response to the second Australian cotton industry environmental audit 2003*, coordinated and produced by CRDC.

# FINANCIAL PERFORMANCE

## Revenue 2008–09

The drought-reduced production levels in both 2007–08 and 2008–09 mean significantly decreased bale levy receipts for 2008–09 compared to non-drought production years. Combined with a sustained period of low cotton prices, this will continue to constrain Australian Government contributions.

Following a drought-affected season in 2007–08, the 2008–09 growing season was also affected by drought, but not to the same degree. This meant that forecast production of 1.50 million bales for 2008–09, proved to be relatively accurate with an estimated actual cotton crop size of 1.39 million bales (Source: ABARE, June 2009). As a consequence, revenue of $7.68 million for 2008–09 is 10.3 per cent higher than the 2007–08 total of $6.96 million and 19.4 per cent above budgeted income of $6.43 million. The favourable budget variance occurred because 51.3 per cent of 2007–08 crop revenue and an estimated 53.5 per cent of 2008–09 crop revenue has been collected in the 2008–09 financial year, whereas the budget estimated receipt of 50 per cent of the 2007–08 and 2008–09 crops during the period.

Total revenue of $7.68 million for 2008–09 comprised:

- Industry levy revenue of $2.37 million, which includes $0.71 million (51.3 per cent) of the 2007–08 crop and $1.67 million (estimated 53.5 per cent) of the 2008–09 crop.
- $2.44 million of Australian Government matching of expenditure of levy money, which was capped when expenditure reached the 0.5 per cent of gross value of production of the cotton industry.
- $1.61 million in royalties from sales of CRDC-funded CSIRO seed varieties, which was seven per cent above budget.
- $0.74 million from interest, which was 28 per cent above budget, but $0.04 million below the previous year.
- $0.52 million from other sources, including project refunds and external grant revenue.

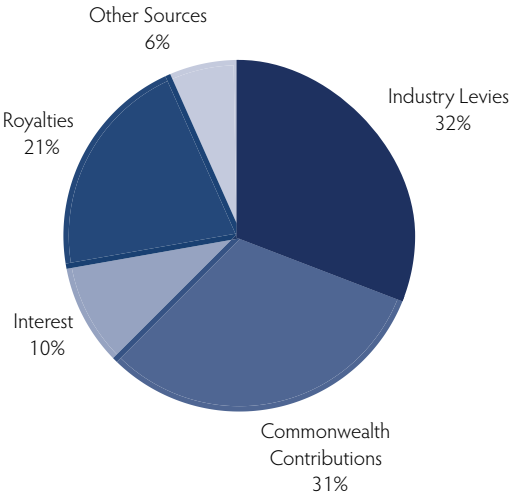
### Revenue sources

CRDC's revenue is drawn from two main sources.:

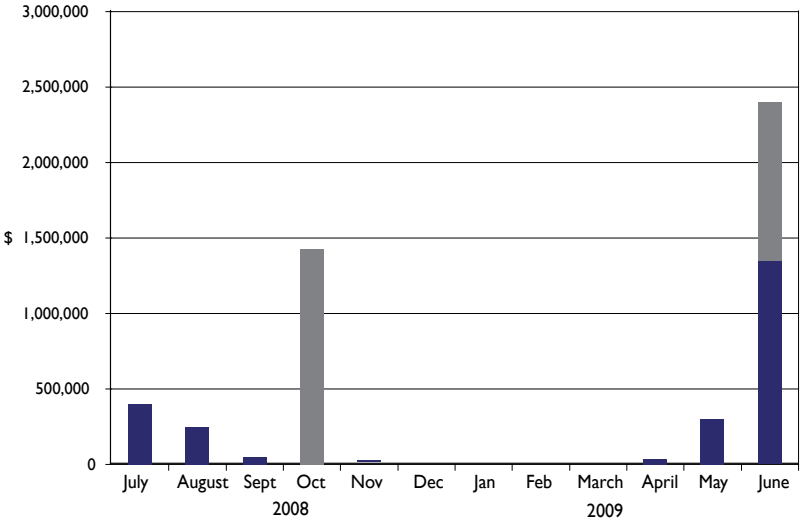
- Cotton farmers pay a levy of $2.25 for each 227 kilogram bale of cotton. Cotton levy revenue is collected at the point of ginning: that is, when cotton has been picked and delivered to cotton gins which then separate the cotton lint from the seed. This occurs from March to September of each calendar year, so that cotton levy revenue in any financial year is drawn from two consecutive cotton crops.
- The Australian Government matches expenditure of levies on eligible R&D, capped at 0.5 per cent of the three-year average gross value of production or the cumulative levy receipts, whichever is the lesser. The setting and collection of the industry levy is enabled by the *Cotton Levy Act 1982* and the *Primary Industries Levies and Collections Act 1991*.

Royalties from the sale of domestic and international planting seed, interest on investments, external grant revenue and research project refunds make up the balance of Corporation income.

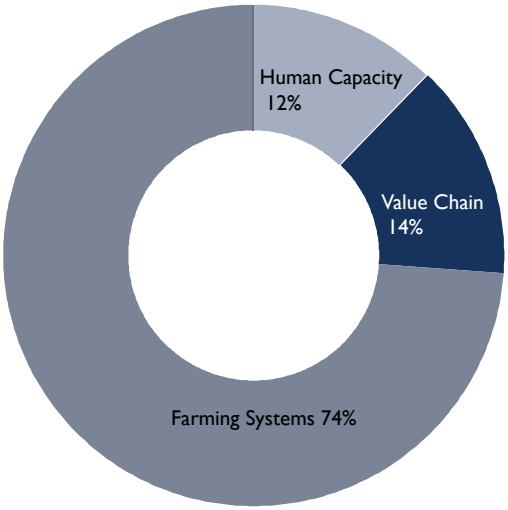
Revenue by Source



Levies and Commonwealth Contributions 2008–09




Expenditure by R&D Program




## Expenditure 2008–09

Total expenditure for 2008–09 was $9.41 million, 3 per cent below budget expectations. Research expenditure on CRDC's three strategic research programs and research-related corporate activities was $7.92 million. Other areas of expenditure for the Corporation included employees and operational expenditure.

## Financial position

CRDC reported an actual net deficit of $1.728 million for 2008–09 as against a conservative budgeted deficit of $3.255 million, which was based on water shortages for irrigated cotton at the time of budgeting and the effect this was expected to have on crop size. The 2007–08 and 2008–09 crops both contributed to the Corporation's 2008–09 income, with both crops around the estimated crop size. However, as

### R&D Program Breakdown*

| | Value Chain | Farming Systems | Human Capacity | Total |
|---|---|---|---|---|
| Number of projects | 18 | 62 | 26 | 106 |
| Program expenditure | $0.96m | $5.21m | $0.87m | $7.04m |

* Excludes untied grants and corporate research activities supporting R&D planning and adoption

described above, 51.3 per cent of 2007–08 crop and an estimated 53.5 per cent of 2008–09 crop were received, creating additional revenue independent of crop size.

The Corporation's total equity position of $10.29 million at 30 June 2009 is a decline of $1.66 million from the previous year, reflecting the impact of drought on revenue streams, combined with the need to maintain research project expenditure at sustainable levels. As a consequence, the Corporation drew upon its reserves to supplement research investment and operational needs, as has been the case in five of the previous six years, all of which were affected by drought. The equity to expenditure ratio for 2008–09 was 92 per cent, which was within the guidelines of the Corporation's policy to maintain reserves at a sustainable level.

## The coming year

### Revenue

The difficult drought-affected conditions faced by the Australian cotton industry in recent seasons will continue to have a significant impact on levels of production. The Queensland cotton regions received significant summer rain in 2008; however, this was not the case for NSW cotton regions. This means that the outlook for the 2009–10 season is uncertain, as cotton planting does not occur until September.

Water availability will continue to be a significant constraint on NSW production in the coming year, as will the continuing effect of low world cotton prices. Based on these factors, the Corporation is forecasting a total crop of 2.0 million bales for the 2009–10 season, which will be harvested from March to May 2010 and ginned from March to September.

The Corporation has forecast an operating deficit of $1.03 million for 2009–10, which will be funded from existing cash reserves. This reflects revenue of $9.21 million (compared with 2008–09 revenue of $7.68 million), with 71 per cent derived from industry levies and Commonwealth government contributions. Levy revenue and Commonwealth contributions for 2009–10 will be drawn from both the 2008–09 and 2009–10 crops.

The size of levy and Government contributions is heavily reliant upon crop production, which is budgeted to be 2.0 million bales for the 2009–10 crop. This follows on from a forecast low figure of 1.39 million bales in 2008–09, the other production year that contributes to income in the 2009–10 year. Continuing low international cotton prices will also have a negative impact on the Gross Value of Production (GVP). The Corporation expects that this will activate the PIERD Act 0.5 per cent of GVP legislative trigger, thus also limiting the Australian Government contribution.

### Expenditure

As levels of income are still well below the pre–drought average, the Corporation's capacity to invest in R&D in recent years has been reduced, but will stabilise in 2009–10. Forecast expenditure for the coming year is $10.244 million, up from $9.41 million in 2008–09. This level of expenditure will produce an operating deficit of $1.03 million, which will be funded from the Corporation's reserves.

## Outcome

Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.

| | |
|---|---|
| Total Budgeted Revenue: | $6,434,925 |
| Total Actual Revenue: | $7,680,822 |
| Total Budgeted Cost of Outputs: | $9,689,876 |
| Total Actual Cost of Outputs:* | $9,408,468 |

** Total cost is shown rather than total price because the Corporation is primarily funded through industry levies rather than on the basis of the price of its Outputs. Each research project and its funding contributes to the Outcome. Total research expenditure for the Outcome is calculated, with the remaining expenditure attributed to the Outcome on a pro rata basis.*

# Context

## ABOUT CRDC

### Vision

A globally competitive and responsible cotton industry

### Mission

The quest for sustainable competitive advantage

### Purpose

Enhancing the performance of the Australian cotton industry and community through investing in research and development, and its application

### Outcome

A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation

### Key research partners

- Cotton growers
- Rural Research and Development Corporations
- CSIRO
- Universities
- The Cotton Catchment Communities Cooperative Research Centre
- Other Cooperative Research Centres
- New South Wales Department of Primary Industries
- Queensland Department of Primary Industries and Fisheries
- Other State Government Departments
- The Crop Consultants Association
- Agribusinesses

### Who we are

One of 16 Rural R&D Corporations, CRDC is based in Narrabri, NSW – the heart of one of Australia's major cotton growing regions and home to the Australian Cotton Research Institute. The Corporation is a research and development partnership between the Australian cotton industry and the Australian Government.

### What we do

CRDC invests in and manages a portfolio of research, development and extension projects that seek to enhance the environmental, social and economic values associated with cotton production systems and to increase benefit to cotton industry participants, regional communities and the Australian people.

CRDC funds and coordinates the development of technical and non-technical documents, guides and other information tools and coordinates workshops, seminars and field days for a range of purposes including research review and progression, information sharing or technology transfer to industry.

CRDC produces a range of publications about corporate activities and operations and to disseminate research outcomes. It acts as a formal and informal information source for stakeholders and client groups (facilitated by its location in a major cotton growing centre), through general industry media activities and the Corporation's website, www.crdc.com.au.

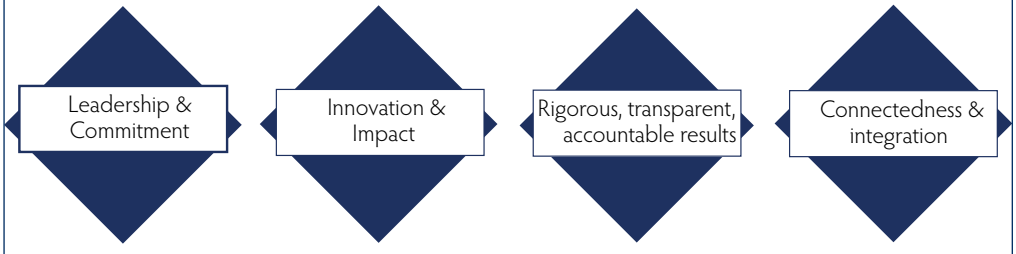
CRDC researchers are actively involved in the dissemination of research results, working with the CRDC-supported National Cotton Extension Team.

## CRDC Statement of Principles

CRDC Directors and staff members are required to:

- Commit to excellence and productivity
- Be accountable to stakeholders
- Act legally, ethically, professionally and responsibly in the performance of duties
- Strive to maximise return on investment of industry and public funds invested through our Corporation
- Strive to make a difference in improving the knowledge base for sustainable cotton production in Australia
- Value strategic, collaborative partnerships with research providers, other research and development bodies, industry organisations, stakeholders and clients, for mutual industry and public benefits; including cooperation with kindred organisations to address matters of national priority
- Value the contribution, knowledge and expertise of the people within our organisation and that of our contractual consultants, external program coordinators and research providers
- Promote active, honest and effective communication
- Commit to the future of rural and regional Australia
- Comply with and promote best practice in corporate governance
- Commit to meeting all statutory obligations and accountability requirements in a comprehensive and timely manner.

Values CRDC embraces to execute its Strategic Plan 2008–2013




**Our purpose** is to enhance the performance of the Australian cotton industry and community through investing in resear and development, and its application

**Our underlying principles** are to implement our objectives and outcomes using a triple bottom line framework for planning, implementation and reporting:

| | |
|---|---|
| **Economic** | Profitability and International Competitiveness |
| **Environmental** | Sustainable Production Systems and Catchments |
| **Social** | Empowered People and Communities |

## CRDC Strategic Elements 2008–2013

<table>
<tr><th>Accountabilities</th><th>Planning Instruments</th><th>R&D Program Objectives</th></tr>
<tr><td rowspan="3">PRINCIPAL LEGISLATION<br>Primary Industries and Energy Research and Development (PIERD) Act 1989<br><br>Commonwealth Authorities and Companies (CAC) Act 1997<br><br>GOVERNMENT STAKEHOLDER<br>Objects of the PIERD Act<br>Australian Government National Research Priorities and Rural Research and Development Priorities<br><br>Ministerial guidance and directives<br><br>INDUSTRY STAKEHOLDER<br>Cotton Australia R&D Priorities</td><td rowspan="3">FIVE YEAR STRATEGIC R&D PLAN<br>ANNUAL OPERATING PLAN<br>PORTFOLIO BUDGET STATEMENT</td><td>PROGRAM ONE Value Chain<br>Goal<br>Add value to the Australian cotton industry with premium products in improved routes to market<br>Planned Outputs<br>• Markets, risks and opportunities for Australian cotton products are clearly defined and understood within the industry<br>• New partnerships between industry, researchers and end-users<br>• Post-farmgate best management practices are developed and adopted<br>• New and improved products, processes and measurements<br>• Assessments of the competitive advantage of the Australian cotton industry<br>Planned Outcome<br>High quality consumer-preferred Australian cotton products in the world marketplace</td></tr>
<tr><td>PROGRAM TWO Farming Systems<br>Goal<br>Cotton in a highly productive farming system with improved environmental performance<br>Planned Outputs<br>• Climate and natural resource management risks and opportunities for Australian cotton producers are defined and understood<br>• Climate and natural resource policy implications are interpreted<br>• Collaborations and partnerships within and between rural industries delivering innovation, capacity and knowledge for farming systems<br>• Benchmarking, assessing and reporting on productivity and environmental performance of cotton farming systems<br>• An industry capable of managing its biosecurity responsibilities<br>Planned Outcome<br>A more resilient, profitable and competitive cotton farming system</td></tr>
<tr><td>PROGRAM THREE Human Capacity<br>Goal<br>A culture of innovation and learning<br>Planned Outputs<br>• Industry and R&D capacity needs identified and gaps being addressed<br>• An industry with the capacity to deliver our future R&D innovation needs and their adoption<br>• The adoption of a shared vision for the cotton industry's future<br>• Assessments of industry capacity to innovate, lead and adapt<br>Planned Outcome<br>Innovative people in the cotton industry and community, creating a sustainable industry and viable regional communities</td></tr>
</table>

| Triple Bottom Line Outputs | R&D Outcome |
|---|---|
| ECONOMIC<br>Profitability and International Competitiveness<br><br>ENVIRONMENTAL<br>Sustainable Production Systems and Catchments<br><br>SOCIAL<br>Empowered People and Communities | A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation. |

# ABOUT THE AUSTRALIAN COTTON INDUSTRY

Cotton is the most widely produced natural fibre in the world, representing about 40 per cent of the world textile market. The Australian cotton industry is relatively small, with between 700 and 880 cotton enterprises currently producing the crop. The capacity of experienced cotton growers not currently growing cotton is substantial and a return to favourable seasons and higher per-bale returns could readily result in greater production.

Historically, 70 per cent of Australia's cotton has been grown in NSW, with the majority of the remainder grown in Queensland. The average Australian cotton farm is 4630 hectares in size, with 362 hectares planted to cotton and 2840 hectares used for dryland cropping or grazing. Cotton production is highly mechanised, capital intensive, technologically sophisticated and requires high levels of management expertise. National production averages 2.5 million bales, with the average cotton farm producing 2840 bales at 7.84 bales per hectare from 362 hectares of cotton planted.

The average yield for irrigated cotton in Australia is 1800 kilograms per hectare – the highest in the world (Source: Cotton Australia, 2005). These yields can be attributed almost entirely to improved cotton breeding and better crop management systems, which have been achieved with a reduced impact on the environment.

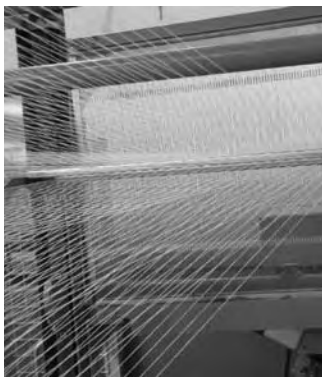
Cotton producers also engage in other agricultural enterprises, which typically include other summer crops such as sorghum and sunflowers, and summer legumes such as soybean, while winter crops include legume and cereal crops such as faba beans and wheat. Livestock are often another key element of a diverse farm where cotton is grown. This adds up to cotton as a major crop in an integrated farming system designed to make the best use of natural rainfall, soil fertility and irrigation.

The economic and environmental health of the cotton industry can largely be attributed to high quality collaborative research and development, much of it coordinated and funded by CRDC. This culture of innovation and continuous improvement with practical implementation and willingness by growers to adopt new ideas results in an industry that is very quick to pick up and act upon new research outcomes.

Despite its relatively small size, the Australian cotton industry makes an important contribution to the national economy, in terms of both exports and employment. On a global scale, Australia is not a large cotton producer: only around 3 per cent of the global crop is grown within Australia. Yet, Australia is one of the largest exporters of cotton in the world, with over 95 per cent of the national crop exported.

The cotton industry directly employs an estimated 10,000 people under normal seasonal and market conditions (prior to recent and current drought-affected conditions).

Because almost all the Australian cotton crop is exported, the industry operates in an environment



High quality Australian cotton – from field ... to fibre ... to fashion

of intense global competition and therefore must continually improve operational efficiency, environmental sustainability and quality of the product to remain competitive.

That is why the continued R&D effort of the Corporation, in conjunction with its government and industry stakeholders, remains of paramount importance to the industry and an essential linkage in the maintenance of a viable industry and rural communities.

## The 2008–09 harvest

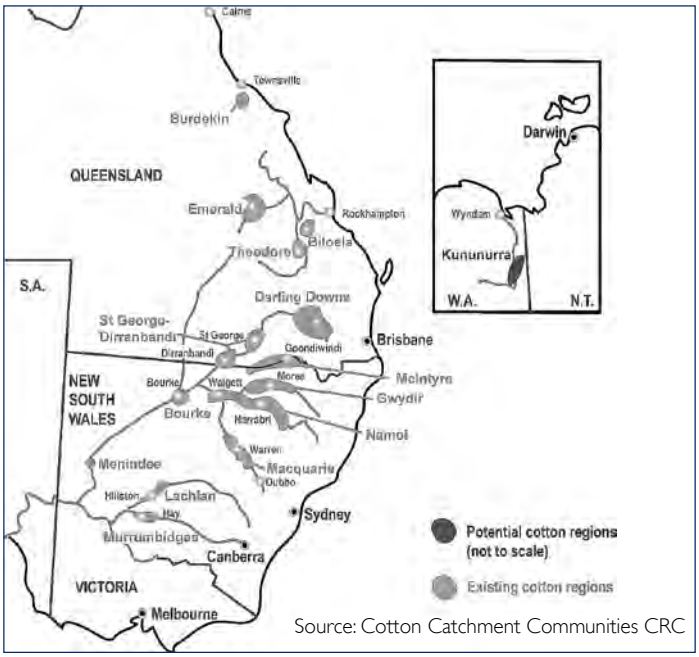
Increased supplies of irrigation water and improved cotton varieties have enabled better than average cotton yields to be achieved for both irrigated and dryland cotton. In 2008–09, Australian cotton lint and cottonseed production are both estimated to have been more than double the previous year's production but remain low in historical terms. According to the Australian Bureau of Agricultural and Resource Economics (ABARE), cotton lint production for the season was 329,000 tonnes (some 1.45 million bales). This was grown on 164,000 hectares and yielded 2.01 tonnes per hectare compared with the five-year yield average of 1.95 tonnes per hectare. (Source: ABARE Australian crop production report, September 2009.)

The increasing yield per hectare is a good news story for the Australian industry. An independent analysis of the impact of R&D investments under CRDC's previous Strategic Plan (2003–2008) found that improvements in water use, nutrient management and general agronomy, as well as new Australian-bred cotton varieties, were the principal contributors to improved yield achieved in the face of severe, prolonged drought.

## The coming season

Although winter rainfall in northern NSW and southern Queensland has been below average, ABARE forecasts Australian cotton plantings in 2009–10 to increase by 19 per cent from 2008–09 levels to 195,000 hectares for two reasons: an improvement in irrigation water availability compared with the 2008–09 season and the fact that irrigated cotton delivers a higher gross margin per megalitre of water used than alternative irrigated summer crops. (Source: ABARE Australian crop production report, September 2009.)

## Australian cotton regions




Source: Cotton Catchment Communities CRC

# Stakeholder Relations

## COTTON AUSTRALIA

### Changing of the guard

On 17 March 2009 the Minister for Agriculture, Fisheries and Forestry, the Hon Tony Burke MP, notified CRDC of a declaration under section 7 of the *Primary Industries and Energy Research And Development Act 1989*, that formalised Cotton Australia as the Corporation's new industry body.

Cotton Australia took over this role following its merger with CRDC's previous industry body, the Australian Cotton Growers Research Association (ACGRA), which had carried out the role of industry stakeholder since the Corporation was established in 1990. As a grower-owned organisation, ACGRA had carried out or facilitated a valuable range of R&D-related roles that spread across the cotton industry. Further information about ACGRA can be found in previous CRDC Annual Reports at www.crdc.com.au.

COTTON AUSTRALIA

Cotton Australia Chair, Joanne Grainger, and ACGRA Chair, Ben Stephens, at the time of the merger of the two organisations

Cotton Australia was originally established in 1972 as the Australian Cotton Foundation. As the peak industry representative body, its membership comprises all Cotton Grower Associations, cotton processors and some service industry members. It is funded through a voluntary grower levy of $2.25 on each bale of cotton produced. Its head office is located in Sydney, with regional hubs in Narrabri and Toowoomba. A Board of 12 elected Cotton Australia Directors, who are growers and/or ginners, sets policy and strategic direction. It is chaired by Ms Joanne Grainger, a cotton grower from Mungindi in north-west NSW.

Board and staff members are represented on a wide range of working groups, boards, committees, reference groups and Grower Associations, as well as the Australian Cotton Industry Council, the International Cotton Advisory Committee, the National Farmers' Federation and Queensland Farmers' Federation, and NSW and Queensland Irrigator Councils. Cotton Australia supports levy paying cotton growers in cotton production and marketing, represents and advances the interests of cotton growers and the Australian cotton industry and promotes the Australian cotton industry to the community. It works with State Governments and

the Australian Government in an effort to drive the cotton industry's environmental performance, while supporting the interests of growers. It is responsible for implementation of the industry's environmental management system, Best Management Practices (BMP), developed by CRDC.

Cotton Australia provides executive officer services and administrative support to the Australian Cotton Industry Council (ACIC). It also provides administrative and accounting support to the Australian Cotton Exhibition Centre in Narrabri in order to help attract school student participation in its education programs.

Further information about Cotton Australia can be found at www.cottonaustralia.com.au.

## The R&D role

Cotton Australia has retained the ACGRA R&D Priorities, which can be found in Incorporating Stakeholder Priorities on page 39.

As CRDC's industry representative body, Cotton Australia provides advice to the Corporation on research issues after canvassing the views of its grower representative organisations on the relevance to their needs of research funding submissions received by CRDC each year.

Cotton Australia research advisory panels reflect the R&D programs established under the CRDC Strategic Plan 2008–2013 – Value Chain, Farming Systems, Biosecurity and Human Capacity – and address each of the CRDC Strategic Research Priorities under those programs.

Members' nominated representatives are asked to nominate specific areas of research interest and are then allocated to the appropriate advisory panel. These panels consider relevant research applications in detail and report their views to the organisation as a whole at the annual research review meeting. These views are conveyed to CRDC, who also attend the annual meeting.

In addition to its role as CRDC's industry representative body, Cotton Australia is formally responsible for liaising on research issues generally for the cotton industry and has taken over all functions formerly performed by ACGRA, including advising the Cotton Catchment Communities CRC.

## The TIMS Committee

The Transgenic and Insect Management Strategy Committee (TIMS) is a sub-committee of Cotton Australia, which provides the Chair and up to five grower members of the committee. TIMS also includes representatives from CSIRO, State Departments of Agriculture, CRDC, Crop Consultants Australia and the Cotton Catchment Communities CRC. It is responsible for developing, in close consultation with the relevant scientific experts and technology providers, the resistance management strategies for conventional insecticides, herbicides and transgenic cotton.

## Industry Biosecurity Group

Cotton Australia convenes the Industry Biosecurity Group. This group oversees implementation of the Cotton Industry Biosecurity Plan, which was developed in 2006 and addresses key exotic pest threats and mitigation and contingency plans in the event of an emergency.

## NORCOM

NORCOM – industry development in Northern Australia – is an industry-based stewardship committee now convened by Cotton Australia. It oversees R&D relating to the development of new cotton growing areas (currently North Queensland). Although CRDC does not invest in this area at present, it is represented on this committee. NORCOM provides advice to CRDC's major collaborative partner, the Cotton Catchment Communities CRC.

## Australian Cotton Conference

After 14 highly successful and well-attended biennial conferences organised, financed and administered by ACGRA, culminating in *New Beginnings – Cotton in a Climate of Change* in August 2008, Cotton Australia will take over ACGRA's role for the 15th conference, to be held in 2010. The 2008 conference was, for the first time, held jointly with the Australian Cotton Shippers Association (ACSA) to formalise the R&D focus on the entire production chain that had been a feature of recent conferences. This partnership will continue between Cotton Australia and ACSA. CRDC remains a foundation sponsor of the conference.

# THE AUSTRALIAN GOVERNMENT

Australian Government National Research Priorities and Rural Research and Development Priorities were essential planning instruments in development and execution of the Corporation's Annual Operating Plan 2008–09.

## National Research Priorities

Four National Research Priorities were issued by the Australian Government in 2002, and enhanced and refined in 2003:

### A An environmentally sustainable Australia

A1 Water – a critical resource

A2 Transforming existing industries

A3 Overcoming soil loss, salinity and acidity

A4 Reducing and capturing emissions in transport and energy generation

A5 Sustainable use of Australia's biodiversity

A6 Developing deep earth resources

A7 Responding to climate change and variability

### B Promoting and maintaining good health

B1 A healthy start to life

B2 Ageing well, ageing productively

B3 Preventive healthcare

B4 Strengthening Australia's social and economic fabric

### C Frontier technologies for building and transforming Australian industries

C1 Breakthrough science

C2 Frontier technologies

C3 Advanced materials

C4 Smart information use

C5 Promoting an innovation culture and economy

### D Safeguarding Australia

D1 Critical infrastructure

D2 Understanding our region and the world

D3 Protecting Australia from invasive diseases and pests

D4 Protecting Australia from terrorism and crime

D5 Transformational defence technologies

## Rural Research and Development Priorities

The Australian Government issued five revised rural research and development priorities in May 2007:

### Productivity and Adding Value

Improve the productivity and profitability of existing industries and support the development of viable new industries.

### Supply Chain and Markets

Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole supply chain, including to consumers.

### Natural Resource Management

Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable.

### Climate Variability and Climate Change

Build resilience to climate variability and adapt to and mitigate the effects of climate change.

### Biosecurity

Protect Australia's community, primary industries and environment from biosecurity threats.

## Supporting the Rural Research and Development Priorities:

- Improve the skills to undertake research and apply its findings
- Promote the development of new and existing technologies.

## Addressing Australian Government research priorities

### Principal contributing activities 2008–09

In its Annual Operating Plan 2008–09, CRDC identified the following research, development and extension activities that were of major relevance to the National Research Priorities and Rural Research and Development

| National Priority<br>An environmentally sustainable Australia | |
|---|---|
| **Rural Priority** Natural resource management | |
| STRATEGIC PLAN R&D FOCUS | Effectively manage weeds, pests and diseases and soil health to underpin primary production, environmental sustainability and social needs<br><br>Improve our understanding of water resources and their productive and efficient use for commercial, environmental sustainability and social needs<br><br>Support the conservation of native vegetation, biodiversity and ecosystems and the provision of ecosystem services within primary production systems<br><br>Mitigate the damage to the natural resource base caused by previous production practices, drought and extreme weather events |
| OUTPUTS 2008–09 | • Outcomes from a study on the provision of ecosystem services at some 85 sites should prove a powerful tool for illustrating to farmers the effect of different management on native vegetation.<br>• A whole of industry deep drainage forum has developed a list of priorities for future deep drainage research and extension to guide future actions.<br>• A decade of research has led to an understanding of where the balance lies between too little and too much deep drainage for soil and catchment health.<br>• Data collected in a 2008 water use benchmarking study shows an improvement of around 40 per cent in water use efficiency since 2003, with the number of farms surveyed in future to be increased.<br>• Research has identified the key growth stages where Bollgard II® cotton can tolerate water stress quantified the impact of seasonal variations in climate on the yield responses that can be expected from a range of irrigation frequencies.<br>• A survey of consultants representing over 38,000 hectares of cotton indicates that growers are changing their practices to achieve more efficient fertiliser use.<br>• Long-term cropping experiments have enabled the development of a Nitrogen Use Efficiency Index (NUEI) for benchmarking the efficiency with which nitrogen is used in Australian cotton production.<br>• Insecticide resistance monitoring programs continue to provide cotton growers with early warning signals to enable proactive changes to pest management strategies before the negative effects of resistance occur in the field.<br>• Monitoring has discovered that *Helicoverpa* resistance to *Bt* technology and weed resistance to Roundup Ready cotton varieties is trending upwards, conventional chemistry is trending downwards for *Helicoverpa* spp. but up for aphids. Indicators are steady for whitefly.<br>• REFCOM continued to provide a sound forum for the coordination and prioritisation on R&D for *Bt* technology, with a precautionary contingency plan being developed for *Cry2Ab* resistance. |

| | |
|---|---|
| OUTPUTS 2008–09 (continued) | • Research has defined the periods during which weed control is required and those during which weeds cause insufficient yield loss to justify their control.<br>• Information specific to different spray application scenarios common in cotton farming was developed through field trial evaluations and is now used for extension, including a series of spray application workshops in northern NSW.<br>• Evaluation of the spray application workshops indicated 80 per cent of participants subsequently changed their spraying behaviour, leading to an active reduction in the risk in offsite movement of agricultural chemicals. |
| **Rural Priority Climate variability and climate change** | |
| STRATEGIC PLAN R&D FOCUS | Increase our understanding of climate variability and climate change to improve our ability to predict changes and to manage impacts on primary industries and regional economies<br>Develop and improve climate information tools, including forecasting models, to enable producers to make informed risk management decisions and build resilience to climate impacts<br>Help manage and further reduce greenhouse gas emissions from primary industries<br>Enable industries to respond and better adapt to climate change in a timely and sustainable manner and to capitalise on potential growth opportunities |
| OUTPUTS 2008–09 | • Cotton's Big Day Out whole-of-industry event identified a range of opportunities for producers to adopt the most appropriate technologies to deal with climatic and economic challenges.<br>• The National Climate Change Research Strategy for Primary Industry, involving wide collaboration, has identified cross-industry R&D requirements and is coordinating broad R&D collaborative projects dealing with carbon emissions and adaptation.<br>• A Life Cycle Assessment of a cotton t-shirt showed that on-farm production processes and manufacturing are minor factors, with the greatest contribution to greenhouse gas production occurring in the 'use' phase – washing, drying and ironing.<br>• A study on the potential economic impacts of an Emissions Trading Scheme on agricultural industries in Australia confirmed that understanding how to reduce national greenhouse gas emissions without reducing competitive advantage or productive capacity is the most positive way to contribute to the development of sound policy for reducing emissions in the sector.<br>• A study has shown cotton gins can improve their energy use efficiency through benchmarking and measuring, particularly if it can be done collaboratively across the industry.<br>• Greenhouse gas data collection from cotton-grains systems with reduced fallow was completed in 2008–09 and has provided the impetus for the Australian Government to fund a new national program to examine greenhouse gas emissions from agricultural systems.<br>• Custom designed static chambers for measuring nitrous oxide and carbon dioxide will greatly enhance the industry's ability to benchmark the influence of cropping systems and farming practices on greenhouse gas emissions.<br>• A study of energy consumption in cotton gins has informed gin owners of their emissions in the context of any planned national emissions trading scheme.<br>• A study by the National Centre for Engineering in Agriculture, using the energy assessment software, EnergyCalc, found that reduced tillage has had a significant impact on energy use and costs, has been extended to industry. |

| National Priority<br>Promoting and maintaining good health | |
|---|---|
| **Rural Priority** Productivity and adding value | |
| STRATEGIC PLAN R&D FOCUS | Enable commodities and food to be produced more efficiently and sustainably<br>Provide information and tools to help producers identify the best returns on investments, especially in pursuing new product opportunities<br>Add value through improved products and processes that focus on consumer needs and expectations |
| OUTPUTS 2008–09 | • A newly completed project has identified a gene that provides potential improvements in fibre elongation: an important characteristic of high quality fibre.<br>• A study of nitrogen use in cotton production has shown nitrogen fertiliser inputs can safely be reduced by 15 to 25 per cent, which will reduce costs and improve gross margins, and may improve yields.<br>• Links have been established with the University of Polytechnic, Hong Kong, which will investigate opportunities for new spinning technologies suitable for Australian premium cottons.<br>• Following Office of the Gene Regulator approval of healthier, high oleic content cottonseed developed by CSIRO with CRDC support over several years, 1.5 tonnes of seed was produced in the 2008–09 season, allowing food sector and stock feed trials to proceed.<br>• Knowledge from fibre development research and applied practice change research into agronomic factors that affect fibre quality and links fibre to yarn and fabric quality have been collated into a new decision support package, FIBREpak, to aid producers in agronomic decision making.<br>• A new CSIRO-developed moisture sensor is expected to play a key role in automating any new moisture management system developed for gins. A provisional patent has been lodged and preliminary discussions have taken place with a potential commercial developer.<br>• Data collected in a neps survey will provide better guidance on why neps and short fibre content develop and where to target future research.<br>• International spinning mill trials highlighted key areas for improving Australia cotton as reducing neps and short fibre levels and improving fibre strength, providing guidance for future R&D.<br>• Collaboration with John Deere, with the support of Case IH, has resulted in a Safe Harvesting video in readiness for the 2009–10 harvest.<br>• CRDC investment in workshops on pesticide application technology has improved pesticide use industry-wide, with 80 per cent of participants changing their application practices.<br>• The Collaborative Partnership for Farming and Fishing Health and Safety is investing in R&D to improve the physical and mental health of farming and fishing workers and their families and improve the safety of the environment and work practices in farming and fishing industries.<br>• Data collected by Cotton Consultants Australia, which details inputs to production on the majority of cotton farms in the 2008–09 crop, provides producers with benchmarking information in relation to past and future crops.<br>• Work to extend BMPs through the post-farmgate sector is nearing completion with increasing ownership of the process and benefits of best management practice of cotton throughout the value chain. |

