Acknowledgements
SRA acknowledges and thanks its investors, including levy payers (sugarcane growers and millers), the Commonwealth Government and the Queensland Government.

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1. MESSAGE FROM THE CHIEF EXECUTIVE OFFICER

I am pleased to present Sugar Research Australia Limited’s (SRA’s) Annual Operational Plan (AOP) for 2019/20. This AOP directly aligns with SRA’s Strategic Plan 2017/18 – 2021/22 and outlines the research, development and adoption (RD&A) activities and investment program SRA will be undertaking during 2019/20 to achieve our strategic goals to drive profitability, improve sustainability, enhance capability and strengthen organisational excellence.

In setting our RD&A agenda for the coming year, SRA’s Board and Management recognise there will be several key challenges and potential opportunities for SRA.

Our grower and miller investors are facing significant operating and financial pressures at present, particularly in terms of sustained low world sugar prices, declining production, increasing regulation and maintaining social licence to operate. At the same time, SRA has a responsibility to balance our investor priorities and invest appropriately in RD&A that will mitigate the impact of these pressures and bring positive benefits to the industry and broader communities in which we operate.

SRA is not immune from the challenges faced by our Members and investors and our income will be impacted by these challenges. Effectively managing these pressures whilst delivering impactful RD&A will be challenging given the impact low sugar prices and decline in production will have on SRA’s income during the 2019/20 operating period. The SRA Board has reduced our current research investment and internal research capability and is confident that this process will succeed. The Board has therefore endorsed a deficit Budget of $3.1 million for 2019/20 and will utilise a small proportion of our accumulated cash reserves to maintain our RD&A investment portfolio and support activities.

We are acutely mindful though that this deficit budget cannot be continued and we have had to make some hard decisions concerning our own operations to mitigate as best we can the impact of the current financial constraints on our frontline RD&A investment and improve the overall operating result. We will continue to implement prudent financial management and budget containment measures throughout the coming year, including: implementing improvements to our RD&A investment framework and processes; closely monitoring and evaluating our resourcing levels; exploring additional funding opportunities; streamlining our core RD&A and support functions wherever possible; and introducing improved business processes and technologies to reduce costs and improve efficiency.

Although financial pressures prevail, our focus on delivering impact and returns for our investors remains equally strong.

To this end, the SRA Board has adopted a targeted approach for new investment in 2019/20, with a specific focus on transformational research, variety development and milling efficiency and technology that will complement our current RD&A portfolio.

New projects to be undertaken in 2019/20 include:

- Validation of high throughput phenomics technologies for sugarcane clonal selection;
- Near infra-red (NIR) calibrations for key fibre quality parameters for use in plant breeding measurement systems;
- Strategies to improve mill processing of soft or low-fibre sugarcane varieties;
- Ratoon Stunting Disease (RSD) detection blueprint for use in sugar factories;
- Proof-of-concept for creation of a new tool for real-time, continuous monitoring of harvest losses;
- Development and commercial testing of new technology to eliminate arcing of mill rollers and improve crushing performance; and
- Development of training modules for sugar factory operators.

SRA will also support industry good initiatives through investment in social and scientific research associated with animal feedstock and probiotics; and additional external income secured through the Commonwealth Government’s Reef Trust and the Great Barrier Reef Foundation to undertake the Cane to Creek 2.0 project which expands on two successful water quality projects that have been running in the Wet Tropics under the direction of SRA.

SRA will also be collaborating with the milling sector to establish a long-term milling RD&A investment program, with a focus on improving milling efficiency and capital utilisation, and will also be continuing investment in the Small Milling Research Program (SMRP) scheme which provides a vehicle for targeted investment in small milling sector projects that develop a product, service or process that will deliver tangible outputs with almost immediate outcomes for our miller investors.

SRA will also continue to invest in sugarcane industry capability and innovation through a number of initiatives, including: the development of a Sugarcane Industry RD&A Employment and Capability Strategy; Next Crop leadership development program; SRA Sugar Industry Research Awards; SRA Postgraduate Research Scholarship; Travel and Learning Awards; and the Innovation Catalyst program for SRA researchers. These award programs help researchers to undertake projects to test novel ideas that could lead to further research activity or directly contribute to productivity, profitability and sustainability outcomes for sugarcane growers and millers. Projects funded under these programs for 2019/20 include:

- Characterising nitrogen use efficiency in sugarcane;
- New approaches to quantifying nitrogen fluxes in enhanced efficiency fertilisers;
- Innovative techniques to coat the basecutter blades of harvesters to reduce wear; and
- Developing a marker system to measure dosage of alleles for use as a selection tool in the sugarcane breeding program.