| Rural Priority Supply chains and markets | |
|---|---|
| STRATEGIC PLAN R&D FOCUS | Identify changes in national and international market and consumer requirements (including social and environmental concerns) regarding the integrity and safety of food and other products |
| OUTPUTS 2008–09 | • A survey of Korean spinning mills established how these mills view Australian cotton in relation to the mills' quality requirements and identified areas where improvements are needed.<br>• The 'We're Aussie, Wear Aussie' forum resulted in a post-farmgate consensus on marketing issues facing the industry and a shared view of future action.<br>• Combining the Australian Cotton Conference with ACSA has reinforced the industry's awareness of the importance of producing high quality fibre that meets the needs of spinning mills.<br>• The Premium Cotton Initiative demonstrated that Australian growers might have the opportunity to develop a niche market for new premium cotton varieties, which it found to be at least equivalent to the US cotton brand 'Ultima Cotton', which can receive a 10 to 15 per cent premium in the market.<br>• A new industry partnership is exploring the business case for developing marketing initiatives for premium quality Australian cottons. |

| National Priority<br>Safeguarding Australia | |
|---|---|
| **Rural Priority Biosecurity** | |
| STRATEGIC PLAN R&D FOCUS | Assist in minimising the risk of entry, establishment or spread of identified target invasive pests and diseases that could have major economic, social, health or environmental impacts<br><br>Where practicable and cost-effective, assist to eradicate, contain, control or mitigate the impact of significant established invasive or endemic pests and diseases |
| OUTPUTS 2008–09 | Version two of the National Cotton Biosecurity Plan, developed with CRDC involvement and scheduled for release in late 2009, will strengthen risk mitigation by outlining a range of pre-emptive strategies at the national, state, regional and property levels to ensure the exclusion/management of serious plant pests.<br><br>The Fusarium wilt research coordination committee, FUSCOM, fostered collaboration between research projects in different research organisations and enable information to be shared with industry participants.<br><br>Diagnostics services identified no new properties with Fusarium wilt in the 2008–09 season; however, the spread of the disease within farms was confirmed at a number of locations. A database of Fusarium strains and their confirmed locations is being maintained.<br><br>Black root rot continues to be monitored effectively through disease surveys and research continues to develop controls of this disease. |

| National Priority<br>Frontier Technologies for Building and Transforming Australian Industries | |
|---|---|
| **Supporting the Rural Research and Development Priorities**<br>**Improve the Skills to Undertake Research and Apply its Findings** | |
| STRATEGIC PLAN R&D FOCUS | Constraints on availability and skills for research and innovation<br>Skills needed by producers to make the best use of research and innovation<br>Drivers and barriers to adoption of research and innovation by industries and in regional communities<br>Impacts of research and innovation on industries and regional economies, including on the viability of businesses and communities |
| OUTPUTS 2008–09 | • CRDC continued to invest in employment of the National Cotton Training Coordinator, as well as the range of training and professional development activities that he designs, produces and coordinates. Key courses include the University of New England/Cotton Catchment Communities CRC Cotton Production Course, the Cotton Field to Fabric Training Course, the Cotton and Grains Irrigation Management course and Vocational Education Training in Schools (Certificates II to IV).<br>• A study to identify current needs of producers for extension services indicated a shift in producer preferences for extension activities to focus mostly on 'big picture' support and not just the day-to-day agronomic and localised support services that has been a feature in past years.<br>• Scoping studies identified three core themes for future investments to address gaps in human capacity: skills, communities of interest and practice, and new technologies that will assist industry to create and deliver the outputs of R&D through new technologies and systems.<br>• An e-Learning pilot project has received recognition under the Australian Flexible Learning Framework – the first agriculture-related project of its type to do so. Agribusiness engagement through this online knowledge portal pilot project will support BMP and e-Learning.<br>• The Big Day Out in Cotton event enabled producers and consultants to help define future needs for knowledge and professional development in the industry.<br>• Information gained from modelling and initial analysis that has identified skills, communities of interests and workforce development as key gaps for knowledge and industry engagement will underpin achievement of the Program Three outcome.<br>• Prior learning on-farm has received formal acknowledgement through the Certified BMP Farm Manager Diploma, aligned to the Australian Training Framework, with ten diplomas awarded in 2008–09 and four more awards to come.<br>• A project to document and quantify the impact new technologies have had on health and safety in the industry and document the industry's capacity to adapt to these changes has shown a dramatic improvement in 53 hazard areas on-farm in the cotton industry, with 48 categories not effectively managed or managed to some degree in the 1980–1990 decade decreasing to 19 in these categories in 2000–2006.<br>• The Cotton and Grains Irrigation Knowledge Management project, now conducted through NPSI, has resulted in the development of improved on-farm water use benchmarking which means that producers are able to effectively benchmark their own irrigation efficiency performances against similar enterprises in the industry. |

| | |
|---|---|
| OUTPUTS 2008–09 (continued) | • CRDC collaboration with Nufarm Australia, the Grains R&D Corporation (GRDC) and Cotton Australia to map sensitive areas has mitigated the effects of off-target spray application.<br>• CRDC investment in workshops on pesticide application technology has improved pesticide use industry-wide, with 80 per cent of participants changing their application practices.<br>• New collaboration with Crop Consultants Australia to undertake a survey on practice and production in the 2008–09 growing season has provided detailed information on key economic and environmental measures that will benchmark future performance.<br>• Key CRDC-supported courses, including the University of New England/Cotton Catchment Communities CRC Cotton Production Course, the Cotton Field to Fabric Training Course, the Cotton and Grains Irrigation Management course and Vocational Education Training in Schools (Certificates II to IV), are increasing industry skills.<br>• Following the successful completion of the first Australian Future Cotton Leaders Program by 21 young people in 2007–08, a further ten young people began the course in May 2009 and will complete it in the coming year, gaining improved self-confidence and skills for effective presentation.<br>• Women in the industry were provided with logistical support through Wincott (Women's Industry Network – Cotton) and featured prominently in attendance at CRDC-supported courses.<br>• Young indigenous people were supported to gain office skills through a school-based traineeship program developed by CRDC, with the assistance of the Aboriginal Employment Strategy and the Cotton Catchment Communities CRC.<br>• School-age children in cotton communities received support through a range of projects that promote science, including a Moree Rotary tour of the Australian Cotton Research Institute and Australian Cotton Exhibition Centre by high school students from north-west NSW; children from Burren Junction, Rowena, Narrabri and Fairfax public schools attending the RiverHealth Conference in Tamworth in November 2008; and the Combined Schools Careers Expo in Tamworth and Armidale in April 2009.<br>• 20 projects supported travel by individuals or groups to conferences, workshops, meetings and training, with a number of R&D projects also containing support for travel relating to the research. |

| **Supporting the Rural Research and Development Priorities**<br>Promote the Development of New and Existing Technology | |
|---|---|
| STRATEGIC PLAN R&D FOCUS | Identification of critical points in the value chain that would benefit from a technological solution<br><br>Scanning of international research and innovation so Australia can adopt and tailor technologies to our requirements<br><br>Use of systems approaches in addressing challenges faced by industries |
| OUTPUTS 2008–09 | • Following several years of development and testing, CSIRO's SiroMat is due for commercial release in 2011 and will provide more accurate and meaningful measurement of fibre maturity.<br>• CSIRO's Cottonscan measures fibre fineness: researchers have reduced the time required for sample preparation and testing to approximately one minute, which is a much more acceptable sampling time for use with HVI equipment, with commercial testing of the faster technology by commercial and US research organisations.<br>• A 'systems thinking' workshop identified a number of potential key intervention or leverage points where further development or investment in R&D could lead to considerable improvements in cotton/grains farming systems.<br>• A new web-based version of the industry's environmental management system, Best Management Practices, has been developed and an evaluation has indicated positive support from a broad mix of farmers trialling the system<br>• Linkages between R&D and BMP have been strengthened by uploading a wide range of R&D information to myBMP. Information gained on a national roadshow undertaken to assess the functionality of this electronic system for knowledge acquisition enabled improvements to achieve a more robust system. |

## Composition of National Research Priorities attributed to each CRDC R&D Program 2008–09

| National Research Priorities (NRP) | An Environmentally Sustainable Australia | | | | | | | Promoting and Maintaining Good Health | | | | Frontier Technologies for Building and Transforming Australian Industries | | | | | Safeguarding Australia | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expenditure | A1 | A2 | A3 | A4 | A5 | A6 | A7 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | C5 | D1 | D2 | D3 | D4 | D5 | |
| | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m | $m |
| Program 1: Value Chain | | | | | | | | | | | 0.51 | | 0.38 | 0.07 | | | | | | | | 0.96 |
| Program 2: Farming Systems | 0.80 | 0.34 | 0.15 | | 1.60 | | 0.20 | | | | 0.23 | 0.17 | 0.39 | | 0.22 | 0.09 | | | 1.02 | | | 5.21 |
| Program 3: Human Capacity | 0.10 | | | | | | | | | 0.02 | 0.11 | | | | | 0.64 | | | | | | 0.87 |
| Total | 0.90 | 0.34 | 0.15 | | 1.60 | | 0.20 | | | 0.02 | 0.85 | 0.17 | 0.77 | 0.07 | 0.22 | 0.73 | | | 1.02 | | | 7.04 |

## Composition of Rural Research and Development Priorities attributed to each CRDC R&D Program 2008–09

| Rural Research & Development Priorities (RRDP) | Productivity and Adding Value | Supply Chain and Markets | Natural Resource Management | Climate Change and Climate Variability | Biosecurity | Supporting the Priorities | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Innovation Skills | Technology | |
| Expenditure | $m | $m | $m | $m | $m | $m | $m | $m |
| Program 1: Value Chain | 0.37 | 0.22 | | | | | 0.37 | 0.96 |
| Program 2: Farming Systems | | | 2.42 | 0.20 | 2.13 | 0.16 | 0.30 | 5.21 |
| Program 3: Human Capacity | | | 0.13 | | | 0.74 | | 0.87 |
| Total | 0.37 | 0.22 | 2.55 | 0.20 | 2.13 | 0.90 | 0.67 | 7.04 |

## Incorporating stakeholder priorities into planning and execution 2008–09

# THE R&D INVESTMENT PROCESS

CRDC has a two-part procurement process in evaluating and forming R&D investment decisions. An online database system, Clarity, assists CRDC management to collate, assess and manage R&D investments efficiently. This system enables CRDC to manage all existing and future investments with the highest levels of probity, while providing for in-depth analysis of its investment portfolios against a wide range of economic and management criteria on behalf of industry and government stakeholders.

The two-part process begins with calls for Preliminary Research Proposals, using advertising in national newspapers, research publications and on the Corporation's website. This occurs in August/ September each year, with 1 September the deadline for the receipt of Preliminary Research Proposals.

The second phase is the request for Full Research Proposals, by late January, from those applicants whose Preliminary Research Proposals have satisfied the initial selection criteria, including alignment with the Corporation's strategic priorities.

At an annual budget meeting in March, the CRDC Board considers recommendations from management for R&D investment, inclusive of Full Research Proposals.

All Preliminary and Full Research Proposals submitted for the 2008–09 year were assessed by the Australian Cotton Growers Research Association (ACGRA). Following the merger of the two organisations, Cotton Australia replaced ACGRA as CRDC's formal industry stakeholder. Cotton Australia now reviews R&D performance and assesses and offers its recommendations on all Preliminary and Full Research Proposals.

CRDC may also seek to commission research where gaps or additional needs are identified in the portfolio of research investment. The Board also sets aside an amount for contingencies, so that urgent research and development can proceed without undue delay if required.

## Triple Bottom Line Reporting

CRDC Strategic R&D Plan 2008–13 and Annual Operating Plans are formulated to implement the Corporation's objectives and outcomes. A triple bottom line framework for reporting has been adopted in support of communicating performance.

These plans deliver one integrated outcome via three outputs:

| | |
|---|---|
| Economic: | Profitability and international competitiveness |
| Environmental: | Sustainable production systems |
| Social: | Empowered people and communities |

These planned outputs underpinned the scoping of planned investments, outputs and measures of success within each R&D program.

General Manager – R&D Investments, Bruce Pyke

Manager – R&D Implementation, Helen Dugdale

# Report of Operations
# Research & Development

## Program One VALUE CHAIN

### STRATEGIC R&D PLAN 2008–2013

#### Goal

Add value to the Australian cotton industry with premium products in improved routes to market

#### Outputs/Measures of Success

- Markets, risks and opportunities for Australian cotton products are clearly defined and understood within the industry
- New partnerships between industry, researchers and end-users
- Post farm-gate best management practices are developed and adopted
- New and improved products, processes and measurements.
- Assessments of the competitive advantage of the Australian cotton industry

#### Outcome

High quality consumer-preferred Australian cotton products in the world marketplace

#### Background

Australian cotton producers compete in global markets. Their competitive edge is largely based on their ability to produce world's-best yields of high-quality cotton.

This said, increasing global competition for higher quality cotton is creating the driver for a change in emphasis for industry investment across the value chain. Producers and participants in the Australian cotton value chain are seeking to create added value through producing and marketing evolved and new premium cotton products and services.

To achieve this, producers will require improved market intelligence and greater engagement with the customers of Australian cotton is essential.

A clearer understanding of existing markets and supply chains for Australian cotton products will be an initial step. Identifying and developing innovations for market opportunities will follow. Beyond this, developing a market focus from the farm to the fabric and/or garment producer will be critical to ensuring that value chain R&D is customer driven and is able to secure a competitive advantage for the Australian cotton producer.

Innovation arises at the point where knowledge, markets and experience coincide. Just as R&D has assisted industry in on-farm productivity growth, it is expected that industry can grow the value of its products by further developing people and partnerships which encourage innovation and collaboration in the research, development and delivery of value chain R&D outputs.

This approach recognises the strengths of existing post-farmgate practices; the skilled and professional agribusinesses and individuals that already service the Australian cotton industry.

A cohesive and integrated industry approach to implementing change will continue to provide the maximum benefits to the producers and value chain participants for Australian cotton.

Value Chain Investment Manager, Dallas Gibb

# Progress towards Planned Outcome in 2008–09

## STRATEGIC OBJECTIVE 1

**Develop contemporary knowledge and intelligence about products, markets and supply chains**

### Key investments

Conduct scoping studies of markets, risks and opportunities for Australian cotton products

Support for the ACGRA 14th Australian Cotton Conference; extending contemporary market knowledge and value chain research results

Investments to achieve this strategic objective produced some very promising results in 2008–09. Even more promising for the future, this work represented an involvement by the industry's entire production chain and a joint commitment to collaborative future action.

Previous investments in farm productivity and the cotton industry's environmental management system, Best Management Program (BMP), have resulted in large efficiency, environmental and production gains at the farm level. As a result, Australian growers now enjoy a reputation for leading the world in the sustainable production of some of the highest quality upland (*Gossypium hirsutum)* cotton available. In respect to fibre quality, the benchmark for Australian cotton on the world market is SJV: an acala-type cotton from the San Joaquin Valley in California. Like SJV, Australian cotton is almost entirely upland cotton, with only small areas of the high quality extra-long staple Pima cotton, *Gossypium barbardense*, grown (Pima cotton constitutes less than 5 per cent of global production). Worldwide, the quality of upland cotton is ever-increasing, particularly in countries such as the USA, India and Brazil, and, as a result, Australia must develop strategies to maintain and improve on its competitive advantage in the marketplace.

CRDC's Strategic R&D Plan 2008–2013 provides for greater investment in post-farmgate research, including development of 'demand pull' strategies for Australian cotton fibre, in order to generate greater value within the Australian cotton fibre for the benefit of all supply chain participants. One key focus under the new strategic plan is to understand how best to develop and promote new premium cotton types. As a result, the industry is seeking to develop collaborative links with domestic and/or international processors and brand owners to help secure, improve and share the premiums gained for Australia cotton.

CRDC convened a forum, 'We're Aussie, Wear Aussie', in May 2009, which brought a wider high level supply chain audience together to challenge a number of assumptions the industry has made over potential market leverage points for Australian fibre, and to chart a course for the future.

The forum posed a number of questions and challenges for the industry, including the need to identify clearly 'the problem that needs solving' and who the industry is targeting. The forum also dealt with the need for the industry to generate an agreed market focus, or positioning of Australian cotton, that can still be adapted to meet the needs of spinners and consumers but delivers a clearer message about Australian cotton fibre quality and the high standards of our production values. The table on the adjacent page summarises the forum outcomes and future actions.

In 2008–09, CRDC worked in collaboration with the Australian Cotton Shippers Association (ACSA) to monitor spinning mills' quality requirements, with surveys conducted in Korea and Japan (the results from Japan are still to be collated). The Korean survey revealed some interesting findings. The mills' perceptions of quality parameters for Australian cotton, compared with our key competing growths, indicate that they believe SJV cotton remains a superior fibre; however, for parameters such as contamination, trash, and neps (short, immature, tangled bunches of fibre) Australian cotton has an equal or better reputation. For short fibre content, SJV is still seen as significantly better than Australian cotton, showing that this is an important area for future R&D. (See graphs, page 44.)

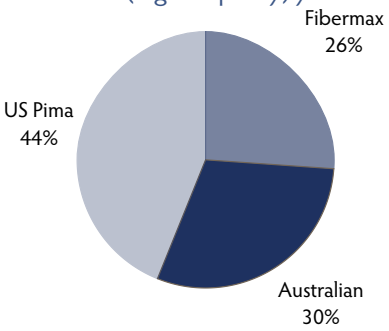
CRDC was a foundation sponsor of the 14th Australian Cotton Conference, *New Beginnings – Cotton in a Climate of Change*, held in August 2008. For the first time, the conference combined with ACSA to formalise and enhance the R&D focus on the entire production chain that has been a feature of recent conferences. This well-attended conference reinforced the industry's awareness of the importance

## 'We're Aussie, Wear Aussie' outcomes and future actions

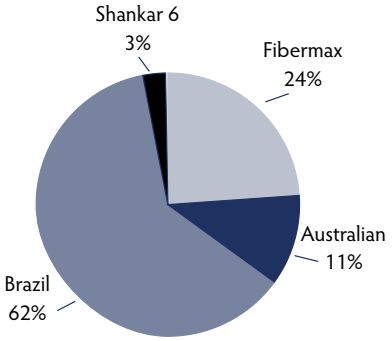
| Objectives | Outcomes | Future Action |
|---|---|---|
| Showcasing Australian Best Management Practice 'BMP' cotton | The concept of 'BMP' was well communicated to all value chain stakeholders – but brand owners considered the value of 'BMP' as a marketing tool to be of limited value. Rather, BMP may be part of the process that can be used to back up a brand if the consumer decides to delve deeper. Key message: 'an accreditation scheme is not a brand.' | Identify potential 'lifestyle' issues associated with the BMP concept that may be communicated simply/visually within a brand. |
| Showcasing Australian Premium Cotton | The concept of Australia as a supplier of premium raw cotton for production of medium to fine count yarns was communicated adequately; however, communication of how this translates to fabric and garment quality was lacking. | Preparation of 'premium' fabric samples for demonstration purposes of desirable tactile and physical properties may be required. Enhanced communication to ensure we are producing a fibre that can adequately deliver the fabric the market demands. |
| Showcasing the 'Australian Grown' cotton product | 'Australia' as a brand is unique and recognisable. There is potential to link generic concepts of quality and sustainability to the 'Australian Cotton' story to generate a brand. There may be potential co-branding opportunities with the 'Australian Grown' campaign. | Determination of what percentage of Australian cotton is required/acceptable in an 'Australian Grown'/'Australian Cotton' product. This may have implications with regards to the price point for the end product. Traceability of the product is also important. |
| Bring cotton/textile industry 'value chain' participants together for mutually beneficial dialogue. | Participants included seed breeders, textile researchers, farmers, marketers, media, garment manufacturers and brand-owners | Identification and inclusion of other links in the chain, that is, spinners, weavers, knitters, manufacturers and textile agents. |
| Identify individual supply chain stakeholders' wants and needs | Limited success. Without solid commercial participation from spinners and manufacturers, outcomes from this part of the program were not great. Assumptions were made that 'practical' requirements (eg product specifications) were more important at the production/manufacturing end of the supply chain, whereas conceptual issues are more important the closer you progressed toward the end consumer. | Possible inclusion of other supply chain members – spinners, weavers, knitters, manufacturers and textile agents – as part of the 2010 Australian Cotton Conference, and/ or offshore forums. |
| Lessons from case studies | By enhancing communication, business linkages and or product ownership there is potential to shorten supply chains and improve market signals and/or sharing of value through the supply chain. | Develop supply chain 'maps' and discuss/ communicate developments with all stakeholders to ensure good two-way information flow. Develop a proactive approach toward textile/fashion market signals. |
| Exploring opportunities to develop 'Demand Pull' | Any effort to develop a brand needs to be linked to a lifestyle that the consumer can relate to, rather than a process that benefits the producer or manufacturer. Premiums (if available) will flow through the supply chain via normal supply/demand functions. | Determination of 'Lifestyle' benefits of Australian raw cotton (which may, or may not, be linked to the BMP concept above).<br>Additionally, there is a need to clearly identify the question that was not answered in terms of any 'branding concept'. |

## Korea mill survey 2009

### 40–59 Ne (higher quality) yarn




### 30–39 Ne (lower quality) yarn

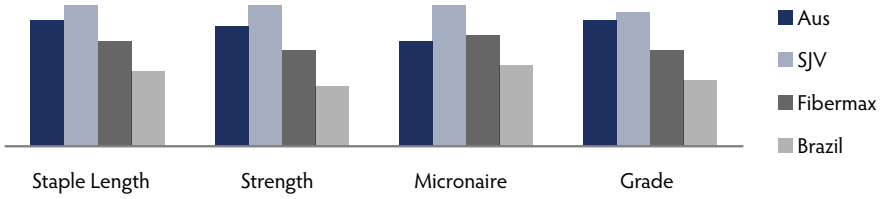



of producing high quality fibre that meets the needs of spinning mills. A paper presented at the conference by CSIRO's Geoff Naylor, Stuart Gordon, Robert Long and Rene van der Sluijs, *The role of long staple upland & pima cotton – Opportunities for medium & ELS types*, highlighted the results of CRDC investments in value chain R&D, which is developing new understanding of the spinning capabilities and market potential for new high quality CSIRO varieties likely to be grown in Australia within the next five years.

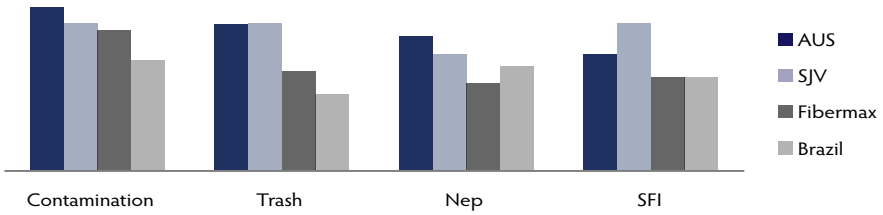
The partnership established with ACSA is developing stronger links with major international mills and allowing a greater understanding of product needs and market opportunities. As a result of the survey of Korean spinning mills, discussed above, a supply chain map has been developed for two major Korean spinning mills, showing their supply links to four clothing manufacturers who in turn supply to over 30 well known brand names in the US and Australia. Similar supply chain maps will be developed for other countries to which Australia supplies cotton as the surveys in those destinations are completed.

The improved market knowledge developed during 2008–09 in partnership between CRDC, ACSA and Cotton Australia has also started to highlight

### Average mill perceptions of key Contracted quality specifications




### Average mill perceptions of key Non-Contracted quality specifications



to industry where adoption of the outcomes from R&D on fibre processing and fibre testing can best be collaboratively promoted.

### Outputs contributing to Strategic Plan Measures of Success

- A survey of Korean spinning mills established how these mills view Australian cotton in relation to the mills' quality requirements and identified areas where improvements are needed.
- The 'We're Aussie, Wear Aussie' forum resulted in a post-farmgate consensus on marketing issues facing the industry and a shared view of future action.
- Combining the Australian Cotton Conference with ACSA reinforced the industry's awareness of the importance of producing high quality fibre that meets the needs of spinning mills.

## STRATEGIC OBJECTIVE 2

Develop improvements in current products

### Key Investment

Develop collaborative R&D partnerships with Australian cotton shippers and overseas cotton spinning mills to investigate new opportunities for using Australian premium cotton

CRDC is a key driver of the industry's Premium Cotton Initiative, which is developing partnerships across the cotton value chain to secure higher value markets for Australia premium cotton varieties. The initiative was born of the success of the CSIRO breeding program in developing a number of new varieties that offer superior fibre quality attributes. This initiative brings together these varieties with new textile processing knowledge and fibre measurement tools developed with CRDC investment.

A key aim of the initiative has been to link industry textile experts with international mills, to assess the use of cotton varieties with improved fibre quality and determine whether they provide the opportunity for mills to produce high quality yarns and fabrics. A CSIRO Materials Science and Engineering researcher travelled to Northern India in March 2009 to work with Vardhman Textile Limited: one of the largest textile groups in India, with numerous processing mills in different parts of the country. Vardhman produce a large range of staple fibres, with cotton accounting for 85 per cent of their production in either 100 per cent cotton or blended cotton.

The results from this commercial trial showed that the new cotton varieties can be spun successfully in high quality fine count ringspun yarns and may be able to be blended with Extra Long Staple (ELS) cottons to produce premium fine 80Ne yarns. The results showed that quality combed yarns for the weaving and knitting sector in the count range 50 to 70Ne can be produced on traditional ring spinning and compact spinning machines more efficiently.

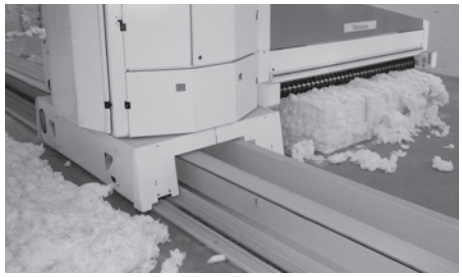
The collaborative program has demonstrated that Australian growers may have the opportunity to develop a niche market for such new premium varieties. For the mill, the primary advantage for using such cotton is a substantial savings in raw material costs compared with other premium ELS varieties that are traditionally used for producing such yarns. This work concludes that new CSIRO-bred cotton varieties are at least equivalent to the US cotton brand 'Ultima Cotton' ,which can receive a 10 to 15 per cent premium in the market.

The international trials also highlighted key areas for improving Australia cotton as reducing neps and short fibre levels, and improving fibre strength.

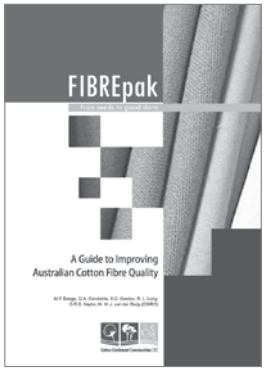
CRDC is working with ACSA to establish links with another three or four major premium production mills. Premium mills across China, Thailand, Japan and Indonesia are being targeted for future trials with Australia new premium cotton types.

CRDC is also working with a number of industry organisations, including ACSA, Cotton Australia, CSIRO and the commercial company, Cotton Seed Distributors Limited, to assess the opportunities that exist for establishing new premium cotton product development and marketing initiatives. The collaboration is exploring the business case for developing specific premium brands for Australia cotton. CRDC's role in the initiative is to provide technical support and investment for the development of new products, technologies and practices that are required to support such brands.

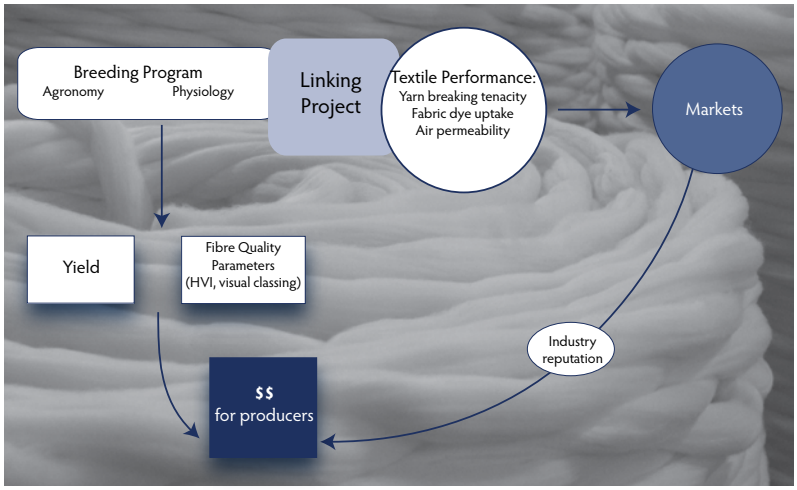
Fibre quality is affected by a large number of interacting factors: variety, seasonal conditions, crop and harvest management, and ginning can all determine whether or not the spinner's requirements are met. While some of these factors cannot be controlled, there are many that can. Through better understanding of the nature of fibre and the factors that affect its quality, improved varieties, management for each region's climate, and processing to minimise damage to fibre are all opportunities to improve the quality of fibre delivered to mills. CRDC, in partnership with the Cotton Catchment Communities CRC, has invested in a project that assessed agronomic factors that affect fibre quality and links fibre to yarn and fabric quality. The research involved a mixture of basic fibre development research with applied practice chance research. In 2008–09, outcomes of this research were collated into a new decision support package for cotton growers, FIBREpak. A table showing fibre quality characteristics and their consequences can be found on the opposite page.



Sicala 350B cotton is fed into the mill in India for its first commercial trials




FIBREpak: a valuable new industry resource for improving agronomic management to achieve and maintain fibre quality




CSIRO researchers from the cotton breeding, agronomy and processing divisions of CSIRO are collaborating on a project entitled 'Linking Farming Systems to Fibre Quality and Textile Performance'. This research is improving knowledge of how crop management, environment and variety can affect fibre quality and thus textile quality. Before the Australian industry can extract the benefits of a sustained competitive advantage in the global marketplace, these linkages need to be fully researched and understood. This research was initiated by the CSIRO, Cotton Catchment Communities CRC and CRDC

## Consequences of poor fibre quality

| Fibre trait | Trait description | Ideal range | Consequences of poor fibre quality – cotton price | Consequences of poor fibre quality – spinning |
|---|---|---|---|---|
| Length | Fibre length varies with variety. Length and length distribution are also affected by stress during fibre development, and mechanical processes at and after harvest. | UHML in excess of 1.125 inch or 36/32nds | Premiums can be gained for long staple length. Significant price discounts below 33/32nds | Fibre length determines the settings of spinning machines. Longer fibres can be spun at higher processing speeds and allow for lower twist levels and increased yarn strength. |
| Micronaire | Micronaire is a test of fibre fineness. The test measures the resistance offered by a weighed plug of fibres in a chamber of fixed volume to a metered airflow. | Micronaire values between 3.8 and 4.5 are desirable. Premium range is considered to be 3.8 to 4.2. | Significant price discounts below 3.5 and above 5.0. | Micronaire determines the number of fibres needed in a yarn cross-section, and hence the yarn count that can be spun. Cotton with a low micronaire may have immature fibre. High micronaire is considered coarse and provides fewer fibres in cross section. |
| Short fibre content | Short fibre content (SFC) is the proportion by weight of fibre shorter than 0.5 inch or 12.7 mm. | < 8% | No premiums or discounts apply. | The presence of short fibre in cotton causes increases in processing waste, fly generation and uneven and weaker yarns. |
| Uniformity | Length uniformity or uniformity index (UI), is the ratio between the mean length and the UHML expressed as a percentage. | > 80% | Small price discounts at values less than 78. No premiums apply. | Variations in length can lead to an increase in waste, deterioration in processing performance and yarn quality. |
| Strength | The strength of cotton fibres is usually defined as the breaking force required for a bundle of fibres of a given weight and fineness. | > 29 grams/tex | Small premiums for values above 29 g/tex. Discounts appear for values below 27 g/tex. | The ability of cotton to withstand tensile force is fundamentally important in spinning. Yarn and fabric strength correlates with fibre strength. |
| Grade | Grade describes the colour and 'preparation' of cotton. Under this system colour has traditionally been related to physical cotton standards although it is now measured with a colorimeter. | > MID 31 | Small premiums for good grades. Significant discounts for poor grades. | Aside from cases of severe staining the colour of cotton and the level of 'preparation' have no direct bearing on processing ability. Significant differences in colour can lead to dyeing problems. |
| Trash / dust | Trash refers to plant parts incorporated during harvest, which are then broken down into smaller pieces during ginning. | Low trash levels of < 5% | High levels of trash and the occurrence of grass and bark incur large price discounts. | Whilst large trash particles are easily removed in the spinning mill too much trash results in increased waste. High dust levels affect open end spinning efficiency and product quality. Bark and grass are difficult to separate from cotton fibre in the mill because of their fibrous nature. |
| Stickiness | Contamination of cotton from the exudates of the silverleaf whitefly and the cotton aphid. | Low / none | High levels of contamination incur significant price discounts. | Sugar contamination leads to the build-up of sticky residues on textile machinery, which affects yarn evenness and results in process stoppages. |
| Seed - coat fragments | In dry crop conditions seed-coat fragments may contribute to the formation of a (seed-coat) nep. | Low / none | Moderate price discounts. | Seed-coat fragments do not absorb dye and appear as 'flecks' on finished fabrics. |
| Neps | Neps are fibre entanglements that have a hard central knot. Harvesting and ginning affect the amount of nep. | < 250 neps/gram | Moderate price discounts. | Neps typically absorb less dye and reflect light differently and appear as 'flecks' on finished fabrics. |
| Contamination | Contamination of cotton by foreign materials such as woven plastic, plastic film, jute / hessian, leaves, feathers, paper leather, sand, dust, rust, metal, grease and oil, rubber and tar. | Low / none | A reputation for contamination has a negative impact on sales and future exports. | Contamination can lead to the downgrading of yarn, fabric or garments to second quality or even the total rejection of an entire batch |

Source of table: FIBREpak

### Outputs contributing to Strategic Plan Measures of Success

- The Premium Cotton Initiative demonstrated that Australian growers may have the opportunity to develop a niche market for new premium cotton varieties.
- International spinning mill trials highlighted key areas for improving Australia cotton as reducing neps and short fibre levels and improving fibre strength, providing guidance for future R&D.
- A new industry partnership is exploring the business case for developing marketing initiatives for premium quality Australian cottons.
- Knowledge from fibre development research and applied practice change research into agronomic factors that affect fibre quality and links fibre to yarn and fabric quality have been collated into a new decision support package, FIBREpak, which will aid producers in agronomic decision making.

## STRATEGIC OBJECTIVE 3

**Facilitate the development of novel products**

### Key Investment

Conduct scoping studies of opportunities for improved and novel Australian cotton products and processes

R&D for the development of novel products has focused on three key areas: biotechnology for fibre development, biotechnology for cottonseed improvement and cotton spinning technologies and practices.

With the establishment of the Cotton Breeding Australia partnership between CSIRO and Cotton Seed Distributors Ltd in 2007, CRDC investments in cotton fibre research have been reduced over the last two years, following the completion of research identifying fibre-specific genes. However, CRDC has invested in a project just completed at the University of Adelaide, which has identified a gene that provides potential improvements in fibre elongation: an important fibre property that allows for production of higher quality yarns.

CRDC investments in CSIRO research into healthier cottonseed oil has centred on the potential for commercial development of cottonseed oil with high oleic content, derived from genetically modified cotton plants. Following approval by the Office of the Gene Technology Regulator (OTGR), seed increase trials were conducted in 2009, with 1.5 tones of the GM cottonseed produced. This seed will be used for cottonseed oil trials, food service sector trials such as frying tests, and small scale animal stock feeding trials to assess feed conversion improvements and improvements in meat and other animal produce (milk quality and egg quality). CSIRO also continues to investigate the opportunities for international commercialisation of the technology.

### Outputs contributing to Strategic Plan Measures of Success

- A recently completed project has identified a gene that provides potential improvements in fibre elongation: an important characteristic of high quality fibre.
- Following OTGR approval of healthier, high oleic content cottonseed developed by CSIRO with CRDC support over several years, 1.5 tonnes of seed was produced in the 2008–09 season, allowing food sector and stock feed trials to proceed.

## STRATEGIC OBJECTIVE 4

**Advance cotton product processing**

### Key Investment

Investigate improvements in cotton fibre quality and processing efficiency.

Moisture management is a fundamental problem in the ginning process; as the cotton dries, it becomes more prone to damage. One key problem in maintaining moisture has been a lack of accurate measurement of moisture before and after the cotton undergoes ginning. In a joint investment with CRDC in a Cotton Catchment Communities CRC project, CSIRO researchers have developed a new moisture sensor. A provisional patent has been lodged for the technology and preliminary discussion have taken place with a potential commercial developer.

The opportunity also exists to combine the sensor with a new cotton flow system being developed as part of a project investigating changes to the lint cleaner. A change in the method of flow of cotton from the gin stand may enable more effective techniques to be developed for adding moisture to cotton prior to cleaning. The new sensor is expected to play a key role in automating any new moisture management system developed for gins.

Neps are one of the key fibre property defects monitored by international mills, because they have a major impact of the quality of the fabric produced. As identified above, while Australia has a reputation for high quality cotton, the levels of neps and short fibre content remain a concern for the industry. As a result of a CRDC investment, data collected by CSIRO has found higher neps levels than expected: a problem that will need to be addressed if the industry wishes to develop higher premiums in the future. Data developed from the survey of some 1000 cotton samples has been analysed using different ginning techniques and, where possible, traced back to individual farms and growing regions. This data will provide better guidance on the key factors leading to the development of neps and short fibre content and, in turn, provide an indication of where best to target future research.

With respect to cotton spinning technologies, links have been established with the Hong Kong Polytechnic University to investigate opportunities for developing new spinning technology. The university had developed and commercialised technology for developing low twist yarns and CRDC is interested in working with them to assess how such technology can best be used with Australian premium cottons, either alone or in combination with other fibres.

### Outputs contributing to Strategic Plan Measures of Success

- A new CSIRO-developed moisture sensor is expected to play a key role in automating any new moisture management system developed for gins. A provisional patent has been lodged and preliminary discussions have taken place with a potential commercial user.
- Data collected in a neps survey will provide better guidance on why neps and short fibre content develop and where to target future research.
- Links have been established with the Hong Kong Polytechnic University, to investigate opportunities for new spinning technologies suitable for Australian premium cottons.

## STRATEGIC OBJECTIVE 5

Develop objective measurement of Australian cotton fibre

### Key Investment

Investigate the commercial application of new Australian fibre measurement technologies in the value chain

The majority of international mills that produce premium fabric and garments pay particular attention to the quality of cotton they purchase to ensure it meets their needs for a particular product they are producing, so uniform, reliable measurement of important quality characteristics is important.

CRDC has invested over the past several years in the development of two new instruments: SiroMat, which measures maturity, and Cottonscan, which measures fibre fineness. Currently available commercial instruments cannot directly measure these two important fibre properties.

SiroMat is due to be commercially available in 2011 and will be promoted to both domestic and international cotton classing rooms and mills. The technology may also prove to be a useful research tool in understanding the impact of fibre maturity on cotton processing. Both dye uptake and neps generation have been shown to correlate to fibre maturity and these two aspects should provide evidence of the value of the new measurement to mills and dyeing houses.

Cottonscan measurements have been shown to offer a significant improvement over traditional High Volume Instrument (HVI) measurement. This potentially allows spinners to more effectively differentiate fibre fineness, which may be a key factor used to improve mill efficiency by reducing yarn breaks. Further development continued in 2008–09 to increase the speed with which Cottonscan can reliably determine average fibre linear density, or fineness. The CSIRO Cottonscan developers have now reduced the time required for sample preparation and testing to approximately one minute, which is a much more acceptable sampling time for use with HVI equipment. These faster instruments have been tested with Australian commercial collaborators, as well as the United States Department of Agriculture and another research institution in the USA.

## Key Investment

### Further develop post-farmgate best management practices for ginning and classing and investigate BMPs for the storage and handling of cotton

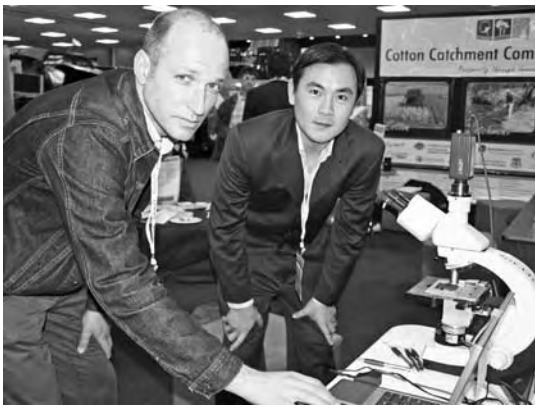
The development of Best Management Practices (BMP) for various sections of the value chain is critical to securing the value of cotton and obtaining premiums. As described below, BMPs have been developed for the classing and ginning and are being investigated for the transport and storage sectors.

In collaboration with the respective industry groups, classing BMPs have been further developed and BMPs for ginning have been initiated. An audit of compliance with the classing BMPs has allowed the development of procedures for assessing fibre properties and a comparative assessment of standard cotton samples. After completion of two separate audits by CSIRO, it is evident that the Australian classing sector offers a standard equivalent to, or better than, similar testing services used internationally. An additional benefit of the audit process is that it has identified inconsistencies that exist between classing rooms, thereby assisting the industry to improve its performance. An initial audit of compliance with ginning BMPs has been completed and the results with be used to further develop the BMPs and supporting R&D.

Completion of an initial draft of BMPs for transport and storage is expected in early 2010.

### Outputs contributing to Strategic Plan Measures of Success

- Following several years of development and testing, SiroMat is due for commercial release in 2011 and will provide more accurate and meaningful measurement of fibre maturity.
- Cottonscan researchers reduced the time required for sample preparation and testing to approximately one minute, which is a much more acceptable sampling time for use with HVI equipment.
- Work to extend BMPs through the post-farmgate sector is nearing completion, with increasing 'ownership' of the process and benefits of best management practices for cotton throughout the value chain.




CSIRO Project Leader in Cotton Research, Dr Stuart Gordon, and Hy Hwang of BSE Electronics at the launch of SiroMat at the Australian Cotton Conference in August 2008

# Program Two FARMING SYSTEMS

## STRATEGIC R&D PLAN 2008–2013

### Goal

Cotton in a highly productive farming system with improved environmental performance

### Outputs/Measures of Success

- Climate and natural resource management risks and opportunities for Australian cotton producers are defined and understood
- Climate and natural resource policy implications are interpreted
- Collaborations and partnerships within and between rural industries delivering innovation, capacity and knowledge for farming systems
- Benchmarking, assessing and reporting on productivity and environmental performance of cotton farming systems
- An industry capable of managing its biosecurity responsibilities

### Outcome

A more resilient, profitable and competitive cotton farming system

### Background

Over the last decade, Australian cotton growers have had to deal with a highly variable climate, leading to reduced availability and reliability of water for irrigation in many regions. Adapting to a less reliable water supply, along with maintaining profitability, have therefore been key drivers for change and adaptation over this period. Compared with a decade ago, average cotton production in 2009 has improved by one third, or 500 kilograms per hectare. Concurrently, water use efficiency, measured in bales per megalitre of water used, has improved by 40 per cent and insecticide use has declined by over 80 per cent.

Against these improvements, the average cost of growing cotton has increased by more than 40 per cent in the last decade and cotton prices in the last five years have averaged 16 per cent below the long-term (20 year) average. To remain competitive, Australian cotton growers must strive for even greater improvements in yield and/or returns at less cost to themselves and the environment.

Investments in R&D under this goal deal directly with improving the productive and environmental performance of Australian cotton farming systems. This includes having to view the cotton farming system through the new lens of climate change, to better understand the additional challenges a hotter or drier or more variable climate may bring for cotton production, as well has how to reduce greenhouse emissions and contribute to both our national and global responses to this issue. Fortunately, many of the areas in which production efficiencies can still be improved are closely linked to the potential to reduce environmental impact, particularly in terms of greenhouse emissions. For example, CRDC is investing in R&D that focuses on improving nitrogen, water and energy use efficiency. These will all improve the bottom line for growers and reduce emissions, and we do this increasingly in collaboration with other crop-focused Rural R&D Corporations.

In addition to improving these productivity and efficiency issues, biosecurity threats remain an important challenge for the industry and require a significant investment in R&D. Effective monitoring of endemic and potential new pest, disease and weed threats remains a high priority, along with effective stewardship of biotechnology and pesticides to minimise the threat of insect and weed resistance to these important production tools.

Farming Systems Investment Manager, Tracey Farrell

# Progress towards Planned Outcome in 2008–09

## STRATEGIC OBJECTIVE 1

**Build the industry's understanding of climate and natural resources challenges**

Irrigation farming in the Murray Darling Basin is changing as a result of water and climate change constraints. Changes to the physical and resource environment as well as changes to, or new, government policy present both risks and opportunities for cotton growers. Research conducted under this investment area seeks to clarify the nature of those risks and opportunities.

## Key investment

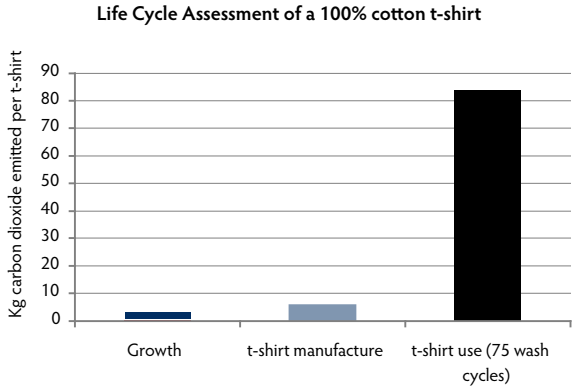
### Conduct scoping studies of climate and natural resource management risks and opportunities for Australian cotton

In a study commissioned by CRDC, with funding support from the Australian Greenhouse Office, (now the Australian Government Department of Climate Change), the Institute for Sustainable Resources and Queensland University of Technology, completed a draft Life Cycle Assessment (LCA) that evaluated the environmental impacts of a 100 per cent cotton t-shirt throughout its life cycle, from production (including the extraction and production of raw materials) to use and final disposal. The main focus of the report is on energy and fuel consumption, with a lesser focus on the effect on the depletion of mineral resources and the ozone layer.

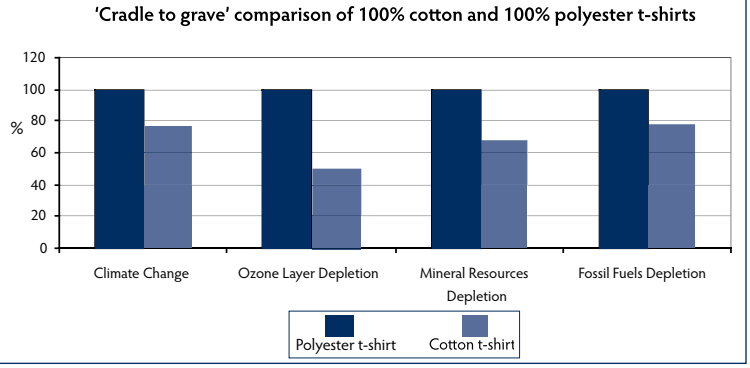
The purpose of the LCA is twofold. The first goal is to measure the contribution of the cotton growing

The carbon footprint of a cotton t-shirt illustrated in this graph shows the dominance of the 'use' component, which indicates that major gains in reducing greenhouse gases could be made by researching how Australians could become more environmentally friendly in the washing, drying and ironing of their clothing.

Data source for both graphs: Professor Peter Grace, Queensland University of Technology




The LCA also looked at the 'cradle to grave' life of a cotton t-shirt compared to a polyester one, considering production of the fibre, manufacture of the product and its use.



and manufacturing industries to the total impact of and using an everyday item such as a t-shirt as well as the impact of consumers in using the t-shirt and communicate the environmental qualities of cotton to the general public and stakeholders. The second goal is a preliminary examination of ways in which the cotton industry could further reduce the greenhouse gas emissions associated with cotton production.

In 2008–09, CRDC, Australian Wool Innovations and Dairy Australia commissioned the Australian Farm Institute to conduct a study on the potential economic impacts of an Emissions Trading Scheme (ETS) on agricultural industries in Australia. The project was initiated prior the Australian Government's announcement that it proposed to introduce the Carbon Pollution Reduction Scheme; however, the assumptions used in the modelling on possible introduction of the scheme to agriculture were well aligned with the indications by the Australian Government to date. The study was conducted by the Centre for International Economics (CIE), who used a range of models to estimate the change in output that might result from an ETS for a range of industries compared to their continuing with business as usual.

The results indicate that the potential impact on the cotton industry could be relatively low, but still significant compared to business as usual, even if agriculture remained an uncovered sector. The results cannot be considered as a prediction of what will happen because it is recognised that production practices are constantly being improved with the assistance of R&D and adoption of new technology and because the "business as usual" scenario used is a modelling tool used for comparative purposes rather than a realistic indicator of the future. Nevertheless, it is important for agricultural industries to attempt to understand the challenges posed by climate change and how they can contribute to reducing national greenhouse gas emissions without reducing their competitive advantage or productive capacity. An understanding of all of these factors places agriculture in a better position to contribute in a positive way to the development of sound policy for reducing emissions in the sector.

A postgraduate project with the University of Southern Queensland, reviewing energy consumption in cotton ginning systems, commenced in 2008–09. Four major processes have been identified for benchmarking power consumption: fans, cleaning, the gin stands and the bale press. Six cotton gins actively participated in the energy use review, enabling the initial development of national benchmarks. From this limited study, an initial estimate of greenhouse gas emissions associated with the cotton ginning process has been calculated at 57 kilograms of carbon dioxide per bale. The study has shown that with improved measurement and benchmarking there is potential for cotton gins to improve their energy use efficiency, particularly if it can be done collaboratively across the industry. Further, the study has informed gin owners of their emissions in the context of the proposed Carbon Pollution Reduction Scheme.

An environmental risk assessment framework has been devised, which accounts for scientific and regulatory gaps in environmental risk assessment applied at the catchment scale in Australia. It recommends a number of improvements to the current process, including a nationally consistent protocol for conducting risk assessments. If the recommendations are adopted it will allow any environmental organisation to conduct risk analyses of identified hazards in a manner consistent with current best knowledge, thereby streamlining comparisons throughout Australia.

Data has been collected during the course of a PhD study on the provision of four ecosystem services (carbon sequestration, biodiversity conservation, erosion mitigation and forage production) by five vegetation types (river red gum, coolibah, myall, native/derived grasslands and mixed tree and shrub plantings) in different condition states and under different management at some 85 sites on cotton farms and travelling stock routes between Boggabri and Walgett on the lower Namoi floodplain. The photographic series from this project, as illustrated on page 54, should prove a powerful tool for illustrating the effect of different management on vegetation.

Above: Summer 2007
Below: Summer 2008

These photographs were taken in exactly the same spot on the lower Namoi floodplain twelve months apart and show the recovery of vegetation despite the drought

Vertisols (cracking clay soils) are the most common soil type in cotton growing areas. The propensity for surface slaking to occur during storm rains has major implications in determining the propensity for erosion in these soils and the ability for rainfall to infiltrate below their surface. This research has shown that soil types with organic matter content of 2.5 per cent or above have a reduced severity of slaking, particularly when the soil also has a higher carbon:nitrogen ratio.

The productivity benefits that flow from commitments to best practice natural resource management on-farm are being extended successfully to cotton growers. Cotton industry extension has facilitated the development of 83 property plans, covering 120,000 hectares of farming land in the Namoi valley.

Other outcomes from extension include a strong collaborative relationship between the industry and the Namoi Catchment Management Authority (CMA) to achieve joint natural resource management targets within the Namoi catchment. This involves a range of agricultural industries, including irrigated cotton and grains. There is also heightened community awareness of the beneficial relationship between the Cotton BMP program and the Namoi CMA catchment and management targets through extension visits, collaborative workshops and extension involvement in grower groups.

The strong relationship between industry and the CMA sees increased level of incentives flowing from the Namoi CMA to targeted projects within the cotton industry. Interest in the work is evidenced by strong attendances at field days.

A project has assessed interactions between streams in the Maules Creek catchment (part of the Namoi catchment), and the underlying aquifer. The outcomes from this study have implications for understanding the impacts of groundwater abstraction, such as the intermittent stream flow due to enhanced stream-fed aquifer recharge, and for estimating the sustainable extraction of groundwater from the regional aquifer. The project achieved close collaboration with many other irrigation and deep drainage researchers. It has also enabled leverage of other funding sources, including the initiation of five PhD studies.

## Outputs contributing to Strategic Plan Measures of Success

- A Life Cycle Assessment of a cotton t-shirt identified the value chain process – on-farm production, processing and manufacturing – as minor factors in the production of greenhouse gases, compared with the 'use' phase – washing, drying and ironing.
- A study on the potential economic impacts of an Emissions Trading Scheme on agricultural industries in Australia confirmed that understanding how to reduce national greenhouse gas emissions without reducing competitive advantage or productive capacity is the most positive way to contribute to the development of sound policy in the sector.

- A study has shown cotton gins can improve their energy use efficiency through benchmarking and measuring, particularly if it can be done collaboratively across the industry.
- Outcomes from a study on the provision of ecosystem services at some 85 sites should prove a powerful tool for illustrating to farmers the effect of different management on vegetation.

The Maules Creek project had a positive reception from local growers at a well-attended meeting, with researcher presentations on soil moisture measurement, surface water/groundwater interactions at an experimental site and the development of multilevel groundwater samplers for hydrochemistry and stable isotopes sparking questions and discussions

PhD student Anna Greve and practicum student Sabastein Moirat installing resistivity probes as part of Anna's development of an in-situ method to measure soil moisture changes using resistivity

- Achievements from CRDC-supported extension activities, include the development of a strong collaborative relationship between the industry and the Namoi CMA to achieve joint natural resource management targets within the Namoi catchment and increased community awareness through field days of the benefits the cotton-CMA interaction is bring to catchments and communities.
- New knowledge of interactions between streams in the Maules Creek area of the Namoi catchment and the underlying aquifer has increased understanding the impacts of groundwater abstraction. This research has also leveraged other funding sources, including the initiation of five PhD studies.

## Key investment

### Investment support for the implementation of the National Climate Change Research Strategy for Primary Industries

In 2008–09, CRDC continued to invest in and support the National Climate Change Research Strategy for Primary Industries (CCRSPI), which involves all Rural R&D Corporations (RDCs), Primary Industries Standing Committee (PISC) agencies and CSIRO, and is affiliated with several universities.

CCRSPI is overseen by a Steering Committee whose membership is comprised of representatives drawn from the partnership. In addition, regular meetings of all partners in the initiative have been held to keep communications channels open. CCRSPI played an important role in coordinating collaborative proposals to the Climate Change Research Program established under the new Department of Agriculture, Fisheries and Forestry program, Australia's Farming Future.

CCRSPI has played an important role in identifying cross industry issues in relation to climate change that require further R&D investment. It has coordinated the establishment of successful broad R&D collaborative programs and projects dealing with carbon emission and adaptation to climate change, funded under the Australian Government Department of Agriculture, Fisheries and Forestry's Climate Change Research Program.

### Outputs contributing to Strategic Plan Measures of Success

- The National Climate Change Research Strategy for Primary Industry, involving wide collaboration, has identified cross-industry R&D requirements and is coordinating broad R&D collaborative projects dealing with carbon emissions and adaptation.

## Key Investment

### Continued investment into benchmarking and reducing greenhouse gas emissions and improved resource efficiency, including the testing of BMPs for reducing nitrous oxide emissions

In the continuation of a long term cotton–legume cropping systems experiment, a study by the Cotton Nutrition Research Group and the Plants and Soils National Priority Team which monitored nitrogen use efficiency (NUE) in 23 commercial cotton crops in six cotton valleys during the 2007–08 season has confirmed that nitrogen fertilisers can be used much more efficiently in the cotton industry. The team compared these measurements using a relationship formulated over the last five seasons in a cropping systems experiment at the Australian Cotton Research Institute, Narrabri.

In the five-year study, NUE has been similar in differing crop rotations over the five years, averaging about 12 kilograms of lint per kilogram of crop nitrogen uptake. Nitrous oxide emissions were measured at the start of the growing season and indicated substantial emission from the nitrogen-fertilised plots but there were no detectable emission from the (unfertilised) plots where cotton is grown in rotation with legumes.

In addition, soil organic carbon levels have increased in all of these cropping systems (continuous cotton, cereal and legume rotations) over the past 10 years at about one tonne of carbon dioxide equivalent per hectare each year, which is consistent with the carbon dioxide emitted from average cotton farming enterprises. It should be possible to grow carbon-neutral cotton where legume rotations are used to reduce nitrous oxide emissions, while assisting in the sequestration of soil organic carbon.

Dr Ian Rochester, CSIRO, is lead researcher in a study of nitrogen use in cotton production which has shown that growers can safely reduce nitrogen fertiliser inputs by up to 25 per cent, providing environmental and economic benefits

A third season of greenhouse gas data collection was completed in 2008–09, with information now available on the emissions from a relatively high intensity cotton-grains system with reduced fallows. The loss of nitrogen as nitrous oxide from a field site at Dalby from early November 2008 to late February 2009 was estimated to be 259 grams of nitrogen per hectare: 0.12 per cent of the applied nitrogen. The full season estimate was less than 0.5 per cent: the nitrous oxide emission factor used in the Australian National Greenhouse Gas Inventory. The estimated loss of carbon dioxide from the experimental site of 1550 kilograms of carbon per hectare during the four months is consistent with a farming system that has sequestered carbon, which is not typically found in traditional cotton monoculture cropping.

This project has provided the impetus for the Australian Government to fund a new national program to examine greenhouse gas emissions from agricultural systems. Professor Peter Grace will lead

the three-year program, principally funded by the Department of Agriculture, Fisheries and Forestry under its 'Australia's Farming Future' initiative. Within this initiative, a cotton-grains experiment will be undertake at Kingsthorpe, west of Toowoomba, on a GRDC/CRDC-funded site.

Custom designed static chambers for measuring nitrous oxide and carbon dioxide were installed at the long-term cotton cropping systems experiment at Narrabri, with staff training and initial measurements undertaken during the 2008–09 cotton season. Initial measurements suggest treatment effects of the cropping systems are greater than can be accounted for by the variability among chambers. These new facilities will greatly enhance the industry's ability to benchmark the influence of cropping systems and farming practices on green house gas emissions.

### Outputs contributing to Strategic Plan Measures of Success

- A study of nitrogen use in cotton production has shown cotton producers that they can reduce nitrogen fertiliser inputs by 15 to 25 per cent, using knowledge gained through R&D, which will reduce their costs (and thus improve gross margins) and may improve yields.
- Greenhouse gas data collection from cotton-grains systems with reduced fallow was completed in 2008–09 and has provided the impetus for the Australian Government to fund a new national program to examine greenhouse gas emissions from agricultural systems.
- Custom designed static chambers for measuring nitrous oxide and carbon dioxide will greatly enhance the industry's ability to benchmark the influence of cropping systems and farming practices on green house gas emissions.

## Key Investment

### Joint investment with other Rural R&D Corporations on improved energy management and standardised approaches to Life Cycle Assessments in agriculture

The Rural Industries R&D Corporation (RIRDC), CRDC, Dairy Australia, the Sugar Research and Development Corporation (SRDC), Australian Pork Limited, the RIRDC Chicken Meat Program and Meat and Livestock Australia commissioned URS Australia to scope requirements to develop a standardised life cycle assessment (LCA) methodology for Australian rural industries. The project included literature review, a stakeholder workshop to discuss LCA methodology and a final report with recommendations.

The methodology proposed is consistent with the recently revised international LCA standards and the methods for energy and greenhouse gas emission accounting generally follows established techniques such as those of the Department of Climate Change and International Panel on Climate Change. There are no established methods for water use accounting in LCA but the methodology proposes a reporting framework based on accounting methods used by the Australian Bureau of Statistics and the National Land and Water Resources Audit.

The report suggests that '... [the] success of LCA is dependent on good quality data and currently there is a paucity of relevant Australian agricultural LCA data. This will only be improved through further research and development and data sharing across agricultural sectors. There is a particular need for effort in order to obtain the necessary data on water resources and usage rates.'

### Outputs contributing to Strategic Plan Measures of Success

- Collaborative scoping of requirements for standardised life cycle assessments should lead to a consistent methodology for Australian rural industries, including cotton.

## Key Investment

### Application and evaluation of the EnergyCalc tool for cotton production

The National Centre for Engineering in Agriculture (NCEA), University of Southern Queensland, has leveraged an initial investment by CRDC to develop tools and methodologies for assessing on-farm energy use through the Queensland Farmers Federation (QFF). The NCEA was engaged by QFF to use experience developed in the cotton industry to scope energy use in other industries including sugar,

horticulture, aquaculture and plant nurseries, while revisiting original cotton case study sites in more detail.

This work has allowed the NCEA to further develop the on-farm energy assessment process, which now includes different levels of assessment, ranging from a general overview of energy consumption to a detailed, site-specific investigation of energy intensive farming operations. The NCEA also obtained funding from the Queensland Department of Environment and Resource Management to develop an improved version of the original EnergyCalc software, which is now available for industry use. Further details about the NCEA R&D can be found in the Keytah case study on pages 60 and 61.

### Outputs contributing to Strategic Plan Measures of Success

- A study by the National Centre for Engineering in Agriculture, using the energy assessment software, EnergyCalc, found that reduced tillage has had a significant impact on energy use and costs, and the results have been extended to industry to aid agronomic decision-making.

## STRATEGIC OBJECTIVE 2

**Enhance the capacity of the industry to adopt resilient and adaptive farming systems**

Investments under this strategic objective seek to ensure that the cotton farming system continues to evolve through the adoption of new knowledge, practices and technology. The capacity to respond and adapt to changes in environmental conditions and soil and water resource constraints underpins resilience and helps to maintain the Australian cotton industry's competitive advantage as an efficient, environmentally responsible producer of high yielding, high quality cotton.

In 2008–09, research investments focused on water (making the most of limited supplies, benchmarking efficiency, improving efficiency of centre pivot/lateral move systems, management of high fruit retention crops and measurement and management of deep drainage); nutrition and soils (nitrogen use efficiency, nutrient redistribution in the plant, soil stratification of nutrients, measurement and better utilisation of potassium and phosphorous and combating sodicity); crop rotations (long-term farming systems trials involving cotton, cereals and legumes, crop rotations and nutrient stratification and cotton-maize rotations); and improving production and environmental performance concurrently (testing environmental performance indicators with growers and developing the next version of BMP – myBMP). Further details about myBMP can be found on page 64 and in Program Three: Human Capacity.

### Key investment

#### Develop a conceptual map of farming systems involving cotton

'Systems thinking' provides a scientific methodology for complex problem solving, such as policy analysis, strategic thinking, conflict resolution and restructuring. It provides a 'language' and a range of tools for strategic thinking and multi-stakeholder problem solving and integration.

In December 2008, CRDC convened a workshop involving representatives from various segments of the cotton industry and the GRDC Northern Panel to apply systems thinking to how the cotton farming system works and determine whether any key points of intervention or leverage for future investment in R&D and/or other action could be identified or mapped. The workshop provided participants with some training on systems thinking and the use of certain tools such as systems maps to enable complex interactions to be visualised and more easily understood.

The workshop identified 25 potential key intervention or leverage points where further development or investment in R&D could lead to considerable improvements in cotton/grains farming systems.. Of the intervention points identified, 14 were related to human capacity and/or communication capacity, but only four dealt with more conventional technological science-based solutions to improving farming systems. In 2009–10 CRDC plans to further investigate the role systems thinking can play in analysing and developing responses to the intervention points identified.

### Outputs contributing to Strategic Plan Measures of Success

- A 'systems thinking' workshop identified a number of potential key intervention or leverage points where further development or investment in R&D could lead to considerable improvements in cotton/grains farming systems.

## Key investment

### Continued investment in research into understanding and reducing deep drainage: its implications for soil salinity and water quality

Deep drainage occurs in cotton farming systems but varies considerably from year to year based on climatic and management decisions. Following a decade of CRDC investments in R&D and extension in this area, cotton growers in general are more aware of deep drainage, understanding the need to balance water losses from the system with deep drainage as a natural process that moves salts through the soil profile.

Over the past decade research has been uncovering the facts about deep drainage in cotton farming systems and developing methods for measuring and managing the impacts. In most instances deep drainage is between 100 and 200 millimetres per year. However, more recently drought has lowered these numbers. In drought conditions, growers must guard against too little deep drainage reducing soil productivity through the build-up of salts. A recommendation of a 10 millimetre deep drainage/irrigation event has provided a basis for arriving at a balance between too much and too little.

CRDC and the Cotton CRC held a whole of industry research forum in 2009 to bring together the outcomes of all deep drainage research from the past ten years and consider the key needs for future investment. One of the highest research priorities is to improve understanding of the water movement below the root zone: in particular, the movement of water through the regolith (the layer of unconsolidated rocky material covering bedrock) and understanding when deep drainage becomes groundwater recharge.

### Outputs contributing to Strategic Plan Measures of Success

- A decade of research has led to knowledge about where the balance lies between too little and too much deep drainage for soil health and farm productivity that will assist cotton producers to manage the issue.
- A whole of industry deep drainage forum has developed a list of priorities for future deep drainage research and extension.

## Key Investment

### Continue to invest in an extensive R&D program for improved water use efficiency research and renewed extension initiatives

The results of a CRDC-supported program designed to benchmark water use on cotton farms were reported at the Australian Cotton Conference in August 2008. A total of 37 farms provided data to the project in 2008 and the researchers used a number of industry standard water use indices to enable equitable comparisons of performance.

The results from the 2008 benchmarking were also compared to a similar program run previously, with encouraging results. Production and water use data from 25 cotton farms and over 200 individual fields over three seasons, 1996–97, 1997–98 and 1998–99 found the industry average Gross Production Water Use Index (GPWUI) at that time to be 0.79 bales of cotton produced per megalitre of water used. The data collected in the new survey shows an improvement of around 40 per cent in GPWUI to 1.13 bales per megalitre: a significant increase in water use efficiency.

Water use benchmarking is seen to be an important area of development and capacity building for the cotton industry and a project supported by CRDC and GRDC through the National Program for Sustainable Irrigation continued in 2008–09. This project also attracted additional funding from the National Water Initiative to increase the number of farms included in future benchmarking surveys.

The widespread adoption of Bollgard II® technology has brought with it differences in the way the cotton plant grows and responds to resources such as water. Research has aimed to identify irrigation scheduling

# "An Environment of Change"

## Reducing on-farm energy use

Keytah, a cotton and grains farming operation west of Moree in northern NSW, managed by Andrew Parkes, produces over 10,000 hectares of cotton each year. A CRDC-funded study by Craig Baillie of the National Centre for Engineering in Agriculture (NCEA) analysed energy consumption and costs, and greenhouse gas emissions stemming from changing farming practices on Keytah and found that reduced tillage has had a significant impact on energy use, costs and greenhouse gas emissions.

It was the aim of both Andrew Parkes and Craig Baillie to identify benefits captured by changes to the farming system and opportunities for ongoing improvement in energy efficiency. The cotton industry is highly mechanised, with an estimated 40 to 50 per cent of farm input costs relating to machinery, while greenhouse gas emissions from the use of fossil fuels for the machinery is in the order of 20 per cent.

Previous research by NCEA shows the highest energy use is irrigation (40 to 60 per cent), where pumping occurs on-farm. Harvesting also uses a significant amount of energy at around 20 per cent. Traditionally, tillage inputs have also required a significant amount of energy; however, broader adoption of minimum till systems equates to an estimated 10 per cent saving in energy use compared to conventional tilling. Much of this information came from CRDC-funded research by Craig Baillie into on-farm energy use from seven case study farms.

Major changes in farming systems at Keytah include the reduced amount of tillage, changed row spacing, cotton grown in a cotton/wheat/fallow/cotton rotation, a reduction in the number of tractors from 26 to 11 (possible because of the reduction in tillage) and conversion of some of the diesel motors on irrigation pumps to Liquid Petroleum (LP) gas.

Keytah crop history data was evaluated using the energy assessment software, EnergyCalc, which was developed with the aid of CRDC investment. A 12 per cent energy saving was observed at Keytah as a result of reduced tillage operations. Farm Managers are experimenting with how the farming system can move further towards zero till, with a potential further energy saving of some 12 per cent identified.

Dr Guangnan Chen of the University of Southern Queensland, Craig Baillie, Deputy Director of NCEA, and Andrew Parkes, Keytah's manager, worked together to calculate energy usage in the farming systems at Keytah using EnergyCalc: a valuable tool developed with CRDC support

The changes in practices have been achieved without adverse effects on the yields. There are opportunities for increasing farm productivity through greater stability in the number of hectares planted annually, even in below average rainfall years.

Back in 2000, the most significant uses of energy in the Keytah farming system were in soil preparation and irrigation. Progressively, through the implementation of minimum tillage practices, energy use for soil preparation has reduced while the amount of energy for irrigation has remained the same over time. Given that irrigation now represents the greatest proportion of energy use on farm (50 to 62 per cent) future efforts to reduce on farm energy will be focused in this area.

### Keytah Energy Study

Comparisons of farming practices commonly used in 2000 with those currently used and the farming practices being trialled for the future

| Farming System | Total Energy Use (gigajoules/hectare) | Energy Costs* ($/hectare) | Greenhouse Gas Emissions (kilograms of carbon dioxide/hectare) | Since 2000 |
|---|---|---|---|---|
| 2000 Benchmark | 16.32 | 402 | 1226 | |
| Current Reduced Tillage | 14.33 | 353 | 1076 | -12 per cent |
| Towards Zero Till | 12.44 | 306 | 935 | -24 per cent |

practices based on both soil and plant based measurements for optimising the yield response to water in Bollgard II cotton.

Research has identified the key growth stages where Bollgard II cotton can tolerate water stress and other times where water stress equates to yield loss of up to 2.7 per cent per day. This compares with daily yield losses of 1.2 per cent per day in conventional cotton, highlighting the need for well planned and well informed decision-making for irrigating Bollgard II cotton. Research has also quantified the impact of seasonal variations in climate on the yield responses that can be expected from a range of irrigation frequencies, chosen based on soil moisture measurement. Research results are being communicated to industry and growers are adopting changes in irrigation scheduling practices as a consequence.

A survey of 79 cotton growers has revealed that 97 per cent believe they have improved their water use efficiency over the past five years and of these, 75 per cent believe this is due to their adoption of management practices that enable them to apply less water. When asked how management is being changed, the most frequent response was the adoption of objective irrigation scheduling techniques.

The results of the grower survey were consistent with those from a survey of cotton consultants, shown in the graph on page 62, who estimated that 86 per cent of their grower clients were using water management practices aimed at maximising water use efficiency in 2008 compared to only 37 per cent in 2003.

### Outputs contributing to Strategic Plan Measures of Success

- Data collected in a 2008 water use benchmarking study shows an improvement of around 40 per cent in water use efficiency since 2003, with the number of farms surveyed in future to be increased.
- Research that will aid producers to achieve further WUE has identified the key growth stages where Bollgard II cotton can tolerate water stress and quantified the impact of seasonal variations in climate on the yield responses that can be expected from a range of irrigation frequencies.