Our expanded Adoption team will continue to provide a vital conduit between research outputs and sugarcane growers and millers, and will continue to collaborate with industry and private sector extension providers on the ongoing delivery of the industry-led adoption strategy.

We will also ensure that we continue to set the internal conditions to support RD&A delivery. This means continuing to develop an investor-centric and performance driven culture, with systems and processes in place to support our people to achieve SRA’s strategic objectives. It also requires ongoing investment in breakthrough scientific and digital technologies to ensure our ways of working continue to evolve to take advantage of new opportunities as and when they present.

Although SRA faces a challenging year ahead, we look forward to working with our Investors, research and adoption partners and industry stakeholders to effectively deliver our RD&A portfolio and achieve valued return on investment and positive impact on the profitability, sustainability and capability of the Australian sugarcane industry.

Neil Fisher
CHIEF EXECUTIVE OFFICER
2. INTRODUCTION

SRA is a sugarcane grower and miller owned company and the declared Industry Services Body for the Australian sugarcane industry under the Sugar Research and Development Services Act 2012 (Cth). 

As the declared Industry Services Body, SRA is required to provide and manage RD&A activities for the benefit of the sugarcane industry and for the wider public good.

The objectives of SRA are to:

• Deliver cost-effective research and development (R&D) services to the Australian sugarcane industry to enhance its viability, competitiveness and sustainability;

• Carry out, coordinate and provide investment for R&D activities in relation to the Australian sugarcane industry;

• Facilitate the dissemination, extension, adoption and commercialisation of the results of R&D activities; and

• Support and develop industry research capacity.

To ensure our objectives are achieved, we maintain a strong presence across the main sugarcane growing regions of New South Wales (NSW) and Queensland, with approximately 150 full-time employees based at nine research farms, laboratories and offices.

To fulfil our responsibilities, SRA operates a contestable investment program that encourages sugarcane researchers and research organisations from the broader research community and other sectors, to investigate and create innovative solutions to address sugarcane industry challenges and opportunities.

SRA also undertakes core research activities that are crucial to the future of the Australian sugarcane industry, including activities in plant breeding and biosecurity.

Through the efforts of our own researchers and our research partners, SRA plans to invest $39.5 million in RD&A activities during 2019/20. These activities will be funded through statutory levy payments from sugarcane growers and millers (forecast $22.1 million in 2019/20), co-investment from both the Commonwealth Government (forecast $6.3 million in 2019/20) and Queensland Government (forecast $5.1 million in 2019/20) and collaborative investment from other research providers and private sector partners, as well as through other commercial activities.

With respect to managing and investing funds from levy payers and government investors, SRA has established a strategic management and planning framework that includes the development and delivery of a five-year Strategic Plan and AOPs for each year covered by the Strategic Plan. These planning documents are industry and outcomes focussed and respond to current and emerging issues and opportunities and the RD&A needs and expectations of SRA’s investors.

This AOP outlines the direction and resourcing for SRA’s core activities and investments in RD&A projects (both as an investor and as a provider) to be undertaken during 2019/20, to deliver on SRA’s 2017/18 – 2021/22 Strategic Plan and optimise economic, environmental and social benefits for SRA’s industry and government investors. This AOP should be read in conjunction with the Strategic Plan.

In delivering on this AOP, SRA will continue to collaborate with its Members, levy payers, industry representative bodies, government, productivity services, extension providers, other industry stakeholders, researchers and international peers and partners. SRA also intends to leverage synergies and opportunities with other RDCs to address cross-sectoral issues impacting agricultural industries and identify and improve access to leading-edge innovation, best-practice and technological advancements.

3. STRATEGIC AGENDA

SRA’s strategic agenda is set out in SRA’s five-year Strategic Plan and is structured to address the primary profitability, sustainability and capability challenges and opportunities facing SRA’s industry investors (Australia’s sugarcane growers and millers) and of significance to SRA’s government investors (the Commonwealth and Queensland Governments). A summary of SRA’s strategic framework is shown in Figure 2.

SRA has four overarching goals that drive the research agenda and ensure we never lose focus on our industry and government investor needs and expectations. These goals are as follows:

1. **Drive profitability** – through innovation-led productivity gains, step-change and value-adding;

2. **Improve sustainability** – through evidence-based research and sustainable production, biosecurity and environmental management;

3. **Enhance capability** – through strengthened research and industry partnerships, capability development programs and collaborative knowledge transfer and adoption mechanisms; and

4. **Strengthen organisational excellence** – through enhanced RD&A investment management, best practice organisational governance and a positive performance-focused organisational culture.