## Key Investment

### Continued development of weed management strategies for key problem weeds in cotton/grains farming systems

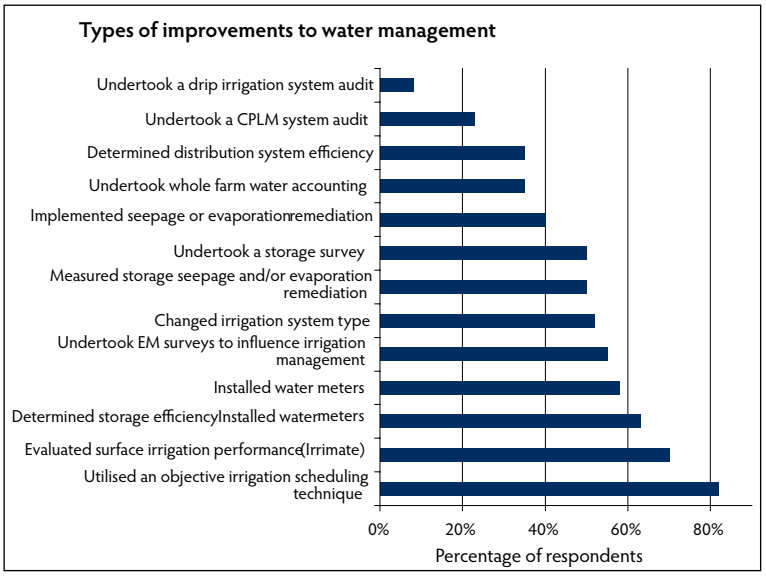
WEEDpak, developed and enhanced with the assistance of CRDC investments, is the industry's principal resource and repository of information and is available at www.cottoncrc.org.au. Updates to WEEDpak in 2008–09 focused on developing a comprehensive resource enabling growers to diagnose symptoms of herbicide damage in cotton crops. As well as extensive pictorial identification tool and symptom descriptions, WEEDpak also provides indications of yield loss associated with damage, as influenced by the type of herbicide, the severity of the damage symptoms and the age of the crop at the time the damage was sustained. This resource aims to assist growers to make prudent economic decisions about the management of crops affected by herbicide drift.

Weed species in cotton fields on farms across the industry were surveyed in 2008–09 through a CRDC investment and compared with surveys from past years. Comparisons show changes in ranking of problem species, in particular the increasing prevalence of Conyza species, that are correlated with changes in farming practices. Research into the ecology of the Conyza species is underway to enable more targeted management strategies to be devised in the near future. Studies are focused on seed characteristics such as dispersal, dormancy and conditions for germination, including testing influence of temperatures, shading, soil moisture, soil type and stubble cover.

A Drift management extension strategy for the northern NSW region was devised and delivered in 2008–09 by Bill Gordon Consulting. Milestones within this project involved the development of information specific to different spray application scenarios common in cotton farming, through field trial evaluations. The findings from these evaluations are incorporated into material for a series of workshops on spray application management (see page 68) and are also presented as independent technical updates at advisor forums such as the Crop Consultants Australia technical updates and Grower Group meetings.

### Outputs contributing to Strategic Plan Measures of Success

- Information in WEEDpak specific to different spray application scenarios common in cotton farming, developed through field trial evaluations, is now an important extension tool.
- A drift management strategy for northern NSW was devised and extended through a series of workshops.




A survey of cotton consultants by Crop Consultants Australia shows the changes made by 233 grower clients in water management over five years 2003–2008. All of these practices have been encouraged by the Extension Team's Water Focus Team under a range of initiatives delivered through the Cotton CRC and supported by CRDC investments in research, development and extension

## Key Investment

### Benchmarks for existing production efficiencies and environmental performance established

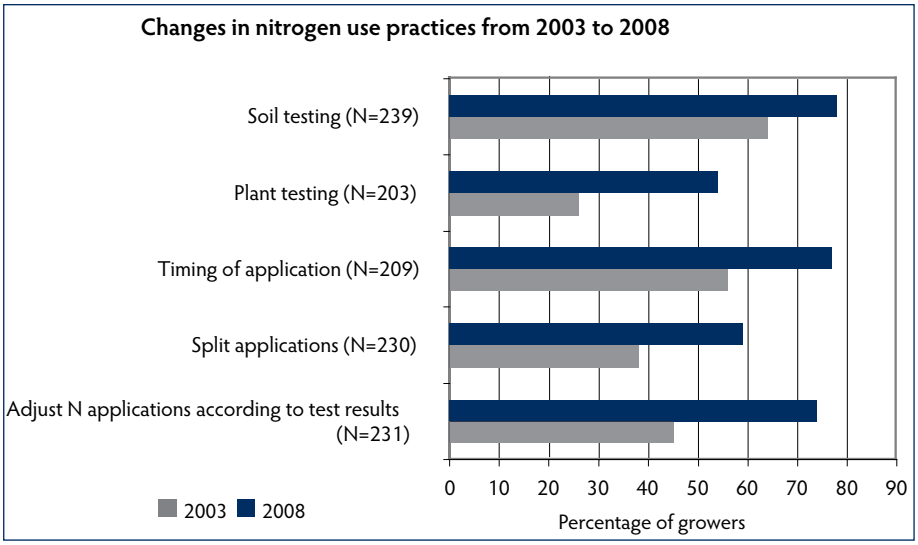
A survey of consultants representing approximately 25 per cent of the Australian cotton area indicates that growers are changing their practices relating to fertiliser use (see the graph below). The use of techniques that promote efficient fertiliser use, such as soil testing, splitting applications and adjusting fertiliser applications in response to test information, have all become much more common practice over the past five years. Further evidence for these improvements is shown by the number of growers and consultants accessing NutriLOGIC (developed with CRDC assistance) on the Cotton Catchment Communities CRC website, www.cottoncrc.org.au, with approximately 1200 hits on the NutriLOGIC pages in the website between 1 September 2008 and 30 June 2009 and at least 86 distinct users accessing the Soil, Petiole and Leaf Nutrient calculators.

Long-term cropping experiments have enabled the development of a Nitrogen Use Efficiency Index (NUEI) for benchmarking the efficiency with which nitrogen is used in Australian cotton production. NUEI values between 10.9 and 12.9 indicate sufficient supply of nitrogen to the crop for optimal yield. Values less than 10.9 indicate excessive supply of nitrogen while values above 12.9 indicate either the crop received insufficient nitrogen or was limited by another stress. Monitoring of 23 commercial fields has identified NUEI values ranging from 6.8 to 16.8, with an average of 10.0. In practical terms this means that on average, the amount of nitrogen applied to the field as fertiliser could be reduced by 50 kilograms per hectare without loss of yield.

It is worth noting, though, that while nitrogen use efficiency presents a significant ongoing challenge for the industry, the independent analysis of CRDC research investments 2003–08 found that improved nutrient management (driven by previous R&D and extension investments) was one of the five major drivers of improved cotton yields per hectare over the period, as shown in the graph on page 64.

### Outputs contributing to Strategic Plan Measures of Success

- A survey of consultants representing approximately 25 per cent of cotton area indicates that growers are changing their practices to achieve more efficient fertiliser use.
- Long-term cropping experiments have enabled the development of a Nitrogen Use Efficiency Index (NUEI) for benchmarking the efficiency with which nitrogen is used in Australian cotton production.



- A Return on Investment study of CRDC R&D 2003–08 found improved nitrogen use has been one of five major drivers of improved cotton yields per hectare.

## Key Investment

### Further development of an electronic (online) version of the BMP Manual

The 2008–09 year has seen extensive development of the online portal to support myBMP, the web-based version of the industry's environmental management system, Best Management Practices. myBMP is designed to enable cotton growers to self-assess their performance and practices against industry agreed standards. It will enable growers to access streamlined information packages and tools as they seek to improve practices and their business. The web-based system also provides a pathway for delivering R&D knowledge, providing targeted support for adoption and evaluating the impact of R&D on practice change. An evaluation of the new web-based version has indicated positive support from a broad mix of farmers trialling the system.

### Outputs contributing to Strategic Plan Measures of Success

- An evaluation of the newly developed web-based version of BMP has indicated positive support from a broad mix of farmers trialling the system.

## Key Investment

### Development of explicit linkages between R&D project outcomes and BMP objectives

The goal for 2008-09 was to providing direct links between the extensive sources of contemporary R&D information and the BMP framework. Under the project, industry's research resources were systematically captured and uploaded into myBMP. Producers and extension officers participated in a national roadshow during February 2008 to provide feedback on the functionality of the myBMP system and on the assembled knowledge resources. This feedback has resulted in the development of a more robust model for online information delivery.

### Outputs contributing to Strategic Plan Measures of Success

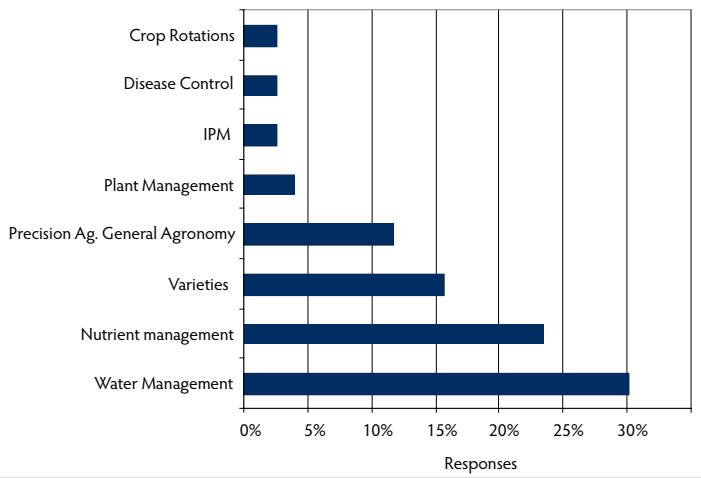
- A wide range of R&D information is now contained in myBMP and information gained on a national roadshow to assess the functionality of this system has enabled development of a more robust system.

## Key Investment

### Continue to monitor the environmental performance of Bt and herbicide-tolerant cotton

CRDC has established a new three-year consultancy with Crop Consultants Australia (CCA), the

**Key factors for improvements in yield 2003–2008**



association representing most consulting agronomists working within the cotton industry. The data collected from the 2008–09 crop details most inputs to production on the majority of cotton farms, including *Bt* and herbicide-tolerant cotton.

This data will allow industry to compare the most recent crop with past and future crops. CRDC itself is managing and analysing the data collected by CCA and will then have responsibility for making the findings available throughout the industry.

### Outputs contributing to Strategic Plan Measures of Success

- Data collected by CCA from the 2008–09 crop includes inputs to *Bt* and herbicide cotton, which provides producers with benchmarking information from the majority of cotton farms with which to compare their own performance.

## STRATEGIC OBJECTIVE 3

### Protect industry from biosecurity threats

Maintaining the capacity to manage biosecurity threats in the form of insects, weeds and diseases is of ongoing importance to the cotton industry and the industry is committed to ensuring responses to any pest incursions are undertaken as effectively as possible to minimise costs to growers, the industry, other plant industries, government parties and the wider community.

The Australian cotton industry is recognised globally as a leader in the areas of pest resistance management and integrated pest management. It has achieved this reputation by ensuring biosecurity threats and risks are well researched and that there is industry capacity and cohesion to respond when the science shows this to be required. Research investments under this strategic objective are aimed at ensuring the industry remains proactive and responsive to biosecurity threats.

The National Cotton Biosecurity Plan (IBP) was developed in line with Plant Health Australia's National Industry Biosecurity Planning Guidelines and launched in November 2006. Version two of the Cotton IBP, developed with CRDC involvement, is scheduled for release in late 2009. The risk mitigation section will be strengthened to outline a range of pre-emptive strategies at the national, state, regional and property levels to ensure the exclusion/management of serious plant pests.

Surveillance for high priority cotton pathogens is now part of the annual cotton disease surveys of cotton areas in NSW and Queensland. There were no detections of any of the high priority diseases in the 14,600 plants surveyed across 73 fields spread throughout the NSW growing areas. In Queensland, new random sampling strategies designed specifically for the collection of absence data are being trialled using the low level presence of the endemic Tobacco Streak Virus for validation. There was no detection of any of the high priority diseases in the Queensland survey.

CRDC is supporting a number of international scientific exchange for industry researchers to investigate diagnostics and management of high priority pests and diseases where they currently occur. In late 2009 researchers are visiting the USA to investigate *Bemisia tabaci* (Q biotype) and sending seed samples of native Gossypium species to Pakistan for screening against Cotton leaf curl disease.

### Outputs contributing to Strategic Plan Measures of Success

- Version two of the National Cotton Biosecurity Plan, developed with CRDC involvement and scheduled for release in late 2009, will strengthen risk mitigation by outlining a range of pre-emptive strategies at the national, state, regional and property levels to ensure the exclusion/management of serious plant pests.
- Surveillance for high priority cotton pathogens is now part of the annual cotton disease surveys of cotton areas in NSW and Queensland. There were no detections of any of the high priority diseases in 2008–09.
- International scientific exchanges are allowing industry researchers to investigate diagnostics and management of high priority pests and diseases where they currently occur.

## Key Investments

### Continued monitoring of resistance to conventional chemistry and biotechnology traits; and

### Egg collection of *Helicoverpa* in remote Australia providing new benchmarks for background resistance to *Bt* technology

Insecticide resistance monitoring programs continue to provide cotton growers with early warning signals to enable proactive changes to pest management strategies before the negative effects of resistance occur in the field. Proactive management of resistance reduces the industry's use of pesticides and encourages the sustainable use of chemicals. Monitoring from 2008–09 indicates that the occurrence of resistance in cotton aphid, mites and *Helicoverpa* has fallen for the majority of chemicals. Resistance in Silverleaf whitefly remains at low levels.

Over the past two cotton seasons, monitoring for resistance to the *Bt* toxins in Bollgard II ® cotton varieties has shown an increase from baseline levels in the species *Helicoverpa punctigera*. While levels are far below those which would enable insects to survive in the field, CRDC is coordinating an industry-wide contingency plan to tighten current resistance management efforts in the event that the trend is seen to continue.

In addition to supporting the industry's management of *Bt* and insecticide resistance, CRDC convenes regular REFCOM (Research and extension in *Bt* resistance) forums involving resistance researchers, growers, commercial technology providers and industry bodies. REFCOM is held each year to identify critical gaps in knowledge and help to shape future research investments.

Tracey Parker and Sharon Thomas, CSIRO, collect Helicoverpa punctigera larvae in the channel country on the Eyre Creek floodplain near Birdsville

Following a REFCOM meeting in February 2009, a precautionary contingency plan is being developed for resistance to *Cry2Ab* (one of the two *Bt* genes for resistance to *Helicovera* spp. contained In Bollgard II cottons). *Helicoverpa* populations are being monitored in remote regions such as the Queensland channel country to determine whether changes in resistance frequencies in these remote areas are consistent with those in cotton growing areas. Larvae were found in the channel country at more than five per square metre and are now progressing through the resistance monitoring program to assist in identifying whether something in the environment other than Bollgard II cotton is selecting for resistance to *Cry2Ab*.

### Outputs contributing to Strategic Plan Measures of Success

- Insecticide resistance monitoring programs continue to provide cotton growers with early warning signals to enable proactive changes to pest management strategies before the negative effects of resistance occur in the field.
- Monitoring has discovered that *Helicoverpa* resistance to *Bt* technology and weed resistance to Roundup Ready ® cotton varieties is trending upwards, conventional chemistry is trending downwards for *Helicoverpa* spp. but up for aphids. Indicators are steady for whitefly.
- REFCOM continues to provide a sound forum for the coordination and prioritisation on R&D for *Bt* technology, with a precautionary contingency plan being developed for *Cry2Ab* resistance.

## Key Investment

### Additional research into the development of improved refuge options and management of Bollgard

The use of Bollgard II ® technology requires the grower to plant a refuge for resistance management. The most popular refuge option at present is

unsprayed pigeon pea; however, this represents a significant cost of production and provides few other benefits to the grower. New refuge crop options for both irrigated and dryland production systems are being evaluated.

Research is also testing some of the core assumptions upon which the refuge management strategy depends, with the aim of increasing understanding of how the refuge strategy impacts on resistance management at the landscape scale. Early work confirms that random mating of moths from different host plants occurs. It has also shown that refuges act as a network across the landscape, rather than as individual crops, to produce a population of moths that can act to reduce any resistance that is selected in Bollgard II crops. The outcomes of these studies suggest that growers are not only reliant on their own actions for the management of Bollgard II resistance but also on the actions of other growers, so that area wide management of refuges is critical to the strategy's success.

### Outputs contributing to Strategic Plan Measures of Success

- New refuge crop options for the management of *Bt* resistance are being evaluated to provide producers with better economic alternatives.

## Key Investments

Further investment in support of the prevention, diagnosis and management of Fusarium wilt; and

Continued research on agronomic management strategies for Black Root Rot and other diseases.

Diagnostics services identified no new properties with Fusarium wilt in the 2008–09 season; however, the spread of the disease within farms was confirmed at a number of locations. A database of Fusarium strains and their confirmed locations is being maintained.

The impacts of farming practices on the incidence of Fusarium wilt continue to be evaluated through on-farm, glasshouse and laboratory research. The management of cotton trash post-harvest was found not to influence the expression of Fusarium in the following spring, enabling growers to make decisions about trash management based on outcomes for soil condition and moisture conservation, without increasing disease risk. Soil type studies are indicating that abiotic characteristics may influence disease survival. More detailed studies are now underway to identify whether any of the causative characteristics are ones that can be influenced by farm management practices.

Black root rot continues to appear frequently in disease surveys across NSW growing regions and is now present in all regions. Its spread, and the occurrence of severe symptoms in localised areas, is fuelling the need for research to continue to investigate the farming practices that contribute to disease risk.

Supporting research in the field of proteonomics has identified defence proteins expressed in cotton seedlings and proteins expressed by the pathogen that are potential virulence factors.

CRDC is represented on the Fusarium wilt research coordination committee, FUSCOM, which includes pathologists, growers, consultants, and representatives of the seed industry and funding bodies. Discipline-based research forums such as FUSCOM foster collaboration between research projects in different research organisations and enable information to be shared with growers and other interested industry participants. Such forums also play a valuable role in the identification of gaps in knowledge and priority issues for future research. A range of research priorities has now been developed for Fusarium, encompassing resistance ranking, biosecurity, soil biology and extension activities.

### Outputs contributing to Strategic Plan Measures of Success

- FUSCOM, with the involvement of CRDC, fostered collaboration between research projects in different research organisations and enabled information to be shared with industry participants and a range of research priorities has been developed.
- CRDC-supported Fusarium wilt diagnostics services identified the spread of the disease in 2008–09. A database of Fusarium strains and their confirmed locations is being maintained.

- Black root rot continues to be monitored effectively through disease surveys in NSW and research continues to develop controls of this disease.

## Key Investment

### Continued research into weed control and herbicide application for Roundup Ready Flex®

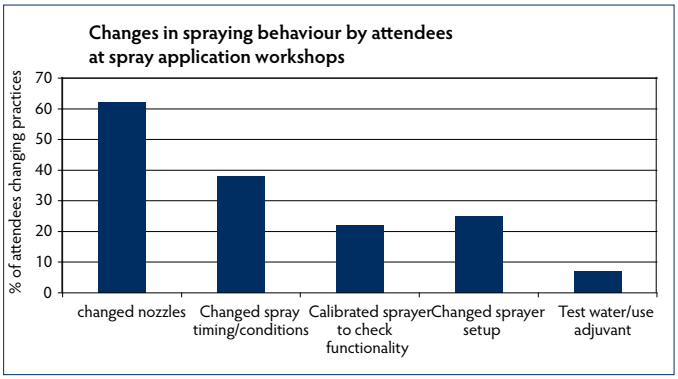
Post-emergence herbicides, such as glyphosate, bring the advantage that they are applied to a known weed population; however, the application timing of post-emergent herbicides remains an issue. Growers must balance spraying too often, which provides good weed control but increases cost and selection pressure for herbicide resistance and species shift, against spraying too little. Research in this area has led to the development of guidelines for the critical periods for weed control. These guidelines clearly defines the period during which weed control is required, and conversely, the periods during which weeds cause insufficient yield loss to justify their control. They consider the time when the weeds germinate relative to the crop, the competitive nature of the weed species present and the density of the weed population.

Evaluation of a series of CRDC-sponsored spray application workshops in northern NSW in 2008–09 demonstrates a high degree of learning. Six months after their attendance at the workshops, 80 per cent of surveyed attendees reported a change in their spraying behaviour, leading to an active reduction in the risk of offsite movement of agricultural chemicals. As many of the participants are landowners, farm staff and spray contractors, a significant area of cropping is now being managed with improved spraying practices. Further information about the spray application extension strategy can be found on page 63.

### Outputs contributing to Strategic Plan Measures of Success

- Research has defined the periods during which weed control is required and those during which weeds cause insufficient yield loss to justify their control.
- Evaluation of a series of spray application workshops indicated 80 per cent of participants subsequently changed their spraying behaviour, leading to an active reduction in the risk in offsite movement of agricultural chemicals.


One of a series of spray application workshops, held at Edgeroi in north-west NSW. As can be seen, the workshops attracted a large number of participants



## STRATEGIC R&D PLAN 2008–2013

### Goal

A culture of innovation and learning

### Outputs/Measures of Success

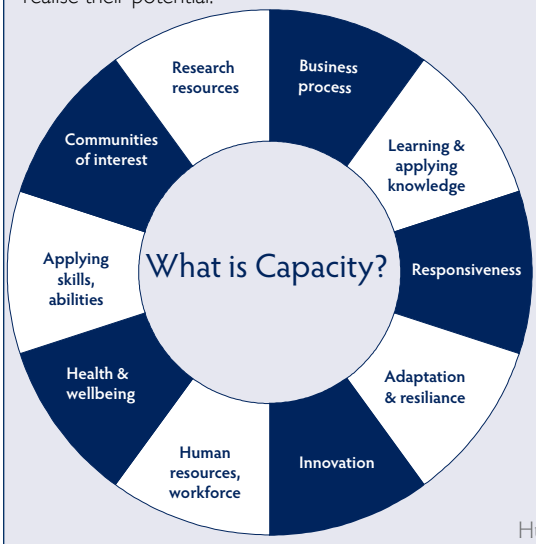
- Industry and R&D capacity needs identified and gaps being addressed
- An industry with the capacity to deliver our future R&D innovation needs and their adoption
- The adoption of a shared vision for the cotton industry's future
- An industry with the capacity to deliver our future R&D innovation needs and their adoption.
- The adoption of a shared vision for the cotton industry's future
- Assessments of industry capacity to innovate, lead and adapt

### Outcome

Innovative people in the cotton industry and community, creating a sustainable industry and viable regional communities

### Background

A key to enhancing the capacity of the Australian cotton industry to adapt and respond to change is assisting people throughout the industry to fully realise their potential.




This goal recognises that it is people that make the difference. People create the innovations necessary for dealing with current and future challenges. Equally, it is the ability of people to adopt and adapt innovation that ensures the outputs of research have the greatest impact.

Strategies within this program will target the development of researchers, producers, agribusiness and industry personnel in alignment with future industry needs for skills and ability.

At the same time, the industry is confronted by challenging trends in the supply of labour and its competitiveness to attract and retain people. Determining the status of this challenge and developing an action plan in response are initial steps. Much of this analysis has already been done and the task is synthesising information across primary industries and collaborating in the development of collective and industry specific action plans.

Providing forums where people can have the freedom to scan and scope emerging strategic issues and explore innovation opportunities will be a feature of supporting future leadership capacity in industry and research. These forums will also assist the industry to develop and adopt a shared vision for the future.

Human Capacity Investment Manager, Rohan Boehm

# Progress towards Planned Outcome in 2008–09

The Australian Cotton Extension Team, unique among Australian agricultural industries, has served the industry well over an extended period of time and continued to do so in 2008–09. However, several years of drought, coupled with rapid changes in how information is generated and how it can be delivered have led to a comprehensive industry-wide review of how best to support the delivery of information and adoption of R&D knowledge and technologies within the cotton industry. Integration with the BMP system was identified as a significant opportunity.

CRDC, in collaboration with the Queensland Department of Primary Industries and Fisheries, and the Cotton Catchment Communities CRC, commissioned a study to identify current needs of producers for extension services. Findings indicated a shift in producer preferences for extension activities to focus mostly on 'big picture' support and not just the day-to-day agronomic and localised support services that have been a feature of past years.

While the Extension Team will remain an important conduit for delivery of knowledge and information, a range of new and innovative methods that specifically address newly defined grower and industry needs will enhance the overall approach. These changes mean, in particular, a new online environment and greater engagement with agribusiness.

## STRATEGIC OBJECTIVE 1

**Identify, understand and plan for future industry capacity needs**

### Key Investment

#### Conduct scoping studies analysing the future industry human resource needs, for the identification of gaps

Scoping studies in 2008–09 have assessed future human resource needs and defined future investments that will generate the Strategic Plan outcome required for Program Three. The scoping studies identified three core themes for future investments to address gaps in human capacity:

### 1. Skills

Widespread industry consultation and studies have demonstrated that the future emphasis in human capacity development should be on need assessment and addressing skills and professional development at all levels of industry in order to achieve the Program Three goal of 'a culture of learning and innovation'.

Existing resources for training and skills enhancement available to industry, as well as systems for aggregating the data covering the many social indicators that industry would require in the future, were also scoped. Pilot projects in 2009–10 will test and validate this approach. Other Rural R&D Corporations (RDCs) have been invited to participate collaboratively in Social Indicator pilot studies in 2009–10, with the aim of validating the methodologies and working towards a whole-of-agriculture repository of social indicator research.

Farmers have identified a need for formal acknowledgement of prior learning and knowledge of best practice cotton production in the granting of recognised qualifications. The cotton industry is pioneering this methodology for the professional development of farmers, with the formulation of a Certified BMP Farm Manager Diploma (further details can be found below).

### 2. Communities of interest and practice

The Australian cotton industry enjoys a culture of working successfully in communities of interest. Studies have shown that future investments to address human capacity gaps should rely on strengthened communities and the creation of new communities of practice to underpin delivery of knowledge and shortened time to adopt technologies and the outputs of R&D.

The Big Day Out in Cotton, a CRDC initiative held in February 2009 in the latter part of the growing season, provided a forum for around 180 producers and cotton consultants to identify technologies that have the potential for impact within their own enterprises. The forum was focused on demonstrating opportunities to optimise inputs for cotton production. Researchers challenged producers to adopt best practice irrigation, tillage management and integrated weed control. Further details about the Big Day Out can be found on page 79 and at crdc.com.au.

### 3. Systems

In the current 'climate of change', a range of new technologies is available that will assist industry to create and deliver the outputs of R&D through new technologies and systems.

In a first for the cotton industry, CRDC collaborated with Flexible Learning Australia and with two experienced registered training organisations, the Australian Agricultural Colleges Corporation in Queensland, and Tocal College in NSW, to secure an e-Learning trial in 2009. This trial is discussed further in Strategy Two.

A promising new system is being trialled to aggregate industry knowledge in the Web2 environment as an online-portal. This is being piloted as a knowledge delivery system supporting the new online Best Practices Management: myBMP.

### Outputs contributing to Strategic Plan Measures of Success

- Information gained from modelling and initial analysis that has identified skills, communities of interests and workforce development as key gaps for knowledge and industry engagement will underpin achievement of the Program Three outcome.
- The Big Day Out in Cotton event was a pilot initiative that successfully enabled producers and consultants to help define future needs for knowledge and professional development in the industry.
- An e-Learning pilot project has received recognition under the Australian Flexible Learning Framework: the first agriculture-related project to do so.
- Agribusiness engagement through an online knowledge portal pilot project will support BMP and e-Learning.

## STRATEGIC OBJECTIVE 2

**Improve human resource development and capacity**

### Key Investment

Develop improved linkages with agribusiness to engage them more directly in the industry's extension of research, implementation of Best Management Practices (BMP) and collection of industry data sets

CRDC investments and personnel were central to a pilot project designed to shorten the time and reduce the complexity involved in discovering up-to-date information on cotton R&D. This was developed for the 14th Australian Cotton Conference in August 2008. Organisers provided all delegates with a USB memory stick that allowed them to upload conference presentations, video of many presentations and the papers from presenters.

After the event all available information, including videos of most presentations, remained available to delegates on the Conference website. The aim of making the 14th Conference a 'paperless' event is being extended through a new project, managed by FarmPlus Info. This system aggregates on-line content from all cotton industry information websites and make it available inside the industry's online BMP system. It will also provide access to the content contained in the industry's pilot e-Learning project and provide the framework for social networking.

CRDC collaborated with Cotton Australia and agribusiness company, Nufarm, to create industry-wide maps of fields where cotton is grown and provided this information to all farming regions to assist in reducing the impact and incidence of spray drift. The success of this program means it will be repeated in future seasons.

In a new three year consultancy, Crop Consultants Australia (CCA), the association representing most consulting agronomists working within the cotton industry, undertook data collection that details most inputs to production on the majority of cotton farms at the conclusion of the 2008–09 crop. Data from the survey will be analysed in 2009–10 to determine

# "An Environment of Change"

## Addressing the future with e-Learning

Increasingly complex farming systems, together with changes imminent in cotton's value chain, point to new levels of management and production skills that are urgently required at all levels of the cotton industry, according to National Cotton Training Coordinator, Mark Hickman.

Mark was addressing a Sydney meeting convened to discuss how the industry could go about introducing and supporting e-Learning and online training for industry-wide skills development by providing online access to an array of future educational courses that could be specially developed to appeal to all sectors of the industry.

CRDC has scoped this new approach and secured new partnerships with experienced registered training organisation, coupled with direct support from the Australian Government e-Learning initiative, the Australian Flexible Learning Framework and its Queensland and NSW offices.

The Sydney meeting was attended by representatives of CRDC, the Cotton Catchment Communities CRC, Cotton Australia, e-Learning Australia and registered training organisations, Industry & Investment NSW, the Australian Agricultural Colleges Corporation and NSW's Tocal College.

The cotton industry has not had any inbuilt capability or a web-based platform that could be used to deliver professional development in an online environment. Mark Hickman told the meeting that, effectively applied, e-Learning can impact on every sector of the industry and its reach would equally include researchers, extension services, farmers, consultants and agribusiness, plus all sectors of the post-farmgate sector.

Professional development for cotton producers and their staff is often a very hard fit for day-to-day operations, with some businesses resorting to professional development on rainy days or when there is sufficient quiet time in the business. This is clearly not going to be enough in the future,

Following the Sydney meeting, the industry has endorsed an e-Learning pilot program to be conducted by the Australian Agricultural Colleges Corporation and Tocal College. The first projects will be short: six months of testing followed by development of a pilot system that the industry can build on. The first pilot project will assess needs in on-farm human resource management and will be followed by the development of new modules addressing the technical skills needed in future farming systems.

The e-Learning environment will be an important means for CRDC to achieve the Human Capacity R&D program's planned outcome.

e-Learning stakeholders at the Sydney meeting

how the crop and industry performed against key economic and environmental measures. The data will add to the considerable history of this survey and will allow industry to compare the most recent crop and the impacts of industry with past crops. CRDC itself is managing and analysing the data collected by CCA and will then have the responsibility for making the findings available throughout the industry.

### Outputs contributing to Strategic Plan Measures of Success

- Collaboration with John Deere, with the support of Case IH, has resulted in a Safe Harvesting video in readiness for the 2009–10 harvest (see below)
- CRDC collaboration with Nufarm Australia, the Grains R&D Corporation (GRDC) and Cotton Australia to map sensitive areas has mitigated the effects of off-target spray application
- CRDC investment in workshops on pesticide application technology has improved pesticide use industry-wide (see also page 62.)
- New collaboration with CCA to undertake a survey on practice and production in the 2008–09 growing season has provided detailed information on key economic and environmental measures that will benchmark future performance.

## Key Investment

### Continue to invest in a cotton training coordinator to develop and support a range of training activities

A consistent effort to develop and deliver relevant professional development for industry continues to provide people with valuable qualifications and professional development opportunities. CRDC continued to invest in employment of the National Cotton Training Coordinator and the range of training and professional development activities that he designs, produces and coordinates. Key courses include the University of New England/Cotton Catchment Communities CRC Cotton Production Course, the Cotton Field to Fabric Training Course, the Cotton and Grains Irrigation Management course and Vocational Education Training in Schools (Certificates II to IV). CRDC staff actively engage in high level planning with the Training Coordinator, which has had a significant impact on the quality of existing and newly developed projects within Program Three.

The Training Coordinator played a pivotal role in work that began in 2007–08 to provide recognised qualifications for individuals who achieved BMP accreditation on a farm. Awards are presented to applicants who undergo a comprehensive assessment of prior learning and knowledge of best practice cotton production. In 2007–08, the project identified alignment to 19 competencies in the Australian Training Framework, of which ten were selected to form a Diploma of Agriculture providing qualifications as a Certified BMP Farm Manager. The 2008–09 year saw the first eight producers receive a Certified BMP Farm Manager award, with a further four awards pending.

The trial engagement with e-Learning as a method of providing flexible delivery for professional development and building of human capacity, discussed in Strategy One, is designed to create and test remote e-Learning in employment skills for cotton producers. Individuals will use the system to undergo self-assessment and undertake online courses designed to improve the skills of cotton producer in best practice employment. These assessments are confidential and will allow producers access to the industry's professional development packages that either already exist or are developed to meet specific future needs.

CRDC once again sponsored industry participants to attend the two Field to Fabric Training Courses held in 2008–09 at CSIRO Materials Science and Engineering in Geelong. The course provided participants with an opportunity to see first hand how cotton is processed from a bale into fabric. CSIRO has both full scale and miniature versions of the equipment used in cotton processing factories used overseas including drawing and carding machines, spinning frame, weaving machines, and dyeing facilities.

## "An Environment of Change"

### The Field to Fabric Training Course

'Understanding how these processes occur helps participants understand the importance of quality standards and how our actions impact on the value chain'

**Brendon Warnock**
Cotton Grower, Narrabri


Participants in a Field to Fabric training course in Geelong in August 2008

CRDC recognises the importance of enhancing the skills of young people, women and indigenous people living in cotton valleys.

CRDC also continued its investment in the Future Cotton Leaders' Program and further detail can be found below.

Wincott (Women's Industry Network – Cotton) began several years ago with seed funding and in-kind support from CRDC and is now a self-sufficient and important source of knowledge and training for women in the industry. CRDC continues to offer logistical support for Wincott's activities. In addition, CRDC financially supported the attendance of CRDC researchers to attend Wincott events.

During 2008–09, CRDC sponsored a female cotton grower to participate in the Australian Rural Leadership Program, four women in the CSIRO Field to Fabric course and continuing sponsorship of one to complete the Cotton Catchment Communities CRC Cotton Production Course at The University of New England. Five women were competitively selected (out of a total of ten participants) to participate in the Australian Future Cotton Leaders' Program.

Five Indigenous students from Narrabri and Wee Waa High School continue to undertake paid work experience at the Australian Cotton Research Institute and CRDC in Narrabri. This program is part of a school-based traineeship program developed by CRDC, with the assistance of the Aboriginal Employment Strategy and the Cotton Catchment Communities CRC. In addition to providing the participants with office skills, this capacity-building project aims to foster greater engagement between the indigenous community and the cotton industry.

CRDC continued to foster the enthusiasm of school age children in science-related subjects in 2008–09 by providing financial and logistical assistance to a range of project, including a Moree Rotary tour of the Australian Cotton Research Institute and Australian Cotton Exhibition Centre by high school students from north-west NSW; children from Burren Junction, Rowena, Narrabri and Fairfax public schools attending the RiverHealth Conference in Tamworth in November 2008; and the Combined Schools Careers Expo in Tamworth and Armidale in April 2009.

### Outputs contributing to Strategic Plan Measures of Success

- Continued investment in the National Cotton Training Coordinator position supported the range of training and professional development activities that he designs, produces and coordinates.
- Key courses, including the University of New England/Cotton Catchment Communities CRC Cotton Production Course, the Cotton Field to Fabric Training Course, the Cotton and Grains Irrigation Management course and Vocational Education Training in Schools (Certificates II to IV), are increasing industry skills with CRDC support.

- Prior learning and knowledge of best practice cotton production has received formal acknowledgement through the Certified BMP Farm Manager Diploma, aligned to the Australian Training Framework
- Women in the industry were supported through Wincott (Women's Industry Network – Cotton) and featured prominently in attendance at CRDC-supported courses.
- Young indigenous people were supported to gain office skills through a school-based traineeship program developed by CRDC, with the assistance of the Aboriginal Employment Strategy and the Cotton Catchment Communities CRC.
- School-age children in cotton communities received support through a range of projects that encourage them to think of future science-related study.

## Key Investment

### Provide funding support for travel and training opportunities that align with future human capacity needs of the industry

CRDC had 20 projects supporting travel by individuals or groups to participate in conferences, workshops, meetings and training. These projects ranged from support for young people to participate in the NSW Youth River Health Conference, the Young Cotton Achievers Award, the Australian Cotton Conference through to international scientific exchanges, cotton processing trials in India and the Field to Fabric fibre training course in Victoria. In addition, investment in a number of individual R&D projects provided for travel related to that project. A full listing of travel-related projects can be found in Program Three in Appendix Three: Research and Development Portfolio.

## Key Investments

### Provide funding support for a cotton industry scholarship in the Australian Cotton Leadership Programs; and

### Continue support for the Australian Rural Leadership Program

In 2008–09, CRDC invested in two scholarships to the Australian Rural Leadership Program (ARLP). Barb Grey, a Mungindi cotton producer, began the ARLP program in 2008, and Dallas King, a Cotton Consultant and Industry Development Officer, who began the program in 2009.

The first Australian Future Cotton Leaders Program, initiated by Cotton Australia with the support of CRDC and the Australian Government's Department of Agriculture, Fisheries and Forestry, was held in 2007–08. The 21 participants finished the program

Ten 2009 Future Cotton Leaders

Left to right: Sinclair Steele, Tracey Farrell, Belinda Duddy, Elissa Wegener, Jo Eady (course facilitator), Tobin Cherry, Matthew Norrie, Nick Gillingham, Barb Grey (presenter), Bruce Finney (CRDC Executive Director). Seated left to right: Susan Maas, Anna Power, Joanne Grainger (Chair, Cotton Australia), Kevin Bagshaw

with improved self-confidence, together with skills for effective presentation. Based on the success of the inaugural program, CRDC has made an ongoing commitment to leadership development through this proven approach. A further ten young people began the course in May 2009 and will complete it in the coming year.

A long term investment through the Cotton and Grains Irrigation Knowledge Management project was completed in 2007–08; however, CRDC continued to invest in this hallmark capacity building irrigation technology initiative in 2008–09 through the National Program for Sustainable Irrigation (NPSI). CRDC is one of 16 NPSI funding partners ,who include GRDC, SRDC, Horticulture Australia Ltd, Land and Water Australia, irrigators, water authorities, research agencies, commodity groups and state and Australian Government departments. A key outcome for the cotton industry from the Knowledge Management project is the development of improved on-farm

## "An Environment of Change"

### The Australian Rural Leadership Program

"I firmly believe the ARLP is a valuable and productive investment in the personal and professional development of the cotton industry's leaders. My Scholarship has afforded me exciting and challenging experiential learning opportunities, and a vast and varied network of contacts I can call on Australia-wide. I plan to utilise these invaluable resources to continue contributing not only to the cotton community but to agriculture generally. Working closely with CRDC throughout the two-year program has, I believe, greatly value-added the Return on Investment for both parties."

**Barb Grey**
Mungindi

"Although my journey in the Australian Rural Leadership Program has just begun, it has already provided me with a greater insight into the unique and varied people who help build rural Australian communities and industries. From what I have experienced already, I believe I will have the confidence to become a more active participant in ensuring positive change within the cotton industry and my local community."

**Dallas King**
St George/Mungindi

Dallas King and other ARPL participants on a three day trek in the Kimberleys as part of the 2009 ARLP course

water use benchmarking. This has demonstrated a 40 per cent improvement in water use efficiency (WUE) in the cotton industry since 1999. The new cotton and grains project through NPSI includes investment from CRDC, GRDC, NPSI and the National Water Initiative and will continue to benchmark water use on more cotton farms as well as develop similar benchmarks for a range of irrigated grain crops.

This capacity building exercise means that producers are able to effectively benchmark their own irrigation efficiency performances against similar enterprises in the industry. Courses in irrigation performance, coordinated by the National Cotton Training Manager, continue to an important driver for irrigation performance by producers and their consulting agronomists. Details about the R&D associated with WUE can be found in Program Two on page 59.

### Outputs contributing to Strategic Plan Measures of Success

- The Cotton and Grains Irrigation Knowledge Management project, now conducted through NPSI, has resulted in the development of improved on-farm water use benchmarking and shown a 40 per cent improvement in water use efficiency since 1999.
- Two scholarships to the Australian Rural Leadership Program (ARLP) are helping to develop leadership skills in the cotton industry and wider agricultural sector.
- The first Australian Future Cotton Leaders Program provided 21 participants with improved self-confidence and skills for effective presentation, with a further ten commencing the course in 2009.

David Williams of Industry & Investment NSW and the Cotton Catchment Communities CRC collected water use efficiency figures across 36 cotton farms, from Hillston in southern NSW to Emerald in central Queensland, that showed a 40 per cent improvement in WUE since 1999. He says that benchmarking irrigation is crucial if an irrigation enterprise is to improve its water use efficiency.

## Key Investment

### Invest in a new farm health and safety joint venture

CRDC continued its investment in the Collaborative Partnership for Farming and Fishing Health and Safety, managed by the Rural Industries Research and Development Corporation (RIRDC). This program began in 2007–08, replacing the joint venture Farm Health and Safety R&D Program, which focused on cropping-based industries.

Partners in the new program include RIRDC, CRDC, GRDC, the SRDC and the Australian Government Department of Health and Ageing. The Fisheries R&D Corporation is also a partner, broadening the applicability and value. The Partnership aims to invest in research and development to improve the physical and mental health of farming and fishing workers and their families and improve the safety of the environment and work practices in farming and fishing industries.

The program focuses strongly on adoption and generating changed attitudes of farmers and fishers towards health and safety issues in the workplace and living environment. As a first step in this process,

the program is facilitating understanding of the existing and potential adoption pathways whereby an increased awareness of health and safety issues can modify current attitudes and practice changes. It is anticipated that the program itself will experiment with a number of alternative pathways for adoption of existing information. The new program will also provide a stronger focus than in the past on evaluation and identification of which methods have been most and least successful. Projects will be expected to incorporate an adoption/communication strategy to ensure that outcomes are achieved with the target audiences.

The Partnership sponsored CRDC's Manager of R&D Implementation to attend the National Rural Health Conference in May 2009. Future research topics highlighted at the Conference included studies on the impact on rural health related to or due to climate change. Significantly, these may extend beyond personal stress arising from highly variable and changed climates to changes in areas such as bushfires, diseases, water quality, high temperatures, variable rainfall and insect populations.

CRDC has also worked with John Deere, with the support of Case IH, to complete the process of updating the Safe Harvesting of Cotton, video into a new DVD format, which will be released for the next harvest. This project has involved broad industry collaboration, aided by a widespread awareness of the need and responsibility to avoid injuries in one of the more hazardous operations within the industry.

### Outputs contributing to Strategic Plan Measures of Success

- The Collaborative Partnership for Farming and Fishing Health and Safety is investing in R&D to improve the physical and mental health of farming and fishing workers and their families and improve the safety of the environment and work practices in farming and fishing industries.
- The Safe Harvesting of Cotton video, updated into DVD format with broad industry and agribusiness collaboration, will be released for the next harvest.

## STRATEGIC OBJECTIVE 3

Enhance capacity to innovate

### Key Investment

#### Assessments of industry capacity to innovate, lead and adapt

CRDC and The University of Sydney's Australian Centre for Agricultural Health and Safety have completed a project to document and quantify the impact new technologies have had on health and safety in the industry and document the industry's capacity to adapt to these changes. The project analysed progress in relation to 53 potential on-farm hazards, ranging from the use of vehicles and farming plant through to chemical and environmental hazard types. The study, *The impact of biotechnology and other factors on health and safety in the Australian Cotton Industry*, will aid a more integrated approach to health and safety risk assessment, management and reporting for the industry, particularly in relation to new technologies.

The study identifies extensive change and improvement in safety on-farm, as a direct consequence of the impact of new technologies and practice change encouraged through the adoption of Best Management Practices. It concludes that the growing of GM cotton is associated with a range of positive changes and has greatly widened the range of safety benefits. Improvements over time can be seen in the graph on the opposite page, which relates to the 53 hazard categories analysed.

The report identified a greatly reduced overall need for labour but an increased demand for skilled workers. The report concluded that attention is required to create career paths, skills and professional development for current and future workers, which echoes the goals of CRDC Program Three.

### Outputs contributing to Strategic Plan Measures of Success

- A study of 53 hazard types has shown a dramatic improvement in on-farm health and safety in the cotton industry, with 48 categories not effectively managed or managed to some degree in the 1980–1990 decade, decreasing to 19 in these categories in 2000–2006.

## Key Investment

### Initiate a series of innovation forums

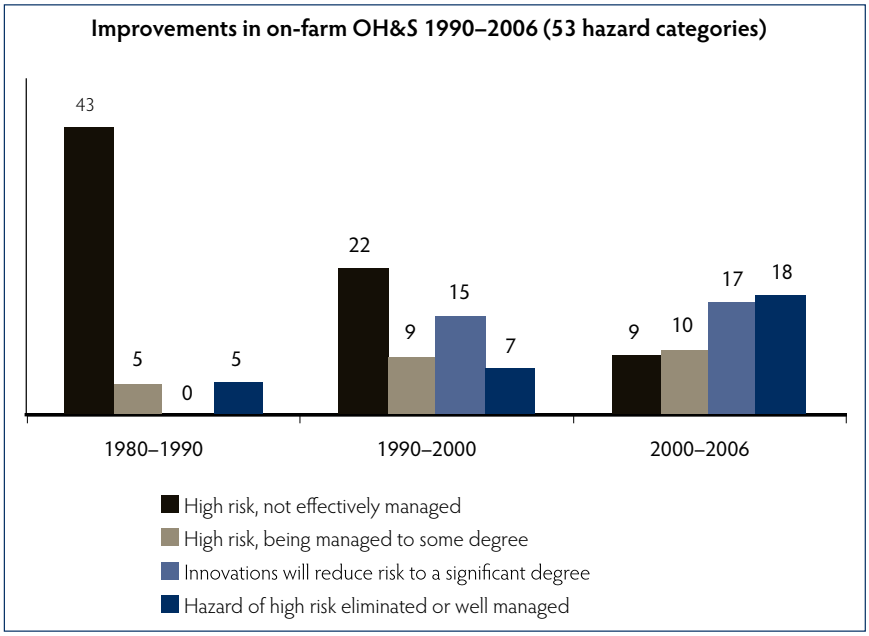
The Big Day Out in Cotton, held in February 2009 at 'Keytah' near Moree, was a significant technology adoption-focused event that provided producers and cotton consultants with a forum to identify technologies that have the potential for impact within their own enterprises. Researchers challenged producers to adopt best practice irrigation, tillage management and integrated weed control. The forum was focused on demonstrating opportunities to optimise inputs for cotton production.

The Big Day Out host, farm manager Andrew Parkes, followed up his Australian Cotton Industry Innovator of the Year Award in 2008 by detailing the changes to the system of producing irrigated cotton on "Keytah", implemented in recent years to combat low water availability and rising input costs. The field day proved how changing farm practice can lead to significant energy savings and the potential for improving nitrogen fertiliser use efficiency. Improving these factors contribute to both increased farm profitability and a lightening of farms' carbon footprint.

The forum demonstrated how on-farm research and trial work pays dividends because it involves farm management, researchers, agronomy advisors, extension officers and farm staff. The Big Day Out demonstrated that the value of encouraging communities of interest that engage farmers and researchers is most likely to be found in increased confidence to adopt new production techniques.

The day showcased many other topics and speakers linking research and farm practice on important issues such as managing difficult weeds, strategies for preventing glyphosate resistance, good stewardship for the application of fallow herbicides, reducing energy use and off-target pesticide drift and how to mitigate it. A Keytah case study on reducing on-farm energy use can be found on pages 60 and 61.

CRDC sees strong strategic importance in developing contemporary knowledge and intelligence about products, markets and supply chains by facilitating




Source: Frager, Lyn & Temperley, John, *The impact of biotechnology and other factors on health and safety in the Australian Cotton Industry*. Australian Centre for Agricultural Health and Safety, University of Sydney.

new engagement mechanisms for industry and end users. A 2009 CRDC forum, 'We're Aussie, Wear Aussie', held in support of the domestic market approach being developed by ACSA and Cotton Australia succeeded in identifying new channels of communication and greater capacity for dialogue between participants. This approach goes beyond building relationships with spinning mills to seek opportunities through the retail sector. The outcome was that local brand owners who participated were enthusiastic for an Australian cotton product and believed that there was a strong fit for their marketing and branding efforts. Further information on the outcomes and future actions arising from this forum can be found in Program One: Value Chain, on pages 42 and 43.

CRDC was, once again, a foundation sponsor of the Australian Cotton Conference, held in August 2008. CRDC R&D Program staff participate in a range of research-related activities at the Conference. For the first time, CRDC's Communication and Human Capacity Manager played a key role in planning, managing, creating content, media liaison and distributing information, which helped to optimise the use of the Conference to disseminate outcomes from CRDC R&D investments.

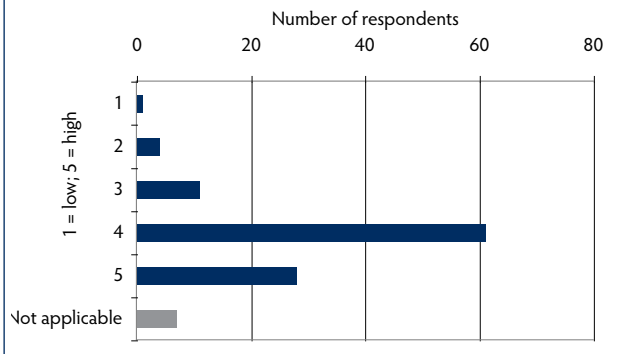
Despite the lowest production for 30 years, attendance at the 2008 Conference was significantly stronger than anticipated and a good measure of the resilience of the cotton industry. Run over three days, the Cotton Conference continued its tradition of being the key forum for researchers, producers, industry and agribusiness to share information and communicate. CRDC's investment in the conference included development of new systems such as a conference website for making information more accessible and available in a 'paperless' conference. A comprehensive survey conducted after the Conference indicated a high level of satisfaction with the direction the Conference has taken. The graphs on the following page show key results from the survey.

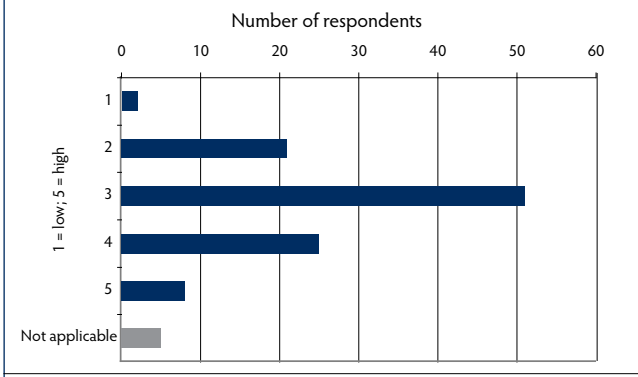
A large number of women from throughout the industry attend the Australian Cotton Conference and many attend the Wincott meeting and lunch held at the conference

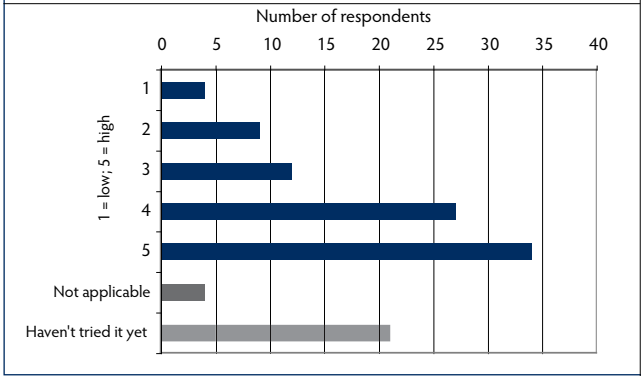
The 'We're Aussie, Wear Aussie' forum gave participating retail brand owners a greater understanding of the 'story' the Australian cotton industry is trying to tell and gave the industry a better understanding of how it must communicate with the brand owners and their customers.

## Outputs contributing to Strategic Plan Measures of Success

- Cotton's Big Day Out event identified a range of opportunities for producers to adopt the most appropriate technologies to deal with climatic and economic challenges.
- The 'We're Aussie, Wear Aussie' event succeeded in identifying new channels of communication and greater capacity for dialogue with retail brand owners.
- A successful Australian Cotton Conference allowed hands-on delivery of research outcomes from CRDC investments.




### 14th Australian Cotton Conference, August 2008

After the conference, attitudes to a number of aspects were surveyed. Thie information from this survey will be important in fine-tuning the next conference, to be held in August 2010.

Top graph:
'How do you rate the conference overall.'

Middle graph:
'How do you rate the conference as your key source of knowledge?'

Bottom graph:
'How would you rate the experience of a paperless conference?'

The responses on the bottom graph are particularly interesting, as they point the way to an increasingly sustainable, but still effective, conference.

# Report of Operations
# Corporate Governance

## CRDC's background

The Cotton Research and Development Corporation was established in 1990 under the Primary Industries and Energy Research and Development (PIERD) Act 1989. The Act provides the Corporation with a charter to invest in and manage a portfolio of research, development and extension projects and programs. The purpose of this Act is to secure economic, environmental and social benefits for the Australian cotton industry and the community and to achieve sustainable use and management of natural resources, while making more effective use of the resources and skills of the scientific and general communities. All of this is to be conducted in a framework of improved accountability for research and development spending in relation to the cotton industry.

CRDC was established in one of Australia's major cotton-growing areas, Narrabri, in north-west NSW, to ensure it was centrally located within the Australian cotton industry. This enables the Corporation to develop and maintain important relationships with cotton growers, researchers, processors and members of regional cotton communities on a day-to-day basis.

### Arrangements with other companies

The Narrabri district is also home to a key industry research facility, the Australian Cotton Research Institute: a collaborative research site and headquarters of the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC), in which CRDC is a core participant. The activities of the Cotton Catchment Communities CRC for 2008–09 are reported in that organisation's Annual Report, accessible on its website, www.cottoncrc.org.au, and its activities associated with CRDC are also contained in this publication in Report of Operation – Research and Development, starting on page 41. CRDC had a third share in an unincorporated joint venture, CottTech, with the CSIRO and Cotton Seed Distributors Ltd. The venture ceased in June 2009.

## Board of Directors

### Composition

The Corporation's Board normally comprises the Chair, appointed by the Minister for Agriculture, Fisheries and Forestry, the Executive Director, selected by the Board, and seven non-executive Directors nominated by an independent Selection Committee established by legislation. Appointment to the Board is subject to Ministerial approval and directors other than the Executive Director are appointed for three year terms. CRDC began the reporting year with an eight-member Board, due to the abolition of the position of Government Member by the previous Australian Government in March 2007. Following the expiry of the non-executive directors' three-year term, the Minister for Agriculture, Fisheries and Forestry, the Hon Tony Burke MP, appointed seven non-executive Directors, returning the Board to nine members. Further details follow and can also be found in the CRDC Selection Committee Report on page 130.

### Appointments

The Minister appointed seven Directors for a three-year period commencing 1 October 2008. Mr Glenn Fleischfresser (Fresser), Ms Leith Boully, and Ms Lisa Wilson were reappointed; Ms Juanita Hamparsum, Dr Mary Corbett, Ms Kerry Adby and Mr Peter Hayes were newly appointed. Details of all Directors who served during the reporting year can be found below.

### Expertise

Directors are selected from across the industry, business and research communities and together they must, and do, bring expertise in cotton production, processing and marketing; conservation/management of natural resources, science and technology and technology transfer, environmental and ecological matters, economics, finance and business management, administration of research and development, sociology and public administration. The Primary Industries and Energy Research and Development (PIERD) Amendment Act 2007 requires the CRDC Selection Committee to specify how its Board nominations will ensure that CRDC collectively possesses experience in

board affairs, adding to the existing requirement for an appropriate balance of expertise.

### Induction

Following appointment to the Board, each Director is provided with a Director's Manual, designed to provide them with an appropriate level of information about the Corporation, its history and operations, and the rights, responsibilities and obligations of Directors. Copies of the Board Charter, Strategic R&D Plan and relevant legislation are also included in the package.

The induction process for Directors includes an initial visit to CRDC offices in Narrabri to meet with the Chair and staff for a comprehensive overview of corporate activities and practices and a tour of key industry research facilities.

### Training

Where necessary and appropriate, the Corporation sources training for Directors, either individually or as a group. The Board generally establishes the need for such training.

### Directors' Responsibilities

The roles and responsibilities of Directors are set out in the Board Charter, which includes conduct and ethical standards provisions. Internal reviews of Board performance are conducted periodically. The Board also obtains an external review of its performance periodically. Due to commencement of a newly appointed Board during the reporting year, no reviews were conducted.

### Board's functions:

- Establishing strategic directions and targets
- Monitoring and evaluating the research and development needs of the industry and ensuring the Corporation's research program is effective in meeting those needs
- Approving policies, plans, performance information and budgets
- Monitoring policies, procedures and internal controls to manage business and financial risk
- Ensuring compliance with statutory and legal obligations and corporate governance standards

Responsibility for the day-to-day management of the Corporation lies with the Executive Director and senior management team. Close links between the Board and management have assisted the development of a sense of mutual confidence, trust, teamwork and common purpose. Senior management participates in Board meetings, with other staff invited to contribute whenever appropriate.

Directors may obtain independent legal and professional advice at CRDC's expense to enable them to discharge their duties effectively, subject to prior approval from the Chair, in consultation with the Board and Executive Director. This advice may relate to legislative and other obligations, technical research matters and general skill development to ensure there is a sufficient mix of financial, operational and compliance skills amongst Board members.

## Board of Directors 2008–09

*Chair*

**Mike Logan**

Mr Logan, who was appointed Chair of CRDC on 24 August 2007, is a cotton farmer from Narrabri, NSW. Mr Logan is Chair of the Remuneration Committee and a member of the Audit Committee.

Mr Logan brings a wealth of practical industry experience and a strong vision to the position. He has long been a strong advocate of best practice use of natural resources in the Australian cotton industry. His cotton farm was the first in the world to gain International Organisation for Standardisation (ISO) certification for compliance with world's best practice principles for environmental management.

Mr Logan also spent six years on the board of Land and Water Australia, where he played a leadership role in a number of key programs dealing with irrigation and climate variability. He was a Director of the Australian Rural Leadership Foundation, the CRC for Irrigation Futures and Cotton Australia (for four years).

*Executive Director*
**Bruce Finney**
BSc Ag

Bruce Finney joined the Board in August 2004 by virtue of his appointment as Executive Director of CRDC. He attends the Audit, Intellectual Property and Remuneration Committees as an observer.

Mr Finney has extensive experience in the agricultural sector. Prior to his appointment to CRDC he worked in corporate agriculture in various corporate, management and agronomy roles in Australia and in an advisory role in Argentina. He is a past chair of the Australian Cotton Growers Research Association, a past director of the Cotton Catchment Communities CRC and Irrigation Association of Australia.

Mr Finney is a graduate of the Australian Rural Leadership Program and of the Company Directors Course of the Australian Institute of Company Directors.

## Non-executive Directors at 30 June 2009

**Kerry Adby**

Ms Adby was appointed to the Board for a three-year term commencing 1 October 2008. She is a member of the Intellectual Property Committee.

Ms Adby is an investment banker and a solicitor in the ACT and NSW, and Managing Director of Copernican Securities Pty Ltd. She also holds non-executive positions on various boards, such as the NSW WorkCover Insurance Investment Fund Board and the Australian infrastructure investment vehicles of the Canadian Pension Plan Investment Board. Ms Adby has extensive experience in government and the private sector and has worked in senior executive positions in Australia and Asia, including with AIDC Limited. She specialises in infrastructure finance and in the feasibility and funding of irrigation and water saving initiatives.

*Vice-Chair*
**Leith Boully**
BRuSc, DipBusStud

Leith Boully is a primary producer from Dirranbandi in Queensland and was appointed to the Board in October 2005. She was a member of the Audit Committee until December 2008 and became a member of the Remuneration Committee in 2009.

Ms Boully is an Adjunct Professor with the School of Natural and Rural Systems at the University of Queensland. She is also Chair of the Centre for Rural and Regional Innovation, Queensland, FarmBi$ Queensland and the Lower Balonne Water Resources Ministerial Advisory Council, a Board member of Murrumbidgee Irrigation Ltd and the Australian Rural Leadership Foundation, a member of the Wentworth Group of Concerned Scientists and the Australian Statistics Advisory Council. Ms Boully is a graduate of the Australian Rural Leadership Program

**Mary Corbett**
BSc PhD (FAICD, AFAIM)

Mary Corbett was appointed to the Board for a three-year term commencing 1 October 2008. She is the Chair of the Intellectual Property Committee.

Dr Corbett is Managing Director of Australian Business Class an organisation specialising in executive leadership development. She has a strong research background and over 10 years experience in rural agriculture. She has an extensive background in the private and public sectors, with specific emphasis on capacity building and governance.

Dr Corbett is a non-executive Director of Food Science Australia and a former Board member of the Sugar Research and Development Corporation.

**Glenn Fleischfresser (Fresser)**

Glenn Fresser was appointed to the CRDC Board in October 2005 and reappointed for a further three-year term commencing 1 October 2008. He has owned and operated a successful cotton and grain production business on the Darling Downs since 1981. He is a member of the Intellectual Property Committee.

Mr Fresser has extensive experience in the cotton industry. His farming approach is underpinned by a respect for the natural environment, and an interest in adopting new technology and farming systems approaches. Mr Fresser has a strong understanding of the needs and issues of farmers and a genuine interest in ensuring the cotton industry continues to be sustainable, profitable and progressive. Mr Fresser is past Chairman of the Australian Cotton Growers Research Association (ACGRA) and has held other industry positions including member of the Australian Cotton Conference Committee and Cotton Biotechnology Review Panel. He is an Honorary Ambassador in Queensland Primary Industries and Fisheries' ambassador program, which supports the Blueprint for the Bush initiative.

**Juanita Hamparsum**
B Bus, CA, GAICD

Juanita Hamparsum was appointed to the Board for a three-year term commencing 1 October 2008. She is Chair of the Audit Committee.

Ms Hamparsum is a chartered accountant. She is a Director of the Hamparsum Family Trust and Kalori Pty Ltd, where she is the corporate trustee, accountant and finance manager for the family farming agribusiness of irrigated and broad acre cropping of cotton, wheat, sunflowers, chickpeas and sorghum. She is also a member of the Watermark Coal Project Consultative Committee. Ms Hamparsum has previously worked with Goldman Sachs in London and Ernst and Young in Sydney. She is a graduate member of the Australian Institute of Company Directors.

**Peter Hayes**
BSc, Dip Ed, BAppSci, M S

Peter Hayes was appointed to the Board for a three-year term commencing 1 October 2008. He is a member of the Remuneration Committee.

Mr Hayes is a self-employed wine industry strategist and adviser. He worked as a national viticulturist, with roles in industry relations and grower relations management for Southcorp Wines/Fosters Wine Estates.

Mr Hayes has extensive knowledge and experience in strategic planning and in the international commercial environment. He is a former Executive Director of the Grape and Wine Research and Development Corporation.

**Lisa Wilson**
BAgSci (Hons)

Ms Wilson was appointed to the CRDC Board in October 2005 and reappointed for a further three-year term commencing 1 October 2008. She is a member of the Audit Committee.

Ms Wilson is an agribusiness professional, senior executive and company director with more than 20 years experience in the agricultural sector. She was Chief Executive Officer of Australian Dairy Farmers Limited until April 2009 and previously acting Executive Director of the Australian Rural Leadership Foundation. She is Chair of the Albert Park Advisory Group for Parks Victoria and a Victorian Advisory Group Member of Landcare Australia Ltd. Her past non-executive directorships include Deputy Chair of the Australian Rural Leadership Foundation.

## Non-executive Directors until 30 September 2008

**Richard Browne**

Dick Browne was reappointed to the Board in October 2005 and remained a Director until the completion of his term on 30 September 2008. He was Vice-Chair until that time. Mr Browne was a member of the Remuneration and Intellectual Property Committees.

Mr Browne worked in the cotton industry for 38 years, most of that at a senior management level in corporate agriculture, involving production and processing of cotton. His main interest has been promoting research and development for the benefit of the industry.

Mr Browne was Chair of the CRC for Sustainable Cotton Production for the life of the organisation, a past Chair of the Australian Cotton Growers' Research Association for three terms and was a Director of the Australian Cotton CRC. He was previously a member for the Cotton Research Council, the forerunner of CRDC. In 2003 he became Chair of Condamine Alliance, a regional Natural Resource Management body in Queensland.

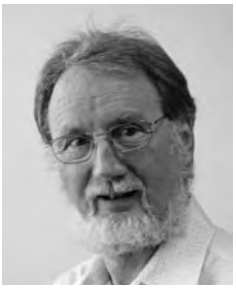
**David Conners**

David Conners was appointed to the Board in October 2005 and remained a Director until the completion of his term on 30 September 2008. He was Chair of the Intellectual Property Committee and a member of the Audit Committee.

Mr Conners was Managing Director of Australian Wool Services/The Woolmark Company from 2000 to 2004 and a Director of the subsidiary, Andar Holdings Pty Ltd. Prior to the formation of AWS, he was Managing Director of its predecessor, Australian Wool Research and Promotion Organisation, from 1999, having previously served as the International Marketing and Operations Director, based in Europe. In 2004 Mr Conners chaired a review of the CSIRO Textile & Fibre Division.

Mr Conners spent 20 years in the book retailing and publishing industries including four years as CEO of Angus & Robertson Bookworld and five years as Marketing Director of Heinemann/Hamlyn Publishing in Australia.

**TJ Higgins**
BScAg, MAgSc, PhD



TJ Higgins is the Deputy Chief of Plant Industry at CSIRO. He was reappointed to the CRDC Board in October 2005 and remained a Director until the completion of his term on 30 September 2008. He was a member of the Remuneration Committee.

Dr Higgins is a distinguished research scientist and has been involved in plant research for 30 years, specialising in gene technology for a range of Australian agricultural ecosystems. He has been involved in research on gene technology and genetically modified legumes (grain and pasture) and is experienced in administration of research and development.

## Board meetings

The Board held seven meetings during 2008–09:

| Board Meeting | Date | Location |
|---|---|---|
| 2008/04 | 11 August 2008 | Broadbeach, Qld |
| 2008/05 | 22 September 2008 | Teleconference |
| 2008/06 | 3 December 2008 | Geelong, Vic |
| 2009/01 | 12 February 2009 | Canberra, ACT |
| 2009/02 | 26 March 2009 | Narrabri, NSW |
| 2009/03 | 21 April 2009 | Teleconference |
| 2009/04 | 15 May 2009 | Ayr, Qld |

## Directors' Attendance at Board Meetings

| Director | Board meeting | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2008/04 | 2008/05 | 2008/06 | 2009/01 | 2009/02 | 2009/03 | 2009/04 |
| Mike Logan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Dick Browne | ✓ | ✓ | Not applicable | | | | |
| T J Higgins | – | ✓ | Not applicable | | | | |
| David Conners | ✓ | ✓ | Not applicable | | | | |
| Glenn Fresser | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ |
| Lisa Wilson | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| Leith Boully | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| Bruce Finney | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mary Corbett | Not applicable | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Kerry Adby | Not applicable | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Juanita Hamparsum | Not applicable | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Peter Hayes | Not applicable | | – | ✓ | ✓ | ✓ | ✓ |

## Board Committees

During 2008–09 the Board operated three committees: the Audit, Intellectual Property and Remuneration Committees. Much of the work of the Committees is conducted via email and telephone, rather than through formal meetings. The Corporation finds this arrangement to be effective and productive.

### Audit Committee

Established under section 89 of the *Primary Industries and Energy Research and Development Act 1989* and section 32 of the *Commonwealth Authorities and Companies Act 1997*, the Audit Committee's primary role is to ensure the Corporation's financial reporting is a true and fair reflection of its financial transactions. The Committee also provides a forum for communication between the Directors, the senior managers of the Corporation and the internal and external auditors of the Corporation. It carries responsibility for identifying areas of significant business risk and stipulating the means of managing any such risk.

Lisa Wilson continued as Chair of the Audit Committee until December 2008 and Mike Logan was a member throughout 2008–09. Dick Browne was a member until the completion of his term of Directorship in September 2008. New Director, Juanita Hamparsum, replaced Leith Boully as a member of the committee in December 2008 and became Chair of the committee. The Executive Director, Bruce Finney, and General Manager – Business and Finance, David Coleman, attended the meetings as observers.

The Audit Committee met five times during 2008–09:

| Director | 5 August 2008 | 14 January 2009 | 11 February 2009 | 25 March 2009 | 14 May 2009 |
|---|---|---|---|---|---|
| Mike Logan | ✓ | ✓ | ✓ | ✓ | ✓ |
| Lisa Wilson | ✓ | ✓ | ✓ | ✓ | – |
| Leith Boully | ✓ | Not applicable | | | |
| Juanita Hamparsum | Not applicable | ✓ | ✓ | ✓ | ✓ |

## Intellectual Property Committee

The role of the Intellectual Property Committee is to assist the Corporation's Board in fulfilling its responsibilities and to monitor the adequacy and effectiveness of the Corporation's policies and procedures that relate to the management of intellectual property (IP). The Committee's specific responsibilities are to review the operation of CRDC's IP Policy and IP Operating Principles and to consider IP matters directed to it for consideration by the Board.

Until September 2008, the Chair of the Committee was David Conners and other members were Dick Browne and Glenn Fresser. Glenn Fresser continued as a member and Mary Corbett and Kerry Adby became members. Dr Corbett became Chair of the Committee. Executive Director, Bruce Finney, attended as an observer. See below for Intellectual Property Committee meetings.

## Remuneration Committee

The Remuneration Committee advises the Board on the Executive Director's remuneration and senior staff remuneration adjustments. In July and August 2008, the members were Mike Logan (Chair), Dick Browne and TJ Higgins. The appointment of a new Board saw Mike Logan continue as Chair and Leith Boully and Peter Hayes became members from December 2008.

The Remuneration Committee met twice during 2008–09:

| Director | 24 July 2008 | 14 May 2009 |
|---|---|---|
| Mike Logan | ✓ | ✓ |
| Dick Browne | ✓ | Not applicable |
| TJ Higgins | ✓ | Not applicable |
| Leith Boully | Not applicable | ✓ |
| Peter Hayes | Not applicable | ✓ |

## Conflicts of Interest

In accordance with Section 131 of the *Primary Industries and Energy Research and Development Act 1989*, Directors are appointed based on their expertise and do not represent any particular organisation or interest group.