To deliver on these strategic goals, SRA has established nine key focus areas (KFA(s)) – each with set objectives, outputs, expected outcomes and measures by which to demonstrate success.

SRA has also established the following suite of enabling strategies to underpin delivery of our goals across the KFAs and ensure we set the requisite internal conditions to achieve the greatest impact from our RD&A portfolio:

• **Mapping the future** – keeping abreast of and responding to current and emerging trends, issues and opportunities;

• **Sustaining financial viability** – achieving and maintaining a sustainable financial position for SRA;

• **Partnering for impact** – establishing new and strengthening existing partnerships to optimise RD&A outcomes;

• **Innovating our science** – fostering innovation, identifying transformative opportunities, adopting new technologies and enhancing capabilities;

• **Optimising return on investment** – enhancing our investment decision-making and governance processes; and

• **Transforming our business culture** – fostering a more agile operating model and supporting our people, leadership and capability.

Initiatives to support these strategic goals and enabling strategies are included in the key deliverables set out in this AOP and, at a more tactical level, in SRA’s Internal Organisational Plan.
RD&A PRIORITIES

The ethos that underpins both SRA’s Strategic Plan and this AOP is one that is outcome and investor focussed, consultative and collaborative. SRA is committed to listening to our investors, understanding their needs and responding to those needs through innovative RD&D solutions that are successfully adopted and deliver significant value for the industry as a whole, as well as benefits for the broader Australian community.

The key deliverables laid out in this AOP respond to the priority challenges and opportunities of the sugarcane industry and, more broadly, the priorities of the agricultural sector, government and the wider Australian public. More specifically, the KFAs and associated RD&A activities respond to the issues raised during consultation with Industry, government and researchers, as well as the principles, strategies and priorities set out in the following strategic documents:

- National Sugarcane Industry Research, Development and Extension (RD&E) Strategy, 2017
- Rural RD&E Priorities, Australian Government, 2015
- Department Strategic Objectives for funding projects for SUGARCANE, Queensland Department of Agriculture and Fisheries, 2018

There is strong alignment across these priorities, particularly with respect to: delivering value for money; increasing profitability and productivity; enhancing environmental sustainability; advancing innovation; and improving adoption of RD&D. A matrix detailing the alignment between the research programs under each of SRA’s KFAs and the key Industry and government priorities is provided in Attachment 1.

Figures 2 and 3 detail the proportion of SRA’s estimated investment for 2019/20 that align with the National Science and Research Priorities and the Rural RD&E Priorities.
SUGAR RESEARCH AUSTRALIA LIMITED

INVESTMENT PRIORITIES

In developing SRA's 2017/18 – 2021/22 Strategic Plan, SRA investors identified a number of industry challenges and opportunities that required priority attention and/or increased investment. The currency and criticality of these research areas was further emphasised during Industry consultation to develop regionally-based sugar industry adoption strategic action plans for 2019/20. The priority research investments and deliverables for 2019/20 are as follows:

Modernising plant breeding and broadening genetic base

Varieties are central to helping make the Australian sugarcane industry more productive, sustainable and competitive. SRA's plant breeding program is the primary producer of new varieties in Australia with up to 100,000 potential new varieties developed each year with promising climate progress through the evaluation stages.

SRA continues to overhaul its plant breeding program with a view to achieving the ambitious target of two per cent annual genetic gain. In 2019/20, SRA will continue with the development of new pre-breeding selection tools using DNA and unmanned aerial vehicle (UAV) based platforms; a more commercial focus in crossing; a more systematic approach to using wild relatives; earlier selection pressure for key economic traits; increased precision of field trials and screening methods; and improved management metrics.

Enhancing soil health and nutrient management

Soil health includes chemical, physical and biological factors that can be detrimentally impacted by farming practices that reduce organic matter and nutrient levels; allow accumulation of pathogens; maintain long-term monoculture; include aggressive tillage practices; and allow compaction from heavy machinery.

SRA's Soil Health Program invests in, coordinates and delivers R&D projects that focus on implementing balanced nutrition on-farm with the ultimate aim of optimising productivity and profitability without adversely influencing soil fertility or causing off-farm effects. In 2019/20, the Soil Health Program will include a focus on: accelerating the adoption of best-practice nutrient management using SRA’s SIX EASY STEPS; continuing field trials on the effect of Enhanced Efficiency Fertilisers (EEFs) on cane and sugar yield; commercial cane sugar (CCS); nitrogen use efficiency and environmental losses; and understanding root system health.