The Intellectual Property Committee met four times during 2008–09:

| Director | 5 August 2008 | 11 February 2009 | 25 March 2009 | 14 May 2009 |
|---|---|---|---|---|
| Dick Browne | ✓ | Not applicable | | |
| David Conners | ✓ | Not applicable | | |
| Glenn Fresser | ✓ | ✓ | ✓ | ✓ |
| Mary Corbett | Not applicable | ✓ | ✓ | ✓ |
| Kerry Adby | Not applicable | ✓ | ✓ | ✓ |

The Board follows section 54 of the *Primary Industries and Energy Research and Development (PIERD) Act 1989* and section 21 of the *Commonwealth Authorities and Companies (CAC) Act 1997* regarding Directors' disclosures of interests. A Director who considers that he or she may have a direct or indirect pecuniary or non-pecuniary interest in a matter to be discussed by the Board must disclose the existence and nature of the interest before the discussion. Depending on the nature and significance of the interest Directors may be required to absent themselves from the Board's deliberations. The Board has a standing notice of Director's interests, which is an agenda item at each Board meeting and is updated as necessary.

The PIERD Amendment Act 2007 repealed section 84 of the PIERD Act 1989 in June 2007 so as to eliminate a possible inconsistency of interpretation with the CAC Act regarding disclosure of interest by the Executive Director, whose obligations are identical to those of other Directors.

The Board is very aware of its responsibilities regarding conflict of interest and duty of care and has adopted a very cautious approach. A Board Charter clearly outlines the roles and responsibilities of Directors in terms of potential conflicts of interest. This approach has been successful and no difficulties have been encountered.

## Indemnities

The Board has taken the necessary steps to ensure professional indemnity cover is in place for present and past Directors and officers of the Corporation. The Corporation's insurance cover is provided through Comcover; however, the insurance contract prohibits CRDC from disclosing the nature or limit of the liabilities covered or the amounts of premiums paid.

## Legislation

The Cotton Research and Development Corporation began operations in 1990 under the *Primary Industries and Energy Research and Development (PIERD) Act 1989*, which sets out the following objectives:

a. Increasing the economic, environmental and social benefits to members of primary industries and the community in general by improving the production, processing, storage, transport and marketing of the products of primary industries

b. Achieving the sustainable use and management of natural resources

c. Making more effective use of the resources and skills of the community in general and the scientific community in particular

d. Improving accountability for expenditure on research and development activities in relation to primary industries.

The requirements of the PIERD Act are central to the Corporation's R&D planning. These requirements, as well as government and industry research priorities, form the Corporation's planning instruments and are addressed in the three R&D programs devised under the five-year Strategic Plan for 2008–2013.

The *Primary Industries and Energy Research and Development Amendment Act 2007* amended the PIERD Act in several respects intended to deliver an enhancement in the governance of Rural R&D Corporations.

The setting and collection of levies on the cotton industry is enabled by the *Cotton Levy Act 1982* and the *Primary Industries Levies and Collections Act 1991*. Accountability and reporting requirements are set out in the *Commonwealth Authorities and Companies (CAC) Act 1997*.

### Functions

CRDC's legislative functions are:

Investigating and evaluating the cotton industry's requirements for research and development, and the preparation, review and revision of an R&D plan on that basis;

*This is achieved by continuing interaction with CRDC's legislated industry body, as well as the industry peak body, the Australian Cotton Industry Council (ACIC). For the first part of the 2008–09 year, the Corporation's legislated industry body was the Australian Cotton Growers Research Association (ACGRA). In November 2008, ACGRA and the industry's representative body, Cotton Australia, merged. On 17 March 2009 the Minister notified formalisation of Cotton Australia as the*

*Corporation's new industry body under the PIERD Act 1989. Cotton Australia has assumed all relevant functions relating to CRDC, including an annual review to ensure the CRDC Strategic Plan remains current and relevant. Prior to the merger, ACGRA reviewed CRDC's planned R&D activities for 2008–09 before the Annual Operating Plan for that year was formulated and submitted to the Australian Government for approval. Following the change of industry body, this function is carried out by Cotton Australia, which reviewed planned activities for the 2009–10 year. The cotton industry, including ACGRA, ACIC and cotton researchers were closely involved in development of the CRDC Strategic Plan 2008–2013, which incorporated Government and industry R&D priorities, as well as advice from the Minister and the Department of Agriculture, Fisheries and Forestry.*

Preparing an Annual Operating Plan for each financial year;

*An Annual Operating Plan is submitted to the Australian Government in April each year and implementation proceeds once Government approval is received.*

Coordinating and funding R&D activities consistent with current planning documents;

*Research, development and extension projects are approved or commissioned in line with the Annual Operating Plan each year. The Annual Operating Plan is devised to address the objectives and strategies outlined in the current five-year Strategic R&D Plan.*

Monitoring, evaluating and reporting to Parliament, the Minister for Agriculture, Fisheries and Forestry, and to industry on R&D activities coordinated or funded by the Corporation;

*The Corporation reports formally to the Australian Government through its Annual Report, which is usually tabled in Parliament in October; in addition, the Corporation informs the Minister for Agriculture, Fisheries and Forestry of any matters of interest or concern in the current operating environment. This occurs in written and, where possible, face-to-face communication. CRDC is also in communication with the Department of Agriculture, Fisheries and Forestry on a range of issues. Communication with the industry occurs continually on both a formal and informal basis, as outlined above.*

*In order to ensure stringent evaluation of its R&D activities, CRDC is committed to the ongoing Council of Rural Research and Development Chair's Impact Evaluation process.*

Facilitating the dissemination, adoption and commercialisation of research and development results in relation to the cotton industry.

*Over the past decade, the Australian cotton industry has benefited greatly from having an industry-wide extension network, the Cotton Catchment Communities CRC-coordinated Australian Cotton Extension Team. CRDC remained the major investor in this network in 2008–09. In addition, CRDC staff members continued to play a pivotal role in the activities of the network, including facilitating fast and effective dissemination of CRDC-funded research outcomes. The industry's investment in a dedicated extension capacity is undergoing continual revision to adapt to changing circumstances.*

*More broadly, CRDC hosts forums, participates in roadshows and the annual cotton trade show, produces publications, sponsors the biennial research-based Australian Cotton Conference and has a communication strategy to extend and enhance the adoption of R&D. CRDC also collaborates in the successful commercialisation of R&D where possible.*

### Powers

Under Section 12 of the PIERD Act, CRDC has the power to do all things necessary to carry out its functions, including but not restricted to:

- Entering into agreements for the carrying out of R&D activities;
- Applying for patents, either solely or jointly;
- Charging for work done, services rendered, and goods and information supplied;
- Acquiring, holding and disposing of real or personal property; and,
- Anything incidental to any of its powers.

## Responsible Minister

The Corporation is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry. The Hon Tony Burke MP was appointed Minister for Agriculture, Fisheries and Forestry on 3 December 2007 and continued in that role throughout 2008–09.

The Minister's powers and responsibilities, as outlined under various sections of the PIERD Act, include:

- Appointing the Corporation's Chair and Directors
- The option to terminate the appointment of the Chair or any Director under certain conditions
- Approving the Corporation's Research and Development (Five Year) Plan and any variations
- Approving the Corporation's Annual Operating Plans and any variations
- Appointing a person as Presiding Member of the Corporation's Selection Committee, as well as other members of that Committee
- Transferring to the Corporation any assets held by the Commonwealth that the Minister considers appropriate and which would assist the performance and function of the Corporation.

### Ministerial Directions

As at 30 June 2009, CRDC is compliant with all legislative and policy requirements of the Australian Government that it has been able to ascertain. Ongoing directions from previous years that are applicable to the Corporation are the Commonwealth Fraud Control Guidelines 2002 (see page 93), Australian Government Property Ownership Policy 2005 and Protective Security Manual 2005 (see page 92).

The Minister notified CRDC on 29 April 2009 that he wished the Corporation to be mindful of community concern about executive remuneration. In addition to the current practice of consulting the Remuneration Tribunal, the Corporation is to seek information on comparable pay rates and scales across government and industry.

On 23 September 2008, the Minister directed CRDC to comply with the Australian Government Bargaining Framework when exercising its power to engage employees in relation to sections 12, 87 and 119 of the PIERD Act. Arrangements are being implemented in line with the Framework to ensure fairness and flexibility, promote productivity, provide for collective agreement negotiated at the individual authority level and enshrine accountability for compliance with the framework with individual authorities.

## Research Accountabilities

The Corporation is accountable to the Australian people through the Australian Government and to the cotton industry through its industry representative body. As outlined above, the Australian Cotton Growers' Research Association was the industry representative body until December 2008. On 17 March 2009, the Minister notified the completion of formal processes allowing Cotton Australia taking over that function. Further details of this change can be found in 'Significant Changes'.

The Corporation has been subject to the *Commonwealth Authorities and Companies (CAC) Act 1997* since August 1998. The CAC Act provided enhanced levels of accountability, as well as a new planning and reporting framework. The Annual Operating Plan 2008–09 marked the first year of operation under the framework requirements of the Strategic Plan 2008–2013.

CRDC's stakeholders set broad objectives, which the Corporation addresses through its Strategic (Five Year) Plan and Annual Operating Plan. CRDC has used these objectives as a basis for the development of its planned outcomes and the identification of key outputs.

## Intellectual Property

In 2007–08, CRDC applied for a 'Cotton Ready' trademark for communication purposes. This application is still pending. No other applications for patents or activities relating to patents were undertaken.

## Risk Management

The Corporation has a Risk Management Plan as part of its approach to identifying and managing areas of significant business risk. Following a 2007 review by the Board's Audit Committee of the Corporation's risk management framework, new policies for Terms of Employment, Equal Employment Opportunity and Harassment, Appropriate Internet and Email Access, Government Protective Security, Delegations of Authority and Risk Register have been implemented.

The risk management process also involves consulting widely and participating in appropriate industry,

Rural Research and Development Corporation and Government forums to keep fully informed about the environment in which the Corporation operates. Situations involving even minor business risk are fully discussed at a Board level with policy developed through consensus. Management and staff have responsibility for implementing policy as directed by the Board.

The Protective Security Manual 2005 (the PSM) has applied to CRDC as a general policy of the Government since 1 March 2007. In accordance with subsections 28(2) and 28(3) of the CAC Act, the Corporation must ensure that the policy is carried out. Implementation of a Protective Security Policy for the Corporation was completed before the reporting year.

The Board holds a focused and facilitated strategic review session in conjunction with Board meetings, focusing on a specific issue or area of research. Depending on the topic, a variety of speakers and industry participants may also be invited to attend, to enable broad discussion and to expose risks and opportunities for the Corporation and the industry.

## Risk Management

Directors and employees conducted or commissioned the following reviews during 2008–09:

| | Review | Outcome |
|---|---|---|
| Corporate Reviews | Risk management framework and risk register | Risk management improved through a number of enhancements and further priorities identified. |
| | Fraud Controls Audit | CRDC engaged Nexia Court & Co to conduct an audit of internal fraud controls for the year ended 30 June 2009. The audit was conducted in accordance with Australian Auditing Standards for the assistance of Directors in evaluating the compliance of CRDC with internal controls. |
| | Review of Information Technology Systems and Practices | CRDC engaged Oakton to conduct a review in alignment with Government policy requirements and international standards, Corporation's objectives of continuous improvement and risk management strategy. |
| R&D Strategic Reviews | R&D program reviews | The reporting year marked the first year of operation under the Strategic Plan 2008–2013. The Board reviewed the status of the three R&D investment strategies, the CRDC business model and administration during the year. Additionally, CRDC convened and/or financially supported a range of forums (listed below) on particular issues to identify R&D progress, gaps and overlaps. |
| | FUSCOM forum | Reviewed industry research addressing Fusarium wilt, a problematic disease in the Australian cotton industry. |
| | REFCOM forum | Addressed the management of resistance in *Bt* crops and to pesticides. |
| | Biotechnology forum | A forum was held with CSIRO and Cotton Seed Distributors Ltd to discuss the industry needs and priorities for R&D where biotechnology was applicable. |
| | Deep Drainage farming systems forum | A comprehensive review of research addressing the drainage of water beyond the cotton plant's root zone and the resulting problems. |
| | The Big Day Out | A review of farming systems best practice in response to climate change. |
| | 'We're Aussie, wear Aussie' | A review of R&D in the cotton industry value chain, together with an overview of Australian cotton as a premium fibre in world markets. |

## Board Charter

A Board Charter assists Directors in carrying out their duties and setting out roles and responsibilities of Directors and staff. A revised Board Charter was implemented in 2007–08.

## Industry Stakeholder Reporting

CRDC's reporting processes include the presentation of a formal report to its industry stakeholder. Part of this presentation includes an opportunity for questioning and debating Board decisions. For the first six months of the reporting year, the Corporation's industry stakeholder was ACGRA. On 17 March 2009, the Minister notified formalisation of Cotton Australia assuming this role. Further information on the relationship between the Corporation and its industry stakeholder can be found on page 28.

## Corporate Planning

In accordance with the *Primary Industries and Energy Research and Development (PIERD) Act 1989* and the *Commonwealth Authorities and Companies (CAC) Act 1997*, the Corporation prepares a Strategic (Five Year) Plan as well as an Annual Operating Plan for each financial year.

The Corporation submitted the Strategic Plan 2008–2013 and the Annual Operating Plan 2008–09 to the Minister for Agriculture, Fisheries and Forestry, the Hon. Tony Burke MP, on 24 April 2008 and received written advice of approval for both on 7 July 2008.

The Corporation submitted its Annual Report 2007–08 to the Minister on 3 October 2008 and received acknowledgement from him on 28 October 2008. The report was tabled in the House of Representatives on 12 November 2008.

## Fraud Control

The Corporation fosters an environment that minimises the likelihood and impact of fraud. Active fraud control is a major responsibility of all staff and clear standards and procedures have been established. All personnel engaged in the prevention, detection and investigation of fraud receive appropriate fraud control training, consistent with the Australian Government's Fraud Control Guidelines. The Audit Committee endorses, monitors and reviews the Corporation's Fraud Control Plan, which is read in conjunction with the Risk Management Plan and the Board Charter for Directors and Statement of Principles for staff.

The Corporation's Audit Committee, Executive Director and General Manager – Business and Finance (the nominated fraud control officer) carry out the functions of a fraud investigation unit collectively, as described in the Commonwealth Fraud Investigation Model. The support of the Australian Federal Police would be sought if the Corporation felt there was a prima facie case of fraud and further investigation was required. No such action was necessary in 2008–09.

Following an external Fraud Risk Assessment conducted at the end of June 2008, an external audit of Fraud Controls was undertaken for the year ending June 2009.

## Service Charter

The Corporation does not provide services direct to the public and does not have a service charter; however, the Corporation has a Board Charter and a Statement of Principles. The Statement of Principles can be found on page 23, in the introductory section of this publication. It embodies the set of values underlying our decisions, actions and relationships.

## Our People

### Employment

Staff members are employed under Section 87 of the PIERD Act 1989, which provides that the terms and conditions of employment are to be determined by the Corporation. Including the Executive Director, there were seven full-time employees and one part-time employee as at 30 June 2009.

The Minister has directed CRDC to comply with the Australian Government Bargaining Framework when exercising its power to engage employees in relation to sections 12, 87 and 119 of the PIERD Act. Arrangements are being implemented in line with the Framework to ensure fairness and flexibility, promote productivity, provide for collective agreement negotiated at the individual authority level and enshrine accountability for compliance with the framework with individual authorities.

## Staff Changes during 2008–09

General Manager – Business and Finance, David Coleman resigned on 19 January 2009 and recommenced on 23 March 2009. Project Administration Manager, Kara Taylor resigned on 26 September 2008, while on maternity leave. Acting Project Administration Manager, Lee-Anne Melbourne left CRDC on 26 September 2008 and continues to consult on a part-time basis. Research Program Manager, Ian Taylor, resigned from CRDC on 26 September 2008. Research Program Manager, Tracey Farrell, commenced at CRDC on 10 December 2008. Administrative Assistant, Karen Larsen, resigned on 24 June 2009.

## Staff appointments after the reporting year

Following the resignation of David Coleman from the position of General Manager – Finance and Business after the reporting year, Craig Young was appointed in September 2009.

## Staff training and development

The Corporation spent $17,752 on training and recruitment in 2008–09. Areas of direct training activities were time management, negotiation, the Australian Institute of Company Directors course, the Field to Fabric course, and executive coaching.

In addition, activities such as the attendance of staff members at workshops and meetings and internal staff training on Occupational Health and Safety occurred at no additional cost to the Corporation.

Throughout the year, Corporation Directors and staff participate in a wide range of Corporation-related activities involving external bodies relating to the operations of the Corporation, providing valuable experience, as well as skills and knowledge upgrades for the personnel involved.

## Organisational structure at 30 June 2009

| CRDC Board of Directors<br>Chair **Mike Logan** | | |
|---|---|---|
| Executive Director **Bruce Finney** | | |
| **R&D Program Team** | **Communication** | **Business and Administration Team** |
| General Manager – R&D Investment<br>**Bruce Pyke**<br><br>Research Program Investment Managers<br><br>Value chain<br>**Dallas Gibb***<br><br>Farming Systems<br>**Tracey Farrell**<br><br>Human Capacity<br>**Rohan Boehm**<br><br>R&D Implementation<br>**Helen Dugdale** | Manager – Communication and Capacity Development<br>**Rohan Boehm**<br><br>(also part of the R&D Program Team) | General Manager – Business and Finance<br>**David Coleman**<br><br>Project Administration Manager / Assistant Accountant<br>**Lee-Anne Melbourne***<br><br>Executive Assistant<br>**Dianne Purcell**<br><br>Administrative Assistant<br>**Margaret Wheeler** |

** External (contracted)

### Equal Employment Opportunity

CRDC is committed to a merit-based, non-discriminatory recruitment and promotion policy and staff members are chosen strictly according to their qualifications for the job. Scientists undertaking CRDC-funded research are of diverse backgrounds and cultures.

CRDC's Equal Opportunity and Harassment Policy defines prohibited discrimination and harassment and sets out a complaints procedure to be followed if there is a breach of this policy, including details of what action can be taken once the complaint has been made. The policy applies to all employees, whether full-time, part-time, casual or temporary, to directors and to contractors and customers (clients).

## Contractors and Consultants

The Corporation employs consultants and contractors on a needs basis and after background checks to ensure proposed appointees have the necessary skills and experience. During the reporting year the Corporation spent $303,145 to remunerate consultants and contractors. Privacy and confidentiality arrangements mean that Corporation policy is not to disclose amounts paid to individual consultants. A list of contractors and consultants can be found in the adjoining column.

## Commonwealth Disability Strategy

Corporation working conditions and procedures for employees and stakeholders are compliant with the Commonwealth Disability Strategy insofar as the small size of the Corporation and physical nature of the CRDC building allows. CRDC has ensured that any person with a disability could be properly accommodated and carry out all functions, as either a staff member or a visitor. Should a future staff member need more specialised disability assistance, CRDC will assess and meet these needs to the extent that it is possible.

CRDC's Equal Opportunity and Harassment Policy defines prohibited discrimination and harassment and sets out a complaints procedure. Further details can be found above under Equal Employment Opportunity.

## Significant Events

Under section 15 of the *Commonwealth Authorities and Companies (CAC) Act 1997*, the Corporation is required to notify the Minister of 'significant events'. The Corporation provides regular briefings to the Minister for Agriculture, Fisheries and Forestry on its key issues and activities; however, CRDC had no significant events within the meaning of the Act during the reporting year.

## Significant Changes in the State of Affairs

CRDC had one significant change in its state of affairs in 2008–09: the Corporation's industry body, the Australian Cotton Growers Research Association, merged with Cotton Australia in November 2008. On 17 March 2009 the Minister for Agriculture, Fisheries and Forestry, the Hon Tony Burke MP, notified CRDC

### Contractors and Consultants 2008–09

| Contractor | Service |
|---|---|
| B & C Druce | Cleaning |
| Bytes & PCs Narrabri | IT support |
| Elizabeth Fox | Database update |
| Guy Roth | Critical analysis |
| Lee-Anne Melbourne | Project administration management |
| Lee Jensen | Cotton Conference 2008 DVD |
| Louise Gall | Publication content |
| Mary Ann Day | Publication content |
| Megan James | Publication content |
| Melanie Jensen | Cotton Conference and publication content |
| Natural Solutions | EMS Pathways |
| Neal Deacon Art Director | Creative advice |
| Pola Media | Publication content |
| Psionic Creative | Website maintenance |
| TechMac Pty Ltd | Program management |
| Terri-Ann Crothers | Publication content |
| Tristan Rossell | Publication content |
| Weemalah Writeability | Publication writing, editing and design |
| Wordsworth Writing | Annual Report indexing |

of a declaration under section 7 of the *Primary Industries and Energy Research And Development Act 1989*, that formalised Cotton Australia as the Corporation's new industry body.

## Judicial decisions and reviews by outside bodies

CRDC had no judicial decisions or reviews by outside bodies within the meaning of Division two of Part two of the PIERD Act 1989.

## Occupational Health and Safety

CRDC has a strong culture of achieving best practice and continuous improvement in Occupational Health and Safety (OH&S), as required by the *Occupational Health and Safety Act 1991*. This is achieved by providing the necessary resources (both human and financial) to ensure that OH&S functions effectively.

| Legislative reporting requirements under s.74 of the OH&S ACT | Action undertaken 2008–09 |
|---|---|
| Health and safety management arrangements | • Regular OH&S committee meetings.<br>• OH&S is a standing item at general staff meetings. |
| Initiatives during the year | • Updated Health and Safety Management Arrangements adopted by staff.<br>• The OH&S policy was amended and approved by the Board.<br>• Safety issues formally discussed, workplace inspections held and staff consulted in resolving safety issues and physical conditions of the workplace.<br>• Flu vaccination program for all staff.<br>• Staff received fire extinguisher training.<br>• General OH&S inductions were provided for new staff, directors and contractors. |
| Statistics of any accident or dangerous occurrence as defined by s.68 of the OH&S Act | • CRDC had no OH&S incidents to report in 2008–09. Should any such incident occur, it would be managed in accordance with the Act. |
| Details of any investigations conducted during the year, including details of all notices given to the employee under s.29, 46 or 47 of the OH&S Act | • CRDC conducted no investigations and no notices were given to an employee. |

## Freedom of Information

General enquiries regarding access to documents or other matters relating to Freedom of Information should be made in the first instance to the General Manager – Business and Finance. The Corporation did not receive any requests under the *Freedom of Information Act 1982* during the reporting year.

Funding information on individual projects funded by the Corporation is available on request, unless that information has been classified as commercial-in-confidence. Information about CRDC projects is also available through the Australian Agricultural and Natural Resources Online (AANRO) Database, which can be accessed through the Internet and through most Australian research and public libraries.

| Categories of Documents Held | | |
|---|---|---|
| Category | Nature | Access |
| Administration | Files | D |
| Annual Operating Plans | Files, Publications | D, C |
| Annual Reports | Files, Publications | D, C |
| Applications, Guidelines and Contracts | Files, Publications | D, C |
| Assets Register | Files | D |
| Financial Management | Files | D |
| Five Year Plans | Files, Publications | D, C |
| Project Lists | Files, Publications | D, C |
| Research Reports | Files, Publications | D, C |
| Workshop Reports | Files, Publications | D, C |
| C: Documents customarily made available<br>D: Documents not customarily made available for reasons of privacy or commercial-in-confidence | | |

## Payments to Advertising Agencies

The Corporation did not engage the services of any advertising agency, market research organisation, polling organisation, direct mail organisation or media advertising organisation during the reporting year.

## Payment to Representative Bodies

The Corporation's industry representative body in June to November 2008 was the Australian Cotton Growers Research Association (ACGRA). Following the merger of ACGRA and Cotton Australia in November 2008, Cotton Australia took over that function. The role of industry representative body involves several specific activities:

- Participation in development of the five year Strategic Plan. This ensures CRDC's strategic planning continues to address evolving industry R&D needs
- A meeting to receive and discuss the CRDC annual report for the preceding year. This enables the industry representative body to ensure CRDC's activities for that year have met its strategic objectives (listed on page 39 in this report) and to question senior staff on any matters of interest or concern
- Participation in CRDC and Cotton Catchment Communities CRC Farming Systems forums.

While CRDC does not pay a fee for service to the industry representative body for these activities, it contributes to the expenses they incur in carrying them out, as authorised by s.15 of the PIERD Act, which relates to consultation with the industry stakeholder.

In 2008–09 CRDC contributed a total of $58,749 to Cotton Australia for the following activities:

- Review of CRDC research 2009–10 research applications and reports
- Travel to various R&D-related forums
- Support for the 14th Australian Cotton Conference.

# Financial Statements

Australian National Audit Office

**INDEPENDENT AUDITOR'S REPORT**

**To the Minister for Agriculture, Fisheries and Forestry**

**Scope**

I have audited the accompanying financial statements of the Cotton Research and Development Corporation for the year ended 30 June 2009, which comprise: a Statement by Directors and Executive Director; Income Statement; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments; Schedule of Contingencies; and Notes to and forming part of the Financial Statements, including a Summary of Significant Accounting Policies.

***The Responsibility of the Directors for the Financial Statements***

The directors are responsible for the preparation and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards (which include the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal control relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

***Auditor's Responsibility***

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Cotton Research and Development Corporation's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Cotton Research and Development Corporation's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial statements.

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT 2600
Phone (02) 6203 7300 Fax (02) 6203 7777

FINANCIAL STATEMENTS

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

***Independence***

In conducting the audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

**Auditor's Opinion**

In my opinion, the financial statements of the Cotton Research and Development Corporation:

(a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards; and

(b) give a true and fair view of the matters required by the Finance Minister's Orders including the Cotton Research and Development Corporation's financial position as at 30 June 2009 and its financial performance and cash flows for the year then ended.

Australian National Audit Office

Ron Wah
Senior Director

Delegate of the Auditor-General

Canberra
16 September 2009

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Statement by Directors and Executive Director

In our opinion, the attached financial statements for the year ended 30 June 2009 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the Commonwealth Authorities and Companies Act 1997.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Authority will be able to pay its debts as and when they become due and payable.
This statement is made in accordance with a resolution of the directors.

Signed

**Mike Logan**
Chair
16 September 2009

Signed

**Bruce Finney**
Executive Director
16 September 2009

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Income Statement
*for the period ended 30 June 2009*

| | Notes | 2009 $ | 2008 $ |
|---|---|---|---|
| Income | | | |
| **Revenue** | | | |
| Revenue from Government | 3A | **2,435,794** | 3,127,710 |
| Industry levies | 3B | **2,374,239** | 1,953,545 |
| Interest | 3C | **739,565** | 1,105,098 |
| Other revenues | 3D | **2,131,224** | 771,623 |
| *Total revenue* | | **7,680,822** | 6,957,976 |
| **Total Income** | | **7,680,822** | 6,957,976 |
| **Expenses** | | | |
| Employee benefits | 4A | **1,176,962** | 1,299,207 |
| Suppliers | 4B | **287,252** | 407,414 |
| Grants | 4C | **7,882,847** | 8,704,419 |
| Depreciation and amortisation | 4D | **61,408** | 52,661 |
| **Total Expenses** | | **9,408,469** | 10,463,701 |
| **Surplus (Deficit) attributable to the Australian Government** | | **(1,727,647)** | (3,505,725) |

The above statement should be read in conjunction with the accompanying notes

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Balance Sheet
*as at 30 June 2009*

| | Notes | 2009 $ | 2008 $ |
|---|---|---|---|
| Assets | | | |
| **Financial Assets** | | | |
| Cash and cash equivalents | 5A | 9,376,385 | 12,151,582 |
| Trade and other receivables | 5B | 3,077,729 | 836,497 |
| *Total financial assets* | | 12,454,114 | 12,988,079 |
| **Non–financial Assets** | | | |
| Land and buildings | 6A,C | 550,000 | 488,316 |
| Infrastructure, plant and equipment | 6B,C | 80,199 | 108,279 |
| Intangibles | 6D | 55,506 | 80,014 |
| Other non–financial assets | 6E | 7,965 | 25,538 |
| *Total non–financial assets* | | 693,670 | 702,147 |
| **Total Assets** | | 13,147,784 | 13,690,226 |
| Liabilities | | | |
| **Payables** | | | |
| Suppliers | 7A | 30,417 | 60,944 |
| Grants | 7B | 2,561,457 | 1,431,743 |
| Other | 7C | 54,950 | 30,510 |
| *Total payables* | | 2,646,824 | 1,523,197 |
| **Provisions** | | | |
| Employee provisions | 8A | 205,952 | 215,481 |
| *Total provisions* | | 205,952 | 215,481 |
| **Total Liabilities** | | 2,852,776 | 1,738,678 |
| **Net Assets** | | 10,295,008 | 11,951,548 |
| Equity | | | |
| Reserves | | 206,699 | 135,592 |
| Retained surpluses | | 10,088,309 | 11,815,956 |
| **Total equity** | | 10,295,008 | 11,951,548 |
| Current Assets | | 12,462,079 | 13,013,617 |
| Non–Current Assets | | 685,705 | 676,609 |
| Current Liabilities | | 2,801,054 | 1,679,131 |
| Non–Current Liabilities | | 51,722 | 59,548 |

The above statement should be read in conjunction with the accompanying notes

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Statement of Changes in Equity
*as at 30 June 2009*

| | Accumulated Results | | Asset Revaluation Reserve | | Total Equity | |
|---|---|---|---|---|---|---|
| | **2009** | 2008 | **2009** | 2008 | **2009** | 2008 |
| | **$** | $ | **$** | $ | **$** | $ |
| Opening balance | | | | | | |
| Balance carried forward from previous period | **11,815,956** | 15,321,681 | **135,592** | 135,592 | **11,951,548** | 15,457,273 |
| Adjustment for errors | **0** | 0 | **0** | 0 | **0** | 0 |
| Adjustment for changes in accounting policies | | | | | | |
| **Adjusted opening balance** | **11,815,956** | 15,321,681 | **135,592** | 135,592 | **11,951,548** | 15,457,273 |
| **Income and expense** | | | | | | |
| Income and expenses recognised directly in equity | **0** | 0 | **71,107** | 0 | **71,107** | 0 |
| **Sub–total income and expenses recognised directly in equity** | **0** | 0 | **71,107** | 0 | **71,107** | 0 |
| Surplus (Deficit) for the period | **(1,727,647)** | (3,505,725) | **0** | 0 | **(1,727,647)** | (3,505,725) |
| **Total income and expenses** | **(1,727,647)** | (3,505,725) | **0** | 0 | **(1,727,647)** | (3,505,725) |
| **Closing balance at 30 June** | **10,088,309** | 11,815,956 | **206,699** | 135,592 | **10,295,008** | 11,951,548 |

The above statement should be read in conjunction with the accompanying notes

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Cash Flow Statement
*for the period ended 30 June 2009*

| | Notes | 2009 $ | 2008 $ |
|---|---|---|---|
| Operating Activities | | | |
| Cash received | | | |
| Commonwealth contributions | | 1,430,175 | 3,093,651 |
| Industry levies | | 2,271,494 | 2,388,887 |
| Interest | | 1,004,251 | 1,229,776 |
| Net GST received | | 46,400 | 0 |
| Other cash received | | 843,865 | 1,913,385 |
| *Total cash received* | | 5,596,185 | 8,625,699 |
| Cash used | | | |
| Employees | | 1,151,846 | 1,307,292 |
| Suppliers | | 418,749 | 331,656 |
| Grants | | 6,802,187 | 8,035,825 |
| Net GST paid | | 0 | 98,036 |
| *Total cash used* | | 8,372,782 | 9,772,809 |
| **Net cash from or (used by) operating activities** | 9 | (2,776,597) | (1,147,110) |
| Investing Activities | | | |
| Cash used | | | |
| Purchase of property, plant and equipment | | (0) | 32,779 |
| Cash received on sale of PP&E | | (1,400) | |
| Purchase of intangibles | | | 0 |
| *Total cash used* | | (1,400) | 32,779 |
| **Net cash from or (used by) investing activities** | | 1,400 | (32,779) |
| Net increase or (decrease) in cash held | | (2,775,197) | (1,179,889) |
| Cash at the beginning of the reporting period | | 12,151,582 | 13,331,471 |
| Cash at the end of the reporting period | 5A | 9,376,385 | 12,151,582 |

The above statement should be read in conjunction with the accompanying notes

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Schedule of Commitments
*as at 30 June 2009*

| | 2009 $ | 2008 $ |
|---|---|---|
| By Type | | |
| **Commitments Receivable** | | |
| Lease rental income | 8,250 | 8,250 |
| GST recoverable on commitments | 1,350,419 | 2,121,648 |
| *Total commitments receivable* | 1,358,669 | 2,129,898 |
| **Commitments payable** | | |
| Operating leases (1) | 149,574 | 43,575 |
| Research grant commitments (2) | 14,705,038 | 23,338,123 |
| *Total commitments payable* | 14,854,612 | 23,381,698 |
| **Net commitments by type** | 13,495,943 | 21,251,800 |
| By Maturity | | |
| **Commitments Receivable** | | |
| One year or less | 783,840 | 668,396 |
| From one to five years | 574,829 | 1,461,502 |
| *Total commitments receivable* | 1,358,669 | 2,129,898 |
| **Operating lease commitments** | | |
| One year or less | 44,678 | 37,350 |
| From one to five years | 104,896 | 6,225 |
| *Total operating lease commitments* | 149,574 | 43,575 |
| **Research grant commitments** | | |
| One year or less | 8,486,816 | 7,261,602 |
| From one to five years | 6,218,222 | 16,076,521 |
| *Total research grant commitments* | 14,705,038 | 23,338,123 |
| **Net commitments by maturity** | 13,495,943 | 21,251,800 |

1. Operating leases are effectively non-cancellable and comprise of agreements for the provision of motor vehicles for senior executives
2. Research grants commitments are amounts payable under grant agreements in respect of which the recipient is yet to perform the services required or meet eligibility conditions

The above statement should be read in conjunction with the accompanying notes.

### Schedule of Contingencies
*as at 30 June 2009*

The Corporation had no contingent assets or liabilities.

The above schedule should be read in conjunction with the accompanying notes

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Notes to and forming part of the financial statements

*for the period ended 30 June 2009*

## COTTON RESEARCH AND DEVELOPMENT CORPORATION

### Notes to and forming part of the financial statements

*for the period ended 30 June 2009*

### Note 1: Summary of Significant Accounting Policies

1.1 Basis of Preparation of the Financial Report

The Financial Statements and notes are required by clause 1 (b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997* and are a general purpose financial report.

The continued existence of the Corporation in its present form and with its present programs is dependent on Government policy and on continuing appropriations by Parliament for the Corporation's administration and programs.

The Financial Statements and notes have been prepared in accordance with:

- Finance Minister's Orders (FMOs) for reporting periods ending on or after 1 July 2008; and
- Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial report has been prepared on an accrual basis and is in accordance with historical cost convention, except for certain assets at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The Financial Report is presented in Australian dollars and values are rounded to the nearest dollar unless otherwise specified.

Unless an alternative treatment is specifically required by an Accounting Standard or the FMOs, assets and liabilities are recognised in the Balance Sheet when and only when it is probable that future economic benefits will flow to the Corporation and the amounts of assets or liabilities can be reliably measured. However, assets and liabilities arising under agreements equally proportionately unperformed are not recognised unless required by an Accounting Standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments and the Schedule of Contingencies (other than unquantifiable, which are reported at Note 10).

Unless alternative treatment is specifically required by an Accounting Standard, revenues and expenses are recognised in the Income Statement when, and only when, the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Significant accounting judgements and estimates

In the process of applying the accounting policies listed in this note, the Corporation has made the following judgements that have the most significant impact on the amounts recorded in the financial statements:

- The fair value of land and buildings has been taken to be the market value of similar properties as determined by an independent valuer.

No accounting assumptions or estimates have been identified that have a significant risk of causing a material adjustment to carrying amounts of assets and liabilites within the next accounting period.

1.3 New Accounting Standards

*Adoption of new Australian Accounting Standard requirements*

No accounting standard has been adopted earlier than the application date as stated in the standard.

*Future Australian Accounting Standard requirements*

Of the new standards, amendments to standards or interpretations that have been issued by the Australian Accounting Standards Board that are applicable to future reporting periods, none will have a material impact on the Corporation.

1.4 Revenue

Revenue from the sale of goods is recognised when:

- The risks and rewards of ownership have been transferred to the buyer;
- The seller retains no managerial involvement nor effective control over the goods;
- The revenue and transaction costs incurred can be reliably measured; and
- It is probable that the economic benefits associated with the transaction will flow to the Corporation.

Revenue from rendering of services is recognised by reference to the stage of completion of contracts at the reporting date. The revenue is recognised when:

- The amount of revenue, stage of completion and transaction costs incurred can be reliably measured; and
- The probable economic benefits with the transaction will flow to the Corporation.

The stage of completion of contracts at the reporting date is determined by reference to the proportion that costs incurred to date bear to the estimated total costs of the transaction.

Receivables for goods and services, which have 30 day terms, are recognised at the nominal amounts due less any impairments. Collectability of debts is reviewed at balance date. Impairments are made when collectability of the debt is no longer probable.

Interest revenue is recognised using the effective interest method as set out in *AASB 139 Financial Instruments: Recognition and Measurement.*

### Resources received free of charge

Resources received free of charge are recognised as revenue when, and only when, a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

### Revenues from Government

Funding received or receivable from agencies (appropriated to the agency as a CAC Act body payment item for payment to the Corporation) is recognised as revenue from Government unless they are in the nature of an equity injection.

1.5 Royalties

Revenue from royalties are recognised on an accruals basis in accordance with relevant agreements.

1.6 Gains

### Other resources received free of charge

Contributions of assets at no cost of acquisition or for nominal consideration are recognised as gains at their fair value when the asset qualifies for recognition, unless received from another Government agency or authority as a consequence of a restructuring of administrative arrangements (refer to Note 1.7).

Resources received free of charge are recorded as either revenue or gains depending on their nature.

### Sale of assets

Gains from disposal of non–current assets are recognised when control of the asset has passed to the buyer.

1.7 Transactions with the Government as owner

### Equity injections

Amounts that are designated as equity injections for a year are recognised directly in contributed equity in that year.

### Restructuring of administrative arrangements

Net assets received from, or relinquished to, another Australian Government Agency or Authority under a restructuring of administrative arrangements are adjusted at their book value directly against contributed equity.

### Other distributions to owners

The FMOs require that distributions to owners be debited to contributed equity unless in the nature of a dividend.

1.8 Employee benefits

Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

Liabilities for 'short–term employee benefits' (as defined in AASB 119) and termination benefits due within twelve months of balance date are measured at their nominal amounts.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

All other employee benefit liabilities are measured at the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

### Leave

The liability for employee benefits includes provision for annual leave and long service leave. No provision has been made for sick leave as all sick leave is non–vesting and the average sick leave taken in future years by employees of the Corporation is estimated to be less than the annual entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration including the Corporation's employer superannuation contribution rates and oncosts to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability for long service leave has been determined by reference to the work of an actuary as at 30 June 2009. The estimate of the present value of the liability takes into account attrition rates, remuneration increases through promotion and inflation, superannuation contribution rates and oncosts.

### Separation and redundancy

Provision is made for separation and redundancy benefit payments. The Corporation recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

### Superannuation

Some staff of the Corporation are members of the Public Sector Superannuation Scheme (PSS) or the PSS accumulation plan (PSSap).

The PSS is a defined benefit scheme for the Australian Government. The PSSap is a defined contribution scheme.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. The liability is reported by the Department of Finance and Deregulation as an administered item.

The Corporation makes employer contributions to the employee superannuation scheme at rates determined by an actuary to be sufficient to meet the current cost to the Government of the superannuation entitlements of the Corporation's employees. The Corporation accounts for the contributions as if they were contributions to defined contribution plans.

The liability for superannuation recognised as at 30 June represents outstanding contributions for the days worked after the final fortnight of the year.

1.9 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessor to the lessee substantially all the risks and rewards incidental to ownership of leased non–current assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains substantially all such risks and benefits.

Where a non–current asset is acquired by means of a finance lease, the asset is capitalised at either the fair value of the lease property or, if lower, the present value of minimum lease payments at the inception of the contract and a liability is recognised at the same time and for the same amount.

The discount rate used is the interest rate implicit in the lease. Leased assets are amortised over the period of the lease. Lease payments are allocated between the principal component and the interest expense.

Operating lease payments are expensed on a straight line basis which is representative of the pattern of benefits derived from the leased assets.

1.10 Borrowing costs

No Borrowing costs were incurred by the Corporation during the year.

1.11 Cash

Cash and cash equivalents includes notes and coins held and any deposits held in bank accounts with an original maturity of 12 months or less that are readily convertible to known amounts of cash and subject to insignificant risk of changes in value. Cash is recognised at its nominal amount.

1.12 Financial assets

The Corporation classifies its financial assets in the following categories:

- held–to–maturity investments;
- available–for–sale; and
- loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition.

Financial assets are recognised and derecognised upon trade date.

### Effective interest method

The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts over the expected life of the financial asset, or, where appropriate, a shorter period.

### Financial assets at fair value through profit or loss

Financial assets are classified as financial assets at fair value through profit or loss where the financial assets:

- are a part of an identified portfolio of financial instruments that the Corporation manages together and has a recent actual pattern of short–term profit–taking; or
- are derivatives that are not designated and effective as a hedging instrument.

Assets in this category are classified as current assets.

Financial assets at fair value through profit or loss are stated at fair value, with any resultant gain or loss recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest earned on the financial asset.

### Available–for–sale financial assets

Available–for–sale financial assets are non–derivatives that are either designated in this category or not classified in any of the other categories. They are included in non–current assets unless management intends to dispose of the asset within 12 months of the balance sheet date.

Available–for–sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised directly in the reserves (equity) with the exception of impairment losses. Interest is calculated using the effective interest method and foreign exchange gains and losses on monetary assets are recognised directly in profit or loss. Where the asset is disposed of or is determined to be impaired, part (or all) of the cumulative gain or loss previously recognised in the reserve is included in profit for the period. The Corporation does not have available–for–sale financial assets.

Where a reliable fair value cannot be established for unlisted investments in equity instruments, cost is used. The Corporation has no such instruments.

### Held–to–maturity investments

Non–derivative financial assets with fixed or determinable payments and fixed maturity dates that the Corporation has the positive intent and ability to hold to maturity are classified as held–to–maturity investments. Held–to–maturity investments are recorded at amortised cost using the effective interest method less impairment, with revenue recognised on an effective yield basis.

### Loans and receivables

Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as loans and receivables. They are included in current assets, except for maturities greater than 12 months after the balance sheet date. These are classified as non–current assets. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

### Impairment of financial assets

Financial assets are assessed for impairment at each balance date.

- *Financial assets held at amortised cost* – If there is objective evidence that an impairment loss has been incurred for loans and receivables or held to maturity investments held at amortised cost, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the Income Statement.
- *Available–for–sale financial assets* – If there is objective evidence that an impairment loss on an available for sale financial asset has been incurred, the amount of the difference between its cost, less principal repayments and amortisation, and its current fair value, less any impairment loss previously recognised in expenses, is transferred from equity to the Income Statement.

- *Available–for–sale financial assets (held at cost)* – If there is objective evidence that an impairment loss has been incurred, the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets.

1.13 Financial liabilities

Financial liabilities are classified as either financial liabilities at fair value through profit or loss or other financial liabilities.

Financial liabilities are recognised and derecognised upon trade date.

### Financial liabilities at fair value through profit or loss

Financial liabilities at fair value through profit or loss are initially measured at fair value. Subsequent fair value adjustments are recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest paid on the financial liability.

### Other financial liabilities

Other financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs.

Other financial liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective yield basis.

The effective interest method is a method of calculating the amortised cost of a financial liability and of allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments through the expected life of the financial liability, or, where appropriate, a shorter period.

### *Supplier and other payables*

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

### *Grants*

Grant liabilities are recognised to the extent that:–

- the services required to be performed by the grantee have been performed, or
- the grant eligibility criteria have been satisfied, but payments due have not been made. A commitment is recorded when the Corporation enters into an agreement to make these grants but services have not been performed or criteria satisfied.

1.14 Contingent liabilities and contingent assets

Contingent Liabilities and Contingent Assets are not recognised in the Balance Sheet but are reported in the relevant schedules and notes. They may arise from uncertainty as to the existence of a liability or asset, or represent an existing liability or asset in respect of which settlement is not probable or the amount cannot be reliably measured. Contingent assets are reported when settlement is probable, and contingent liabilities are recognised when settlement is greater than remote.

1.15 Financial guarantee contracts

Financial guarantee contracts are accounted for in accordance with AASB 139 *Financial Instruments: Recognition and Measurement*. They are not treated as a contingent liability, as they are regarded as financial instruments outside the scope of AASB 137 *Provisions, Contingent Liabilities and Contingent Assets*. The Corporation does not have financial guarantee contracts.

1.16 Acquisition of assets

Assets are recorded at the cost of acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost, or for nominal consideration, are initially recognised as assets and revenues at their fair value at the date of acquisition, unless acquired as a consequence of restructuring of administrative arrangements. In the latter case, assets are initially recognised as contributions by owners at the amounts at which they were recognised in the transferor entity's accounts immediately prior to the restructuring.

1.17 Land, buildings, plant and equipment

### Asset recognition threshold

Purchases of land, buildings, plant and equipment are recognised initially at cost in the Balance Sheet, except for purchases costing less than $2,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

### Revaluations

Fair values for each class of asset are determined as shown below:

| *Asset Class* | *Fair value measured at* |
|---|---|
| Land | Market selling price |
| Buildings excluding leasehold improvements | Market selling price |
| Leasehold improvements | Depreciated replacement cost |
| Infrastructure, plant and equipment | Market selling price |
| Heritage and cultural assets | Market selling price |

Following initial recognition at cost, land, buildings, plant and equipment are carried at fair value less accumulated depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure that the carrying amounts of assets do not differ materially from the assets' fair values as at the reporting date. The regularity of independent valuations depends upon the volatility of movements in market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under the heading of asset revaluation reserve except to the extent that it reverses a previous revaluation decrement of the same asset class that was previously recognised through surplus and deficit. Revaluation decrements for a class of assets are recognised directly through surplus and deficit except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset restated to the revalued amount.

### Depreciation and amortisation

Depreciable property, plant and equipment assets are written–off to their estimated residual values over their estimated useful lives to the Corporation using, in all cases, the straight line method of depreciation.

Depreciation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future periods, as appropriate.

Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

| | **2009** | 2008 |
|---|---|---|
| Buildings on Freehold land | **40 years** | 40 years |
| Plant and equipment | **3–10 years** | 3–10 years |
| Intangibles – Computer software developed in–house | **5 years** | 5 years |

The aggregate amount of depreciation allocated for each class of asset during the reporting period is disclosed at Note 4D.

### Impairment

All assets were assessed for impairment at 30 June 2009. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the Corporation were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

No indicators of impairment were found for assets at fair value.

1.17 Intangibles

The Corporation's intangibles comprise internally developed software for internal use. These assets are carried at cost less accumulated amortisation.

Software is amortised on a straight line basis over its anticipated useful life. The useful life of the Corporation's software is 5 years. This is unchanged from the previous year.

All software assets were assessed for indications of impairment as at 30 June 2009. None were found to be impaired.

1.18 Taxation

The Corporation is exempt from all forms of taxation except fringe benefits tax (FBT), payroll tax and the goods and services tax (GST).

Revenues, expenses and assets are recognised net of GST:

- except for receivables and payables.

## Note 2: Events after the balance sheet date

No matters or circumstances have arisen since the end of the financial year which significantly affected or may affect the operations of the Corporation, the results of these operations or state of affairs of the Corporation in subsequent years.

## Note 3: Income

| | 2009 $ | 2008 $ |
|---|---|---|
| Revenue | | |
| **Note 3A: Revenue from Government** | | |
| Department of Agriculture, Fisheries and Forestry | | |
| PIERD Act 1989 contribution | 2,435,794 | 3,127,710 |
| *Total revenue from Government* | 2,435,794 | 3,127,710 |
| | | |
| **Note 3B: Industry Contributions** | | |
| Industry Contributions | 2,374,239 | 1,953,545 |
| *Total contributions revenue* | 2,374,239 | 1,953,545 |
| | | |
| **Note 3C: Interest Revenue** | | |
| Interest on deposits | 739,565 | 1,105,098 |
| *Total Interest Revenue* | 739,565 | 1,105,098 |
| | | |
| **Note 3D: Other Revenues** | | |
| Royalties | 1,610,254 | 597,544 |
| Project refunds | 498,300 | 25,615 |
| Levy Penalties | 4,686 | 1,014 |
| Grants Revenue | 2,188 | 117,986 |
| Other Revenue | 15,796 | 29,464 |
| *Total Other Revenues* | 2,131,224 | 771,623 |

## Note 4: Expenses

| | | |
|---|---|---|
| **Note 4A: Employee benefits** | | |
| Wages and salaries | 1,004,906 | 1,057,888 |
| Superannuation | 126,537 | 146,034 |
| Leave and other entitlements | 45,519 | 95,285 |
| *Total employee benefits* | 1,176,962 | 1,299,207 |
| | | |
| **Note 4B: Suppliers** | | |
| Provision of goods – external entities | 251,308 | 350,738 |
| Operating lease rentals | 34,294 | 54,418 |
| Workers compensation premiums | 1,650 | 2,258 |
| *Total supplier expenses* | 287,252 | 407,414 |

## Note 4C: Grants

The Corporation makes grants to support the research and development of issues relating to the Australian cotton industry

| | | |
|---|---|---|
| Non–profit institutions | | |
| Commonwealth organisations | 1,859,792 | 2,217,985 |
| State Departments | 994,358 | 1,045,711 |
| Universities and colleges | 318,959 | 467,837 |
| Other research institutions | 3,698,113 | 4,157,016 |
| Corporate activities | 683,225 | 476,286 |
| | 7,554,447 | 8,364,835 |
| Other entities | | |
| Commercial entities | 328,400 | 339,584 |
| *Total grants expense* | 7,882,847 | 8,704,419 |

## Note 4D: Depreciation and amortisation

| | | |
|---|---|---|
| Depreciation | | |
| Infrastructure, plant and equipment | 27,476 | 19,730 |
| Buildings | 9,423 | 9,423 |
| *Total depreciation* | 36,899 | 29,153 |
| Amortisation | | |
| Intangibles: | | |
| Computer software | 24,509 | 23,508 |
| *Total amortisation* | 24,509 | 23,508 |
| *Total depreciation and amortisation* | 61,408 | 52,661 |

# Note 5: Financial Assets

## Note 5A: Cash and cash equivalents

| | | |
|---|---|---|
| Cash at bank | 70,105 | 139,325 |
| Cash on hand | 500 | 500 |
| Deposits on Call | 9,305,780 | 12,011,757 |
| *Total Cash and cash equivalents* | 9,376,385 | 12,151,582 |

## Note 5B: Trade and other receivables

| | | |
|---|---|---|
| Industry levies receivable | 424,939 | 322,194 |
| Interest receivable | 51,451 | 316,137 |
| Commonwealth contribution receivable | 1,039,678 | 34,059 |
| Royalties receivable | 1,387,249 | 0 |
| GST receivable from ATO (Net) | 105,732 | 152,133 |
| Other receivables | 68,680 | 11,974 |
| *Total trade and other receivables (gross)* | 3,077,729 | 836,497 |

| | 2009 $ | 2008 $ |
|---|---|---|
| **Note 5B: Trade and other receivables (continued)** | | |
| Receivables are aged as follows: | | |
| Overdue | 0 | 0 |
| Not overdue | 3,077,729 | 836,497 |
| | | |
| Receivables(net) are represented by: | | |
| Current | 3,077,729 | 836,497 |

## Note 6: Non–Financial Assets

**Note 6A: Land and buildings**

| | | |
|---|---|---|
| **Freehold land** | | |
| Freehold land (at fair value) | 170,000 | 130,000 |
| *Total freehold land* | 170,000 | 130,000 |
| | | |
| **Buildings on freehold land** | | |
| – Fair value | 380,000 | 376,917 |
| – Accumulated depreciation | 0 | (18,601) |
| *Total buildings on freehold land* | 380,000 | 358,316 |
| | | |
| *Total land and buildings (non–current)* | 550,000 | 488,316 |

No indicators of impairment were found for land and buildings

**Note 6B: Plant and equipment**

| | | |
|---|---|---|
| **Office Equipment** | | |
| – Fair value | 40,971 | 40,971 |
| – Accumulated depreciation | (12,262) | (8,165) |
| *Total office equipment* | 28,709 | 32,806 |
| | | |
| **Computer Equipment** | | |
| – Fair value | 51,942 | 58,692 |
| – Accumulated depreciation | (31,915) | (19,101) |
| *Total computer equipment* | 20,027 | 39,591 |
| | | |
| **Fixture and Fittings** | | |
| – Fair value | 44,188 | 44,188 |
| – Accumulated depreciation | (12,725) | (8,306) |
| *Total fixture and fittings* | 31,463 | 35,882 |
| | | |
| *Total infrastructure, plant and equipment (non–current)* | 80,199 | 108,279 |

No indicators of impairment were found for infrastructure, plant and equipment.

## Note 6C: Analysis of Property, Plant & Equipment

**Table A: Reconciliation of the opening and closing balances of property, plant and equipment (2008–09)**

| Item | Land | Buildings | Total Land & Buildings | Office Equipment | Computer Equipment | Fixtures & Fittings | Total Infrastructure | Total |
|---|---|---|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ | $ | $ | $ |
| As at 1 July 2008 | | | | | | | | |
| Gross book value | 130,000 | 376,918 | 506,918 | 40,971 | 58,692 | 44,188 | 143,851 | **650,769** |
| Accumulated depreciation/amortisation and impairment | 0 | (18,602) | (18,602) | (8,165) | (19,101) | (8,306) | (35,572) | **(54,174)** |
| Net book value 1 July 2008 | 130,000 | 358,316 | 488,316 | 32,806 | 39,591 | 35,882 | 108,279 | **596,595** |
| Additions by purchase | 0 | (0) | (0) | (0) | 0 | (0) | 0 | **0** |
| Revaluations and impairment through equity | 40,000 | 31,107 | 71,107 | 0 | 0 | 0 | 0 | **71,107** |
| Depreciation/amortisation expense | 0 | (9,423) | (9,423) | (4,097) | (18,960) | (4,419) | (27,476) | **(36,899)** |
| Disposals – gross book value | 0 | 0 | 0 | 0 | (6,750) | 0 | (6,750) | **(6,750)** |
| Disposals – accumulated depreciation | 0 | 0 | 0 | 0 | 6,146 | 0 | 6,146 | **6,146** |
| **Net book value 30 June 2009** | | | | | | | | |
| Net book value as of 30 June 2009 represented by: | | | | | | | | |
| Gross book value | 170,000 | 380,000 | 550,000 | 40,971 | 51,942 | 44,188 | 137,101 | **687,101** |
| Accumulated depreciation/amortisation and impairment | 0 | 0 | 0 | (12,262) | (31,915) | (12,725) | (56,902) | **(56,902)** |
| | **170,000** | **380,000** | **550,000** | **28,709** | **20,027** | **31,463** | **80,199** | **630,199** |

Note 6C: Analysis of Property, Plant & Equipment (continued)

Table B: Reconciliation of the opening and closing balances of property, plant and equipment (2007–08)

| Item | Land | Buildings | Total Land & Buildings | Office Equipment | Computer Equipment | Fixtures & Fittings | Total Infrastructure | Total |
|---|---|---|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ | $ | $ | $ |
| As at 1 July 2007 | | | | | | | | |
| Gross book value | 130,000 | 376,918 | 506,918 | 40,971 | 27,392 | 42,709 | 111,072 | **617,990** |
| Accumulated depreciation/amortisation and impairment | 0 | (9,179) | (9,179) | (4,068) | (7,751) | (4,023) | (15,842) | **(25,021)** |
| Net book value 1 July 2007 | 130,000 | 367,739 | 497,739 | 36,903 | 19,641 | 38,686 | 95,230 | **592,969** |
| Additions by purchase | 0 | 0 | 0 | 0 | 31,300 | 1,479 | 32,779 | **32,779** |
| Revaluations and impairment through equity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Depreciation/amortisation expense | 0 | (9,423) | (9,423) | (4,097) | (11,350) | (4,283) | (19,730) | **(29,153)** |
| Disposals | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **Net book value 30 June 2008** | | | | | | | | |
| Net book value as of 30 June 2008 represented by: | | | | | | | | |
| Gross book value | 130,000 | 376,918 | 506,918 | 40,971 | 58,692 | 44,188 | 143,851 | **650,769** |
| Accumulated depreciation/amortisation and impairment | 0 | (18,602) | (18,602) | (8,165) | (19,101) | (8,306) | (35,572) | **(54,174)** |
| | **130,000** | **358,316** | **488,316** | **32,806** | **39,591** | **35,882** | **108,279** | **596,595** |

| | 2009 $ | 2008 $ |
|---|---|---|
| **Note 6D: Intangibles** | | |
| Computer software valuation: | | |
| Computer software (internally developed & acquired) | 117,545 | 117,545 |
| Accumulated Amortisation | (62,039) | (37,530) |
| *Total intangibles (non–current)* | 55,506 | 80,014 |
| **Table A – reconciliation of opening and closing balances of intangibles** | | |
| As at 1 July 2008 | | |
| Gross book value | 117,544 | 117,544 |
| Accumulated depreciation/amortisation and impairment | (37,530) | (14,021) |
| *Net book value 1 July 2008* | 80,014 | 103,523 |
| Additions: | | |
| by purchase or internally developed | (0) | 0 |
| Depreciation/amortisation | (24,509) | (23,509) |
| Net revaluation decrement | 0 | 0 |
| *Net book value 30 June 2009* | 55,505 | 80,014 |
| Net book value as of 30 June 2009 represented by: | | |
| Gross book value | 117,544 | 117,544 |
| Accumulated depreciation/amortisation and impairment | (62,039) | (37,530) |
| | 55,505 | 80,014 |
| No indicators of impairment were found for intangible assets | | |
| **Note 6E: Other Non–Financial Assets** | | |
| Prepayments | 7,965 | 25,538 |
| *Total other non–financial assets* | 7,965 | 25,538 |

All Other non–financial assets are current assets.

No indicators of impairment were found for Other non–financial assets

## Note 7: Payables

| | | |
|---|---|---|
| **Note 7A: Suppliers** | | |
| Trade creditors | 30,417 | 60,944 |
| *Total supplier payables* | 30,417 | 60,944 |
| Supplier payables are represented by: | | |
| Current | 30,417 | 60,944 |
| Non – Current | 0 | 0 |
| *Total supplier payables* | 30,417 | 60,944 |

Settlement is usually made net 30 days.

| | 2009 $ | 2008 $ |
|---|---|---|
| **Note 7B: Grants** | | |
| Commonwealth organisations | 1,079,234 | 292,645 |
| State Departments | 323,869 | 276,901 |
| Universities and colleges | 106,932 | 82,364 |
| Other research organisations | 1,051,422 | 779,833 |
| *Total Grants Payable* | 2,561,457 | 1,431,743 |

All grant payables are current. This liability is recognised because grant recipients have not completed the conditions of the grant and are yet to be paid.

| | | |
|---|---|---|
| **Note 7C: Other** | | |
| Taxes payable | 54,950 | 30,510 |
| Total Other Payables | 54,950 | 30,510 |

## Note 8: Provisions

| | | |
|---|---|---|
| **Note 8A: Employee Provisions** | | |
| Salaries and wages | 11,382 | 6,731 |
| Leave | 194,471 | 207,504 |
| Superannuation | 99 | 1,246 |
| *Total employee provisions* | 205,952 | 215,481 |
| | | |
| Employee provisions are represented by: | | |
| Current | 154,230 | 155,933 |
| Non–current | 51,722 | 59,548 |
| *Total employee provisions* | 205,952 | 215,481 |

## Note 9: Cash flow reconciliation

Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement

| | 2009 $ | 2008 $ |
|---|---|---|
| Report cash and cash equivalents as per: | | |
| Cash Flow Statement | 9,376,385 | 12,151,582 |
| Balance Sheet | 9,376,385 | 12,151,582 |
| Difference | 0 | 0 |
| | | |
| Reconciliation of operating result to net cash from operating activities: | | |
| Operating result | (1,727,647) | (3,505,725) |
| Depreciation and amortisation | 61,408 | 52,661 |
| (Increase)/decrease in net receivables | (2,241,232) | 1,593,003 |
| (Increase)/decrease in prepayments | 17,573 | (17,999) |
| Increase/(decrease) in supplier payables | (31,324) | 23,008 |
| Increase/(decrease) in other payables | 24,440 | (6,367) |
| Increase/(decrease) in employee provisions | (9,529) | 15,356 |
| Increase/(decrease) in grants payables | 1,129,714 | 698,952 |
| Net cash from/(used by) operating activities | (2,776,597) | (1,147,110) |

## Note 10: Contingent Liabilities and Assets

Remote Receivable:

The Cotton Research and Development Corporation was established under the Primary Industries and Energy Research and Development Act, 1989. This Act states the Commonwealth Government will make payments to the Corporation equal to one half of the Corporation's annual expenditure. However, government matching payments must not exceed industry levy receipts nor exceed 0.5% of the amount that the Minister determines to be the gross value of production (GVP) for that financial year. In 2007–08 Commonwealth contributions were capped to a GVP of $3,127,710, leaving a remote contingent receivable of $0.395m. The probability of receiving this receivable is remote whilst cotton production and prices continue to remain low.

## Note 11: Directors' Remuneration

| | 2009 | 2008 |
|---|---|---|
| $Nil – $14,999 | 7 | 1 |
| $15,000 – $29,999 | 3 | 5 |
| $30,000 – $44,999 | 1 | 1 |
| $195,000 – $ 209,999 | 0 | 1 |
| $220,000 – $ 234,999 | 1 | 0 |
| *Total number of directors of the Corporation* | 12 | 8 |
| *Total remuneration received, or due and receivable, by directors of the Corporation* | $404,860 | $322,116 |

The 2009 reported remuneration includes the value of leave entitlements accrued for the year.

## Note 12: Related Party Disclosures

Other Transactions with Directors or Director related entities

Grants were made to a number of research institutions which are director related entities. They were approved under the normal terms and conditions of the Corporation. Following full disclosure of their relevant interests, the relevant Directors may or may not take part in discussion and abstain from decisions of the Board.

| | 2009 | 2008 |
|---|---|---|
| | $ | $ |
| Grants to director related entities: | | |
| Australian Rural Leadership Foundation | 23,920 | 28,750 |
| Cotton Catchment Communities CRC | – | 4,137,016 |
| CSIRO (Entomology, Plant Industry, Land & Water, Textile and Fibre Technology) | 1,639,672 | 2,084,235 |
| NSW Department of Primary Industries | – | 569,074 |
| Queensland Department of Primary Industries and Fisheries | 480,018 | 469,237 |
| University of Queensland | 17,800 | 70,000 |

## Note 13: Executive Remuneration

The number of senior executives who received or were due to receive total remuneration of $130,000 or more:

| | | |
|---|---|---|
| $ 130,000 to $ 144,999 | 1 | |
| $ 160,000 to $ 174,999 | | 1 |
| $ 175,000 to $ 189,999 | 1 | |
| Total | 2 | 1 |
| The aggregate amount of the total remuneration of executives shown above. | 322,964 | 170,550 |
| The 2009 reported remuneration includes the value of leave entitlements accrued for the year | | |
| The aggregate amount of separation and redundancy/termination benefit payments during the year to executives shown above. | Nil | Nil |

## Note 14: Remuneration of Auditors

Financial statement audit services are provided to the CRDC by the Auditor General.

| | | |
|---|---|---|
| The fair value of the services provided to the Corporation was: | $12,100 | $8,750 |
| Other services provided by the Auditor-General | 0 | 0 |

## Note 15: Average Staffing Levels

| | | |
|---|---|---|
| The average staffing levels for the Corporation during the year were: | 8 | 10 |

| | 2009 $ | 2008 $ |
|---|---|---|
| **Note 16: Financial Instruments** | | |
| Note 16A: Categories of financial instruments | | |
| **Financial assets** | | |
| Loans and receivables | | |
| Cash and cash equivalents | 9,376,385 | 12,151,582 |
| Trade and other receivables | 1,507,380 | 328,111 |
| **Carrying amount of financial assets** | 10,883,765 | 12,479,693 |
| **Financial liabilities** | | |
| Other financial liabilities | | |
| Suppliers | 30,417 | 60,944 |
| Grants | 2,561,457 | 1,431,743 |
| **Carrying amount of financial liabilities** | 2,591,874 | 1,492,687 |
| Note 16B: Net income and expense from financial assets | | |
| **Loans and receivables** | | |
| Interest revenue (see note 3C) | 739,565 | 1,105,098 |
| **Net gain/(loss) from loans and receivables** | 739,565 | 1,105,098 |
| **Net gain/(loss) from financial assets** | 739,565 | 1,105,098 |
| Note 16C: Net income and expense from financial liabilities | | |
| **Other financial liabilities** | | |
| | 0 | 0 |
| **Net gain/(loss) from other financial liabilities** | 0 | 0 |
| **Net gain/(loss) from financial liabilities** | 0 | 0 |

## Note 16D: Fair Values of Financial Assets and Liabilities

| | Notes | 2009 $ | | 2008 $ | |
|---|---|---|---|---|---|
| | | Total carrying amount | Aggregate fair value | Total carrying amount | Aggregate fair value |
| **Financial Assets** | | | | | |
| Cash at bank | 5A | **70,105** | **70,105** | 139,325 | 139,325 |
| Cash on hand | 5A | **500** | **500** | 500 | 500 |
| Deposits at call | 5A | **9,305,780** | **9,305,780** | 12,011,757 | 12,011,757 |
| Receivables | 5B | **1,507,380** | **1,507,380** | 328,111 | 328,111 |
| ***Total Financial Assets*** | | **10,883,765** | **10,883,765** | 12,479,693 | 12,479,693 |
| **Financial Liabilities** | | | | | |
| Trade creditors | 7A | **30,417** | **30,417** | 60,944 | 60,944 |
| Grants payable | 7B | **2,561,457** | **2,561,457** | 1,431,743 | 1,431,743 |
| ***Total Financial Liabilities*** | | **2,591,874** | **2,591,874** | 1,492,687 | 1,492,687 |

## Note 16E: Credit risk exposure

The Corporation's maximum exposures to credit risk at the reporting date in relation to each class of recognised financial assets is the carrying amount of those cash and receivables. The corporation has assessed the risk of default of payment as nil due to the receivables being paid within 30 days.

The Corporation has no significant exposures to any concentrations of credit risk.

All figures for credit risk referred to do not take into account the value of any collateral or other security.

**Credit risk of financial instruments not past due or individually determined as impaired:**

| | Not Past due or impaired | Not Past due or impaired | Past due or impaired | Past due or impaired |
|---|---|---|---|---|
| | **2009** | 2008 | **2009** | 2008 |
| | **$** | $ | **$** | $ |
| Cash at bank | **9,376,385** | 12,151,582 | **0** | 0 |
| Receivables for goods and services | **1,507,380** | 328,111 | **0** | 0 |
| Total | **10,883,765** | 12,479,693 | **0** | 0 |

**Ageing of financial assets that are past due but not impaired for 2009**

| | 0 to 30 days | 31 to 60 days | 61 to 90 days | 90+ days | Total |
|---|---|---|---|---|---|
| | **$** | **$** | **$** | **$** | **$** |
| Receivables for goods and services | **1,507,380** | **0** | **0** | **0** | **1,507,380** |
| Total | **1,507,380** | **0** | **0** | **0** | **1,507,380** |

## Note 16E: Credit risk exposure (continued)

**Ageing of financial assets that are past due but not impaired for 2008**

| | 0 to 30 days | 31 to 60 days | 61 to 90 days | 90+ days | Total |
|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ |
| Receivables for goods and services | 328,111 | 0 | 0 | 0 | 328,111 |
| Total | 328,111 | 0 | 0 | 0 | 328,111 |

## Note 16F: Liquidity risk

The Corporation's financial liabilities are payables. The exposure to liquidity risk is based on the notion that the Corporation will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to the internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

The following tables illustrates the maturities for financial liabilities:

| | On demand 2009 | within 1 year 2009 | 1 to 5 years 2009 | > 5 years 2009 | Total 2009 |
|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ |
| Trade creditors | | 30,417 | | | 30,417 |
| Grants payable | | 2,561,457 | | | 2,561,457 |
| **Total** | 0 | 2,591,874 | 0 | 0 | 2,591,874 |

| | On demand 2008 | within 1 year 2008 | 1 to 5 years 2008 | > 5 years 2008 | Total 2008 |
|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ |
| Trade creditors | | 60,944 | | | 60,944 |
| Grants payable | | 1,431,743 | | | 1,431,743 |
| Total | 0 | 1,492,687 | 0 | 0 | 1,492,687 |

The Corporation manages its finances to ensure it has adequate funds to meet payments as they fall due. In addition, the Corporation has policies in place to ensure timely payment are made when due and has no past experience of default.

## 16G Market risk

The Corporation holds basic financial instruments that do not expose it to certain market risks. The Corporation is not exposed to 'currency risk' or 'other price risk'.

### Interest Rate Risk

The only interest-bearing items on the balance sheet are the "Cash and cash equivalents'. All bear interest at a variable interest rate and will fluctuate due to changes in the market interest rate. The interest rate risk does not have any impact on the fair value of the Cash and cash equivalents.

The following tables illustrates the maturities for financial assets and financial liabilities:

| | | Floating interest rate | Fixed interest maturing in | | | Non-interest bearing | Total | Weighted average effective interest rate |
|---|---|---|---|---|---|---|---|---|
| | | | 1 year or less | 1 to 5 years | > 5 years | | | |
| | | 2009 $ | 2009 $ | 2009 $ | 2009 $ | 2009 $ | 2009 $ | 2009 % |
| **Financial assets** | | | | | | | | |
| Cash at bank | 5A | 70,105 | | | | | 70,105 | 2.58 |
| Cash on hand | 5A | | | | | 500 | 500 | 0.00 |
| Deposits at call | 5A | | 9,305,780 | | | | 9,305,780 | 6.49 |
| Receivables | 5B | | | | | 1,507,380 | 1,507,380 | 0.00 |
| *Total* | | 70,105 | 9,305,780 | 0 | 0 | 1,507,880 | 10,883,765 | |
| *Total assets* | | | | | | | 13,147,784 | |
| **Financial liabilities** | | | | | | | | |
| Trade creditors | 7A | | | | | 30,417 | 30,417 | 0.00 |
| Grants payable | 7B | | | | | 2,561,457 | 2,561,457 | 0.00 |
| *Total* | | 0 | 0 | 0 | 0 | 2,591,874 | 2,591,874 | |
| *Total liabilities* | | | | | | | 2,852,776 | |

| | | Floating interest rate | Fixed interest maturing in | | | Non-interest bearing | Total | Weighted average effective interest rate |
|---|---|---|---|---|---|---|---|---|
| | | | 1 year or less | 1 to 5 years | > 5 years | | | |
| | | 2008 $ | 2008 $ | 2008 $ | 2008 $ | 2008 $ | 2008 $ | 2008 % |
| **Financial assets** | | | | | | | | |
| Cash at bank | 5A | 139,325 | | | | | 139,325 | 6.00 |
| Cash on hand | 5A | | | | | 500 | 500 | 0.00 |
| Deposits at call | 5A | | 12,011,757 | | | | 12,011,757 | 6.00 |
| Receivables | 5B | | | | | 328,111 | 328,111 | 0.00 |
| *Total* | | 139,325 | 12,011,757 | 0 | 0 | 328,611 | 12,479,693 | |
| *Total assets* | | | | | | | 13,690,226 | |
| **Financial liabilities** | | | | | | | | |
| Trade creditors | 7A | | | | | 60,944 | 60,944 | 0.00 |
| Grants payable | 7B | | | | | 1,431,743 | 1,431,743 | 0.00 |
| *Total* | | 0 | 0 | 0 | 0 | 1,492,687 | 1,492,687 | |
| *Total liabilities* | | | | | | | 1,738,678 | |

## Note 17: Reporting of Outcomes

### Note 17A: Outcomes of the Corporation

The Corporation is structured to meet one outcome:

"Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community."