Strongening milling sector efficiency and capability

The primary objectives of Australia’s sugarcane mills are to maximise throughput of cane and maximise quality sugar output. Innovations in mill technology and processing to assist in the removal of extraneous matter, improve sugar recovery and sugar quality and improve energy efficiency contribute to the long-term sustainability of the milling sector.

In 2019/20, SRA will continue investment that aims to develop products, services or processes that will further optimise milling operations and advance research skills and capacity within the milling sector, including the following projects under the Small Milling Research Program (SMRP) scheme: evaluating the performance of the falling film tube evaporator; evaluating the suitability of the fixed element crystalliser for widespread adoption in Australian sugar factories; addressing operational and maintenance issues with cleared belt intermediate carriers; and reducing surging in shredders.

Facilitating industry led adoption activities

SRA continues to facilitate the implementation of the Strategy for Industry Led Adoption Activities in the Sugar Industry (the Industry Adoption Strategy) that aims to improve the uptake of new and existing technologies and practice change across the Australian sugarcane industry.

In 2019/20, SRA’s Adoption unit will continue to work with the newly established Industry Adoption Advisory Committee and Regional Adoption Advisory Groups to deliver regional and cross-regional projects identified and designed to address strategic industry issues. SRA will also continue to facilitate the delivery of collaborative practice change initiatives including Cane to Creek 2.0.

Driving improvements in harvester design and harvesting practices

Harvesting losses are a major cost to the sugar industry, in particular the loss of marketable cane via the cleaning system during green cane harvesting. Research conducted into harvester performance has resulted in the development of Harvesting Best Practice (HBP) guidelines to reduce cane loss, improve cane quality, and reduce stoal damage.

In 2019/20, SRA will continue to facilitate regional demonstration trials to showcase the significant benefits attributable to the implementation of HBP and will commence work on the development of a decision support tool that will allow growers and harvesting contractors to determine optimal harvesting parameters. Recognising the need to build capacity and capability in the harvesting sector, SRA will also develop a training and accreditation program to be offered across the industry.

Understanding and managing Yellow Canopy Syndrome (YCS)

YCS is a condition of unknown cause affecting sugarcane crops in Queensland. Sugarcane plants affected by YCS display a specific pattern of leaf yellowing accompanied by abnormal and lethal accumulation of sucrose and starch in leaves.

In 2019/20, the YCS program will continue to draw on Australian and international expertise to: work toward a useful control for YCS that has the potential to be supported by an in-field diagnostic test that is in an advanced stage of development; investigate a number of likely biological entities together with physiological disruptions as potential causes of YCS; and investigate sugarcane variety responses to YCS to develop a much better understanding of different varieties’ yield response to YCS, and the severity of impact for different varieties.

Leveraging collaborations and co-investment

SRA recognises the importance of collaborating with a range of partners to improve the efficiency, coordination and leveraging of research investment in areas of mutual interest and where beneficial for the Australian sugarcane industry and the broader public good. Strategic partnerships and joint investment in advanced technologies and agricultural practices are an important part of our investment strategy.

During 2019/20, SRA will seek to expand and strengthen partnerships and collaborative alliances with:

- Leading public research organisations, including universities and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and government to collectively develop the very best solutions to current industry opportunities and challenges;
- Sugarcane research counterparts overseas to create collaborative research opportunities and variety exchange programs that will benefit the Australian sugarcane industry;
- Private sector partnerships, both nationally and internationally, to catalyse the development and commercialisation of cutting-edge technology and research outputs;
- Productivity services organisations, advisory sector and Natural Resource Management (NRM) organisations to accelerate adoption of research outcomes and new technology;
- Other RD&Cs to share knowledge and learnings and to co-invest in cross-sectoral research programs; and
- Non-traditional partners to advance scientific knowledge, innovation and transformational change.