### Note 17B: Net Cost of Outcome Delivery

| | Outcome | |
|---|---|---|
| | 2009 | 2008 |
| | $ | $ |
| **Total Expenses** | **9,408,469** | 10,463,702 |
| | | |
| **Funded by external revenues:** | | |
| Industry contributions | **2,374,239** | 1,953,545 |
| Interest | **739,565** | 1,105,098 |
| Other | **2,131,224** | 771,623 |
| **Total other external revenues** | **5,245,028** | 3,830,266 |
| **Net cost/(contribution) of outcome** | **4,163,441** | 6,633,436 |

### Note 17C: Corporation Revenues and Expenses by Outcome

| | Outcome 1 | |
|---|---|---|
| | 2009 | 2008 |
| **Operating expenses** | $ | $ |
| Employees | **1,176,962** | 1,299,207 |
| Suppliers | **287,252** | 407,414 |
| Grants | **7,882,847** | 8,704,419 |
| Depreciation | **61,408** | 52,661 |
| **Total Expenses** | **9,408,469** | 10,463,702 |
| | | |
| **Funded by:** | | |
| Revenue from Government | **2,435,794** | 3,127,710 |
| Industry contributions | **2,374,239** | 1,953,545 |
| Interest | **739,565** | 1,105,098 |
| Other Revenues | **2,131,224** | 771,623 |
| **Total revenues** | **7,680,822** | 6,957,976 |

Note 17D: Corporation Assets and Liabilities by Outcome

| | Outcome 1 | |
|---|---|---|
| | 2009 | 2008 |
| **Assets** | **$** | $ |
| Cash and cash equivalents | **9,376,385** | 12,151,582 |
| Trade and other receivables | **3,077,729** | 836,497 |
| Land and buildings | **550,000** | 488,316 |
| Infrastructure, plant and equipment | **80,199** | 108,279 |
| Intangibles | **55,506** | 80,014 |
| Other non-financial assets | **7,965** | 25,538 |
| **Total Corporation Assets** | **13,147,784** | 13,690,226 |
| | | |
| **Liabilities** | | |
| Suppliers | **30,417** | 60,944 |
| Grants | **2,561,457** | 1,431,743 |
| Other | **54,950** | 30,510 |
| Employee provisions | **205,952** | 215,481 |
| **Total Corporation Liabilities** | **2,852,776** | 1,738,678 |

# Appendices

## Appendix One SELECTION COMMITTEE REPORT

6 July 2009

The Hon Tony Burke MP
Minister for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600

Dear Minister

In accordance with the requirements of Section 141 of the *Primary Industries Research and Development (PIERD) Act 1989*, I write to inform you of the activities of the Cotton Research and Development Corporation (CRDC) Selection Committee during the period 1 July 2008 to 30 June 2009.

On 30 September 2008, the term of the CRDC directors expired. In preparation for the appointment of new directors, I was appointed Presiding Member and officially commenced the selection process as per your correspondence of 27 June 2008.

The Committee's nominations of seven directors were provided to your office on 1 September 2008. It was noted in the CRDC Annual Report 2006–07 that "The position of Government Director was abolished by this amending legislation, leaving the CRDC Board with eight members. In line with this, the 2008 Selection Committee was instructed to select seven non-executive directors for the new term. The new CRDC Board of nine members was operational from October 1, 2008.

The operations of the Selection Committee and the interview and selection processes undertaken by the Committee are outlined below.

Yours sincerely

**Dr Prue McMichael**
Presiding Member
CRDC Selection Committee

### Selection Committee Report 2008

The CRDC Selection Committee was established under the PIERD Act for the purpose of nominating to you seven persons well qualified for appointment as directors of CRDC.

In addition to the six existing director positions, a further nomination was required to fill a new non-executive position resulting from the 2007 legislative amendment to the PIERD Act that saw the removal of the government director position.

On 2 October 2007 I was appointed Presiding Member by the Hon Sussan Ley MP who, at the time, was Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry. I commenced the selection process as directed in your correspondence of 27 June 2008. The Committee was disbanded on October 8, 2008, after your appointment of the seven non-executive CRDC Board directors.

The Selection Committee comprised an independent member, three members nominated by the Australian Cotton Growers Research Association (ACGRA), and myself as Presiding Member. Each nominee provided a Curriculum vitae and signed declaration statement. The Selection Committee was appointed as follows:

- Mr Benjamin Stephens, (Chair, ACGRA)
- Ms Joanne Grainger, (Chair, Cotton Australia and Vice President, Queensland Farmers' Federation)
- Mr Cleave Rogan, (Member, ACGRA)
- Dr. Nigel Steele Scott, (Chair, Horticulture Australia Ltd and Member, South Australian Premier's Food Council (independent nominee).

At the commencement of the selection process, I undertook relevant consultations with CRDC Chair, Mr Mike Logan, and Executive Director, Mr Bruce Finney, on desired and required skills to drive forward CRDC's strategic plan; general strengths and weaknesses of the current Board; and the industry's future directions and challenges. I also consulted with senior executive members of the Australian Government Department of Agriculture, Fisheries and Forestry.

The Selection Committee advertised the seven available positions and application criteria widely with the specific intention of increasing the pool of candidates, ensuring geographic coverage and cultural diversity of applicants,

high level expertise, experience and equitable gender representations. The advertisements were placed in the national and appropriate regional press, in industry newsletters and on the CRDC and other appropriate websites.

The advertisements called for written applications against the selection criteria contained in the PIERD Act, which included commodity production, processing and marketing; conservation/management of natural resources, science and technology and technology transfer, environmental and ecological matters, economics, finance and business management, administration of research and development, sociology and, finally, public administration.

Cotton industry organisations were also encouraged to nominate candidates, and the retiring directors were invited to re-apply. Searches of the Department of Agriculture, Fisheries and Forestry Balance database and the AppointWomen database of the Office for Women, were also conducted, with suitable candidates being specifically advised of the advertisement.

The Selection Committee believes the advertising period and process were successful. Thirty-eight applications were received by the closing date of 8 August 2008 and two late applications were accepted.

Each member of the Selection Committee considered all applications. The Selection Committee met via teleconference on August 18, 2008 to discuss the applications and to finalise a shortlist of qualified candidates for interview. In developing the shortlist, the Selection Committee considered the core selection criteria outlined in the PIERD Act, and additional criteria agreed to be important for this Board. The additional criteria included: consideration of the candidate's perspective of the current or emerging domestic and/or international trends affecting the cotton industry and its related trade, candidate knowledge of CRDC and how it can meet some of the challenges for the cotton industry, candidate's views about the role of the Board and issues for effective corporate governance, gender balance, geographical spread and Board continuity.

The Selection Committee agreed unanimously that 12 candidates warranted an interview. Amongst those short-listed were three current CRDC directors and six women. The states and territories represented were NSW, Queensland, the Australian Capital Territory, South Australia and Victoria.

The interviews were conducted on 26 and 27 August 2008 at the Stamford Plaza, Sydney Airport. Referee checks on the seven leading candidates were commenced immediately by the Presiding Member, and completed within two days. Solid, positive feedback on each preferred nominee was received.

As is required, the seven nominees submitted to the Minister were selected on the basis of their expertise. Several candidates were selected for their breadth of knowledge across the sector and selection criteria, whilst others were selected for their specific expertise. The Selection Committee also gave due consideration to the diversity and experience of the candidates, individually and as a nominated group.

The Selection Committee agreed unanimously on the seven nominations, which included three current CRDC directors. On forwarding their recommendations for Non-Executive Directors of the CRDC Board, the Selection Committee also provided you with a comprehensive report that outlined the Committee's activities and deliberations and summarised each nominee's strengths, interview responses and referee comments. The nominations were made as follows:

- Dr Mary Corbett, Queensland
- Mr Glenn Fresser (reappointment), Queensland
- Mr Peter Hayes, South Australia
- Ms Juanita Hamparsum, NSW
- Ms Kerry Adby, NSW
- Ms Leith Boully* (reappointment), Queensland
- Ms Lisa Wilson (reappointment), Victoria

You appointed the nominated candidates, and their term commenced on October 1, 2008. Following notification of your appointment of the directors, I disbanded the Selection Committee, pursuant to section 129 of the PIERD Act, on October 8, 2008.

## Expenses

| Item | $ |
|---|---|
| Advertising | 7,345.60 |
| Selection Committee: travel and expenses | 3,897.29 |
| Interviews: candidates travel and expenses | 6126.32 |
| Presiding Member: professional time/fees | 12,407.15 |
| Secretarial/Administrative: Selection Committee support, and Scribing services | 8,200.00 |
| Independent member honorarium | 2,355.05 |
| TOTAL (INCLUDING GST) | 40,331.41 |

# Appendix Two
# COMMUNICATION

CRDC invests in communication services and capacity for two key outcomes: to support the corporate interests of CRDC and to support the adoption of research. The former continued in 2008–09 and the latter was enhanced by the development of new and exciting methods of knowledge deliver.

The primary stakeholder audience of CRDC is the Australian people through the Australian Government, and the industry levy-payers represented by Cotton Australia. The research and development community, together with the post-farmgate sector of industry are vital secondary audiences of CRDC communications. A significant investment has been consistently aimed toward communication activity that supports all audiences in their various needs to be engaged and informed.

The CRDC Annual Report, together with the Annual Operating Plan, the CRDC website, www.crdc.com.au, and the bi-monthly magazine, Spotlight, remain the principal tools applied by CRDC to serve its broad audience mix. Beyond the printed and online elements, CRDC executes much of its remit to informing its stakeholders through participation, collaboration, engagement and leadership.

The adoption of research by producers remains a vital outcome of communication investment. A principal reason for CRDC to invest in communication capacity and resources is to facilitate, monitor and evaluate its efforts and the impacts arising from research outputs.

The cotton industry proudly points to its high levels of adoption of its world-leading research. While the farmers themselves are responsible for enacting best practice farming in their enterprises, many of the ongoing rises in productivity and the sheer performance of Australian farming systems have been directly attributed to the knowledge and technologies from R&D investments taken up and applied.

The shift in emphasis under the new Strategic R&D Plan 2008–2013 includes the post-farmgate sector and, throughout 2008-09, CRDC leadership and communication to this sector has resulted in new thinking and interest in a sustainable, competitive industry with new technologies providing objective description of Australian fibre in a premium market.

The Australian Cotton Conference in August 2008 broke new ground in communication strategy by presenting all papers and content in website form only: the first 'paperless' communication project of the industry. CRDC invested in and led this transformation so that future biennial Conferences will benefit from the new capacity and communication channel.

CRDC communications has consulted closely with industry's Best Management Practices (BMP) committee in the development of an online best practices and knowledge system – the myBMP portal. While providing producers with evidence of environmental performance, the portal underwent development in 2008-09 to become a primary conduit for industry's R&D knowledge services and resources. CRDC will continue to develop this primary communication channel in future years.

In 2008-09 CRDC devised an industry-accepted industry literature system that recognises four basic stages of transformation of information derived from research as it is processed into assets of knowledge that support adoption.

1. Research reports: raw knowledge taken up by early adopting farmers and cotton consultants
2. What's New: general information on research progress, outputs, and outcomes
3. In Practice: shows proof that applied research is ready to adopt by the pragmatic managers who require comprehensive evidence
4. How to: describes step-by-step what managers need to do to implement a new practice.

# Appendix Three
# RESEARCH & DEVELOPMENT PORTFOLIO

## R&D Organisations

| | |
|---|---|
| ACSA | Australian Cotton Shippers Association |
| BGC | Bill Gordon Consulting |
| CA | Cotton Australia |
| CRC | Cotton Catchment Communities Cooperative Research Centre |
| CRDC | Cotton Research and Development Corporation |
| CCA | Crop Consultants Australia |
| COT | CSIRO Plant Industries and Cotton Seed Distributors (CottTech Unincorporated Joint Venture) |
| CSP | CSIRO Plant Industries |
| CSE | CSIRO Entomology |
| CTFT | CSIRO Material Science and Engineering |
| LWA | Land and Water Resources Research and Development Corporation |
| NEC | National Centre for Engineering in Agriculture, University of Southern Queensland |
| DAN | New South Wales Department of Primary Industry |
| DAQ | Queensland Department of Primary Industries |
| QUT | Queensland University of Technology |
| RIR | Australian Rural Leadership Foundation |
| RIRDC | Rural Industries Research and Development Corporation |
| UA | University of Adelaide |
| UQ | University of Queensland |
| USQ | University of Southern Queensland |
| VICDPI | Department of Primary Industries, Victoria |

## Program One VALUE CHAIN

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| CSP004 | Field trial evaluation of GM cotton with nutritionally improved oil traits | CSIRO | Qing Liu | 1–10–08 | 1–11–09 |
| CTFT001 | Australian Premium Class Cotton | CSIRO | Rene van der Sluijs | 1–07–08 | 30–06–09 |
| CTFT0901 | Processing trials in Vardham | CSIRO | Rene van der Sluijs | 1–06–09 | 30–06–09 |
| CTFT0902 | Purchase of Compact Spinning Device | CSIRO | Rene van der Sluijs | 1–06–09 | 30–06–09 |
| CTFT0903 | Mills Survey | CSIRO | Rene van der Sluijs | 1–06–09 | 30–06–11 |
| CTFT0904 | Preliminary investigation into the effects of quarantine | CSIRO | Rene van der Sluijs | 1–06–09 | 30–06–09 |
| UA17 | Analysis and optimisation of cotton fibre-specific gene promoters | UA | Yinghong Liu | 1–07–06 | 30–06–09 |
| CRC130 | Linking Farming Systems to Fibre Quality and Textile Performance | CRC | Michael Bange | 1–07–06 | 30–06–09 |
| ACSA0001 | Support for growing premium cotton | ACSA | Peter Johnson | 1–07–08 | 30–06–09 |
| CTFT002 | Commercialisation of Cottonscan | CSIRO | Geoff Naylor | 1–07–07 | 30–06–08 |
| CTFT003 | Ginning BMP | CSIRO | Rene van der Sluijs | 1–07–08 | 30–06–11 |
| CTFT16 | Improving the Nep Levels in Australian Cotton | CSIRO | Rene van der Sluijs | 1–07–06 | 30–06–09 |
| CRC131 | New Ginning Technology for Australian Cotton: Part I Modified Lint Cleaner (CONFIDENTIAL) | CRC | Stuart Gordon | 1–07–06 | 30–06–09 |
| CRC132 | New Ginning Technology for Australian Cotton: Part II Moisture & Contamination | CRC | Stuart Gordon | 1–07–06 | 30–06–09 |
| NEC15 | Energy Study – Cotton Ginning | NEC | Guangnan Chen | 1–06–08 | 30–09–09 |
| CTFT004 | Classification of Cotton | CSIRO | Rene van der Sluijs | 1–07–08 | 30–06–11 |
| 06CRC009 | Support and Extension of SiroMat (Generation I) (was 06CTFT003) | CRC | Stuart Gordon | 1–07–07 | 30–06–09 |
| CRDC003 | International Cotton Conference – Greg Parle | G Parle | Gregory Parle | 13–11–08 | 18–11–08 |
| | | | R&D INVESTMENT PROGRAM ONE | | $958,578.00 |

## Program Two FARMING SYSTEMS

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| QUT2 | Benchmarking and reducing greenhouse gas emissions and improving resource use efficiency | QUT | Peter Grace | 1–01–07 | 31–12–09 |
| 02CRC011 | Postgraduate: Mitchell Burns – Catchment scale risk assessment for agrochemicals (Commissioned) | CRC | Mitchell Burns | 1–01–08 | 31–12–10 |
| CRC110 | Postgraduate: Rhiannon Smith – Benefits of establishing and managing native vegetation on cotton farms in the Namoi Catchment | CRC | Rhiannon Smith | 1–04–06 | 1–04–09 |
| NEC0901 | GHG Implications of no-till irrigated farming systems – Keytah | NEC | Guangang Chen | 1–01–09 | 26–02–09 |
| CRDC0905 | Deep Drainage Conference travel | CRDC | Helen Dugdale | 1–1–09 | 1–06–09 |
| CSE008 | Gene silencing technologies to control H. *armigera* | CSIRO | Rod Mahon | 1–07–07 | 30–06–08 |
| DAQ0901 | Defining critical soil nutrient concentrations in soils supporting irrigated cotton in Northern NSW & Queensland | QLDDPI | Kaara Klepper | 1–12–08 | 30–06–09 |
| USQ9 | Postgraduate: Alison McCarthy – Optimal irrigation of cotton via real-time, adaptive control of large mobile irrigation machines | USQ | Alison McCarthy | 5–03–07 | 5–03–10 |
| 04CRC008 | Improving cotton nutrition diagnosis and N fertiliser use-efficiency (was 04CSP006 – linked to 04CRC007) | CRC | Ian Rochester | 1–07–07 | 30–06–10 |
| CRC70 | Postgraduate: Susan Lutton – Aquatic biodiversity and the ecological value of ring-tank water storages on cotton farms | CRC | Susan Lutton | 11–10–04 | 11–05–08 |
| CRC85 | Postgraduate: Nicola Cottee – Development of a method to determine thermotolerance in cotton cultivars | CRC | Nicola Cottee | 14–03–05 | 14–03–08 |
| CRC101 | Capturing our understanding of soil water balance and deep drainage under irrigation in models – a basis of design of efficient farming and for assessing impacts on catchments | CRC | Mark Silburn | 1–01–07 | 31–12–08 |

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| CRC112 | Postgraduate: Alison Devereux – Quantifying effects of maize rotation on soil quality and nutrient availability on cotton growth and yield | CRC | Alison Devereux | 1–07–06 | 30–06–09 |
| CRC113 | Postgraduate: Juan Wang – Subsoil nutrient management and stratification in cotton–grain rotations | CRC | Juan Wang | 1–01–06 | 31–12–08 |
| CRC125 | Quantifying deep drainage in an irrigated cotton landscape | CRC | Anthony Ringrose-Voase | 1–07–06 | 30–06–09 |
| CRC127 | Optimal production and water use of high retention cotton and other new technologies | CRC | Steven Yeates | 1–07–06 | 30–06–09 |
| CRC128 | Plant and soil factors optimising water use efficiency | CRC | James Neilsen | 1–07–06 | 30–06–09 |
| CRC129 | Assessing Limited Water Management Strategies in Cotton Farming Systems | CRC | Jose Payero | 1–04–07 | 31–03–10 |
| CRC134 | Promoting cotton BMP adoption – General Manager | CRC | Louise Adcock | 1–09–07 | 31–08–09 |
| CRC139 | Postgraduate: Meredith Errington – Nutrient redistribution within cotton plants | CRC | Meredith Errington | 1–10–07 | 30–09–10 |
| CRC140 | Postgraduate: John Bennett – Getting the best out of gypsum and lime to combat sodicity in the Macquarie and Lachlan valleys | CRC | John Bennett | 5–03–07 | 5–03–10 |
| CRC149 | Deep Drainage Under Irrigated Cotton – Surface & Groundwater Implications | CRC | Thusitha Gunawardena | 1–07–08 | 30–06–11 |
| CRC150 | Maintaining Profitability and Soil Quality in Cotton Farming Systems III | CRC | Nilantha Hulugalle | 1–07–08 | 30–06–11 |
| CRC151 | Development of a qualitative set of Enviro-Economic Sustainability Indicators | CRC | Angus Crossan | 1–07–08 | 30–07–11 |
| CRC156 | Opportunities for Linking Research, Extension and BMP | CRC | Sandra Deutscher | 1–07–08 | 30–06–11 |
| CRC161 | 2008–09 Industry Evaluation series | CRC | Amber Dimond | 1–07–08 | 30–06–09 |
| CCA001 | Improved egg collecting for the Cotton Industry resistance monitoring programs (Commissioned) | Crop Consultants | Amber Dimond | 1–10–07 | 30–04–08 |

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| BGC001 | Drift management extension strategy for the Northern Region | BGC | Bill Gordon | 1–07–06 | 30–06–09 |
| COT002 | Improving waterlogging responses in cotton | CSIRO | Iain Wilson | 2–09–05 | 1–09–08 |
| COT003 | New routes to resistance to Fusarium Wilt | CSIRO | Jeff Ellis | 2–12–05 | 1–12–08 |
| COT0901 | CottTech Fusarium | CSIRO | Jeff Ellis | 1–06–09 | 30–06–09 |
| LWA002 | Climate Change Research Strategy | LWA | Guy Roth | 1–07–08 | 30–06–11 |
| LWA003 | Water Smart Cotton Farms in NSW | LWA | Rod Jackson | 1–07–08 | 30–06–11 |
| CSE002 | Monitoring for resistance in *Bt* toxins | CSIRO | Sharon Downes | 1–07–08 | 30–06–11 |
| 03CSE005 | Implications of *Bt* resistance in H. *armigera* | CSIRO | Rod Mahon | 1–07–07 | 30–06–10 |
| 03CSP012 | Soil impacts on the incidence and evolution of Fusarium wilt (Commissioned) | CSIRO | Bo Wang | 1–07–07 | 30–06–10 |
| 03DAN001 (was 03CRC004) | IPM in Bollgard cotton – New tools and strategies II: A Farming Systems approach (was 03DAN001) | NSWDPI | Robert Mensah | 1–07–07 | 30–06–10 |
| DAN190 | Survival and reproduction of the Fusarium Wilt fungus | NSWDPI | Chris Anderson | 1–07–06 | 30–06–09 |
| DAN193 | *Helicoverpa* spp. Insecticide Resistance | NSWDPI | Louise Rossiter | 20–03–07 | 30–06–08 |
| DAN197 | Sustainable chemical control of Mirids, Aphids and TSM in cotton | NSWDPI | Grant Herron | 1–07–08 | 30–6–2011 |
| DAQ001 | Developing the capacity to manage Cotton Viral Diseases | QLDDPI | Cherie Gambley | 1–07–08 | 30–6–2011 |
| DAQ003 | Cotton Fusarium wilt management | QLDDPI | Linda Smith | 1–07–07 | 30–06–10 |
| DAQ005 | Tobacco streak virus in cotton-scoping study (Contingency) | QLDDPI | Murray Sharman | 1–08–07 | 31–07–08 |
| CRDC0902 | Safe Cotton Harvesting video | CRDC | Helen Dugdale | 1–01–09 | 1–06–09 |
| DAQ006 | Silverleaf whitefly insecticide resistance monitoring 2007-2010 (Commissioned) | QLDDPI | Dave Murray | 1–07–07 | 30–06–10 |
| DAQ134 | Postgraduate: Jamie Hopkinson – Managing cotton aphids with parasitoids | QLDDPI | Jamie Hopkinson | 1–07–05 | 31–12–08 |
| ANU0901 | Genomics of *Helicoverpa armigera* insecticide resistance | CSIRO | Farnsworth | 1–07–08 | 30–06–09 |

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| 03UA002 | Significance, mechanism and new management strategies of inducible tolerance | UA | Otto Schmidt | 1–11–07 | 31–12–07 |
| UQ36 | Postgraduate: Joy Conroy – Investigating the roles of toxins and pathogenicity factors of Fusarium oxysporum f.sp. vasinfectum | UQ | Joy Conroy | 14–02–05 | 13–08–08 |
| UQ37 | Postgraduate: Jennifer Whan – Investigation of the effects of Silicon application on the resistance of cotton to Fusarium oxysporum f.sp. vasinfectum | UQ | Jennifer Whan | 1–07–05 | 30–06–08 |
| 03CRC003 | Postgrad: TBA Genetic Factors involved in pathogenicity of Thielaviopsis basicola towards cotton (Contingency) | CRC | Getachew Ali | 1–07–07 | 30–06–10 |
| CRC005 | Diseases of Cotton IX (was 03DAN003) | CRC | David Nehl | 1–07–07 | 30–06–10 |
| CRC006 | Postdoc: Joelle Coumons – Linking cotton-pathogen molecular interactions and black root rot management (was 03UNE003) | CRC | Joelle Coumons | 1–07–07 | 30–06–10 |
| CRC78 | Postgraduate: Jason Moulynox – Survival of the soil-born fungal pathogen Thielaviopsis basicola in association with cotton and other plants | CRC | Jason Moulynox | 1–08–05 | 31–07–08 |
| CRC111 | Postgraduate: James Hereward – Is the source of mirids in cotton derived from local dispersal or long distance migration? | CRC | James Hereward | 1–03–06 | 28–02–09 |
| CRC126 | Development of weed control thresholds in management of herbicide damage in cotton | CRC | Graham Charles | 1–07–06 | 30–06–09 |
| CRC135 | Maximising the efficiency of *Bt* refuge crop (was cse115) (refuge research – Mary Whitehouse) | CRC | Colin Tann | 1–07–06 | 30–06–09 |
| CRC137 | Postgraduate: Sam Alomari – Molecular analysis of proteobacterial communities in soil under cotton | CRC | Sam Alomari | 1–07–06 | 30–07–09 |
| CRC138 | Postgraduate: Todd Bennett – Ecology of Fleabane (Conyza spp) | CRC | Brian Sindel | 1–01–07 | 31–12–09 |

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| CRC146 | Weed Management Strategies for Farming Systems with Herbicide Tolerant Cotton | CRC | Jeff Werth | 1–07–08 | 30–06–11 |
| CRC154 | Emerging Pests: Developing Knowledge for GVB and Aphids | CRC | Lewis Wilson | 1–07–07 | 30–06–10 |
| CRC155 | Management of Mirids and Stinkbugs in Cotton | CRC | Moazzem Khan | 1–07–08 | 30–06–11 |
| | | | R&D INVESTMENT PROGRAM TWO | | $5,212,023.00 |

## Program Three HUMAN CAPACITY

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| CRC147 | National Cotton Training Co-ordinator (CRC68) | CRC | Hickman, Mark | 1–07–05 | 30–06–11 |
| CA0901 | Cotton Australia – Future Leaders Course 2009–2010 | CA | Adam Kay | 1–10–08 | 31–08–10 |
| FP0901 | Farm Plus Pilot Program | Farmplus | Brendon Fox | 1–01–09 | 30–11–09 |
| CRDC0903 | PISC capability audit | CRDC | Pyke, Bruce | 1–01–09 | 1–06–09 |
| CSE0901 | Travel: ASSAB Conference Auckland NZ | CSIRO | Mary Whitehouse | 14–04–09 | 21–04–09 |
| CTFT005 | Textile Institute Conference NZ | CSIRO | Rene van der Sluijs | 1–07–08 | 30–06–09 |
| CRDC002 | Young Cotton Achievers Award | CRDC | Helen Dugdale | 1–07–08 | 30–06–09 |
| CRDC005 | Travel – John Bennett – 14th Australian Cotton Conf | J Bennett | John Bennett | 11–08–08 | 15–08–08 |
| CRDC0904 | Travel – Mark Silburn | M Silburn | Mark Silburn | 1–01–09 | 30–06–09 |
| CRDC006 | Travel – Allison Devereux – 14th Aust Cotton Conf | A Devereux | Alison Devereux | 12–08–08 | 14–08–08 |
| CRDC007 | Travel – Elizabeth Read – 14th Aust Cotton Conf | E Reid | Elizabeth Reid | 12–08–08 | 14–08–08 |
| CRDC008 | Travel – Farrer Memorial School – 14th Aust Cotton Conf | Farrer Agricultural High School | Farrer | 12–08–08 | 14–08–08 |
| CRDC009 | Travel – Field to Fabric Course: Awan Everleigh and Amber Dimond | A Dimond | Amber Dimond | 1–10–08 | 31–12–08 |
| LWA001 | NPSI Phase 2 (Commissioned) | LWA | Guy Roth | 1–07–07 | 30–06–10 |
| RIRDC002 | Farm Health & Safety – Joint Venture | RIRDC | Helen Moffett | 1–07–08 | 30–06–12 |
| RIR001 | Australian Rural Leadership Program – Course 15 | RIR | Rob Patrick | 1–11–07 | 1–02–09 |

| Project Code | Project | Organisation | Researcher | Start Date | End Date |
|---|---|---|---|---|---|
| VDPI001 | Support of the Australian Agricultural and Natural Resources Online (AANRO) Database | VICDPI | Phillip Jones | 1–07–05 | 30–09–10 |
| CRC142 | Delivering Regional Extension in Qld Farming Systems – Darling Downs & Border Rivers (Commissioned) | CRC | Rod Gordon & Kate Charleston | 1–02–07 | 30–06–09 |
| CRC143 | Delivering Regional Extension in NSW cotton Farming Systems (Commissioned) | CRC | James Hill & Sally Morgan | 25–06–07 | 30–06–10 |
| CRC144 | Delivering Regional Extension in St George–Dirranbandi cotton farming systems (Commissioned) | CRC | Dallas King | 1–07–07 | 30–06–09 |
| CRC148 | Delivering Regional Extension Services – Central Queensland | CRC | Susan Maas | 1–07–08 | 30–06–11 |
| CRDC300 | Bo Wang – Travel to International Cotton Conference | B Wang | Bo Wang | 1–07–08 | 30–06–09 |
| CRDC318 | 14th Annual Cotton Conference 2008 | Cotton Aust | Ben Stephens | 7–01–08 | 30–09–08 |
| CRDC0901 | Qualitative Analysis of the BMP Trial Evaluation | QualData | Geoff Coutts | 27–01–09 | 6–02–09 |
| CRDC0902 | Travel Application – Mitchell Burns | M Burns | Mitchell Burns | 1–01–09 | 30–06–09 |
| | | | R&D INVESTMENT PROGRAM THREE | | $873,824.00 |
| | | | TOTAL R&D INVESTMENT PORTFOLIO 2008–09 | | $7,044,425.00 |

# Appendix Four
# ACRONYMS AND TERMINOLOGY

| | |
|---|---|
| AANRO | Australian Agricultural and Natural Resources Online Database |
| ABARE | Australian Bureau of Agricultural and Resource Economics |
| ACEC | Australian Cotton Exhibition Centre |
| ACGRA | Australian Cotton Growers' Research Association (now merged with Cotton Australia) |
| ACIC | Australian Cotton Industry Council |
| ACIPA | Australian Centre for Intellectual Property in Agriculture |
| ACGRA | Australian Cotton Growers Research Association |
| ACRI | Australian Cotton Research Institute |
| ACSA | Australian Cotton Shippers Association |
| ai/ha | Active ingredient per hectare |
| ANAO | Australian National Audit Office |
| ANCID | Australian National Committee on Irrigation and Drainage |
| APVMA | Australian Pesticides and Veterinary Medicines Authority |
| ARLP | Australian Rural Leadership Program |
| AWAF | Department of Agriculture and Food, Western Australia |
| AWM | Area Wide Management |
| Bollgard II® | Cotton varieties contain two genes resistant to *Helicoverpa* spp. |
| BMP | Best Management Practices program |
| BRS | Bureau of Rural Sciences |
| Bt | Bacillus thuringiensis (crystal protein gene expressed in INGARD® and Bollgard II® cotton varieties |
| CA | Cotton Australia |
| CAC Act | *Commonwealth Authorities and Companies Act 1997* |
| CCA | Crop Consultants Australia Inc. (formerly Cotton Consultants Australia Inc.) |
| CCRSPI | National Climate Change Research Strategy for Primary Industries |
| Cotton CRC | Cotton Catchment Communities Cooperative Research Centre |
| CMA | Catchment Management Authority |
| CMSE | CSIRO Materials Science and Engineering |
| CPRS | Carbon Pollution Reduction Scheme |
| CRC | Cooperative Research Centre |
| Corporation, the | Cotton Research and Development Corporation |
| CRDC | Cotton Research and Development Corporation |
| CSD | Cotton Seed Distributors Ltd (a grower-owned cooperative) |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| TFT | CSIRO Textile and Fibre Technology (formerly a CSIRO Division but now a program within CSIRO Materials Science and Engineering) |
| CVCB | Cooperative Venture for Capacity Building |
| DAFF | Australian Government Department of Agriculture, Fisheries and Forestry |
| DECCW | NSW Department of Environment, Climate Change and Water |
| DEEDI | Queensland Department of Employment, Economic Development and Innovation |
| DERM | Queensland Department of Environment and Resource Management |
| DOFD | Australian Government Department of Finance and Deregulation |

| | |
|---|---|
| EIQ | Environmental Impact Quotient |
| EM | Electromagnetic conductivity |
| EPOI | Environmental Performance Indicator |
| ESD | Ecologically Sustainable Development |
| EPBC Act | *Environmental Protection and Biodiversity Conservation Act 1999* |
| FH&SJV | Farm Health & Safety Joint Venture |
| F Rank | Measure of Fusarium wilt resistance |
| FRDC | Fisheries Research and Development Corporation |
| GM | Genetically modified |
| GMAC | Genetic Manipulation Advisory Committee |
| GOA | Groundrig Operators Association |
| GRDC | Grains Research and Development Corporation |
| HAL | Horticulture Australia Ltd |
| ha. | Hectare |
| *Helicoverpa* spp. | Cotton's major insect pests (*H. armigera* and *H. punctigera*) |
| Heliothis | Insect pest, more properly known as *Helicoverpa* spp. (see above) |
| IBP | Industry Biosecurity Plan |
| I&I NSW | Industry & Investment NSW |
| ICAC | International Cotton Advisory Committee |
| IP | Intellectual Property |
| IDM | Integrated Disease Management |
| IPM | Integrated Pest Management |
| IRMS | Insecticide Resistance Management Strategy |
| IWM | Integrated Weed Management |
| IWUI | Irrigation Water Use Index |
| LCA | Life Cycle Assessment |
| LWA | Land and Water Australia |
| MLA | Meat and Livestock Australia |
| MP | Member of Parliament |
| NCEA | National Centre for Engineering in Agriculture, University of Southern Queensland |
| NFF | National Farmers' Federation |
| NHT | Natural Heritage Trust (Australian Government) |
| NPSI | National Program for Sustainable Irrigation |
| NRM | Natural Resource Management |
| NSW DPI | NSW Department of Primary Industries *(now part of Industry & Investment NSW)* |
| NSW DNR | Department of Natural Resources, New South Wales *(now the NSW Department of Environment, Climate Change and Water* |
| NUEI | Nitrogen Use Efficiency Index |
| OGTR | Office of the Gene Technology Regulator |
| PICSE | National Primary Industry Centre for Science Education |
| PIERD Act | *Primary Industries and Energy Research and Development Act 1989* |
| Pima cotton | *Gossypium barbardense*. Related to Egyptian cotton, having extra long and fine staples. Limited Australian production. |
| QDPI&F | Department of Primary Industries and Fisheries, Queensland *(now the Department of Employment, Economic Development and Innovation)* |
| QFF | Queensland Farmers ' Federation |
| QNRM&W | Department of Natural Resources and Water, Queensland *(now the Department of Environment and Resource Management)* |
| RDCs | Rural Research and Development Corporations |
| RIRDC | Rural Industries Research and Development Corporation |
| RRDCC | Rural Research and Development Chairs' Committee |
| SJV | San Joaquin Valley (California) – the industry benchmark in the international marketplace |

| | |
|---|---|
| spp. | species |
| SRDC | Sugar Research and Development Corporation |
| TIMS Committee | Transgenic and Insect Management Strategy Committee |
| 'Upland' cotton | *Gossypium hirsutum*. Comprises the vast majority of the Australian cotton crop, with Pima cotton (see above) comprising the remainder |
| Wincott | Women's Industry Network – Cotton |
| WUE | Water use efficiency |
| YARN | Young Australian Rural Network |

# Appendix Five
# LEGISLATIVE COMPLIANCE INDEX

***Commonwealth Authorities and Companies Act 1997*, section 9**

A. REPORT OF OPERATIONS

### *Primary Industries and Energy Research and Development Act*, Section 28

# Subject Index

## T



## U



## V



## W

## Y



## Z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