Supporting Industry good initiatives

SRA is conscious of the current and emerging pressures facing industry with respect to maintaining social licence to operate and competing in a world market where market forces are strongly influenced by the trade actions of the world’s largest producers, namely Brazil and India. SRA currently supports the Australian sugarcane industry to address some of these challenges through scientific based research directed at improving soil nutrition, water quality and environmental management, as well as investing in the development of an economic model to support the industry’s trade and market access activities. In 2019/20, SRA will continue to support research projects towards addressing these “industry good” pressures, along with social and scientific research into sugar nutrition aspects of human health.
4. DELIVERABLES FOR 2019/20
### Key Performance Indicators

<table>
<thead>
<tr>
<th>Key Performance Indicators</th>
<th>Milestones for 2019/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFA1/Del1</td>
<td>Evaluation of introgression derived clones in the two-year cropping cycle of temperate cane growing environments of NSW and in response to frost.</td>
</tr>
<tr>
<td>KFA1/Del2</td>
<td>Preliminary estimates of accuracy of genomic selection for yield (tonnes of cane per hectare) and CCS.</td>
</tr>
<tr>
<td>KFA1/Del3</td>
<td>Strategy for integrating genomic selection into breeding program.</td>
</tr>
<tr>
<td>KFA1/Del4</td>
<td>Development of a genetic map and disease phenotyping for high value breeding crosses (Q209® × Q209®).</td>
</tr>
<tr>
<td>KFA1/Del5</td>
<td>A qpha09Na chromosome 5 isolated, sequenced and specific markers linked to Pachymetra resistance-quantitative trait loci identified.</td>
</tr>
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</table>

### Priorities for 2019/20

- Continued implementation of change management plan for enhancing SRA’s core plant breeding operations and increasing rates of genetic gain.
- Complete the establishment of the introgression breeding pipeline including cygogenetic characterisation of elite clones.
- Pilot test the use of molecular markers for smut resistance in a range of seedling populations.
- Establish yield trials for the first crosses selected for accelerated breeding strategies.
- Conduct extensive fibre quality testing to support the development of Near Infrared Reflectance (NIR) calibrations for shear strength, short fibre and impact resistance.

### Outputs for 2019/20

- Exploring and Creating Genetic Diversity: enriching the parental gene bank to enhance cane production, protection and sustainability.
- Trait R&D: improving genome and trait knowledge to reduce genotype-phenotype gap.
- New selection tools: improved methods for earlier, faster and refined parent and progeny selections.
- Parent selection and crossing to develop larger and improved breeding populations.
- Disease screening of breeding clones including earlier stage selection for Pachymetra resistance.
- Robust experimental design and data analysis applied to maximise the precision of breeding and disease screening trials.
- Performance data on potential new varieties provided to Regional Variety Committees for commercial release decisions.

### Forecasts 2019/20 Investment Budget

- $13.0M

### Key Focus Area 1

**Optimally adapted varieties, plant breeding and release**

Key Focus Area 1 includes SRA’s core sugarcane plant-breeding program for the production of new and improved sugarcane varieties and their release and distribution for commercial production. In addition, KFA1’s contestable investment portfolio is aimed at developing tools, technologies and platforms to enable the breeding program to develop those varieties including the exploration and creation of new genetic diversity and improved genome and trait knowledge.

Central Region grower Peter Hackett has always had a keen interest in new varieties making their way through the development pipeline, which is why he has continued to host Final Assessment Trials (FATs) on his property for the last 12 years. “My farm is a fairly average soil type for the district and it was unirrigated at that time. I started with the trials, and I thought the information coming from this trial would be useful for the rest of the growers in the Plane Creek area,” he said. “12 years later and we are still going. It continues to be interesting to observe the trials from the high rise spray tractor and see how much variation there is between different clones.”

### Priorities (Incorporated into Programs)

- Increased sugarcane yield and commercial cane sugar (CCS)
- Restructure and modernise the breeding program and broaden the genetic base

### Organisational Excellence

- Enhanced organisational excellence through more streamlined and timely programmes for delivery and greater resilience to climatic conditions.

### Capability

- Increased capability through a highly efficient plant breeding program, with cutting-edge technology, and improved programs for delivery and grower-selection of varieties.

### Key Impact

- Profitability: increased profitability through more productive varieties that are better aligned to specific regional and farm conditions, greater yielding (tonnes or CCS) and less input intensive.

### Sustainability

- Enhanced sustainability through innovative sugarcane varieties bred with key traits requiring less chemical and energy inputs, optimally suited to their local environment and with greater resilience to climatic conditions.

### Outcomes

- Restructure and modernise the breeding program and broaden the genetic base
- Increased sugarcane yield and commercial cane sugar (CCS)
Key Focus Area 2 contains SRA’s RD&A investments concerned with improving soil health, management of nutrients and chemical inputs, capability to predict and adapt to variable climatic conditions and the industry’s environmental sustainability and social licence to farm. The focus area houses SRA’s dedicated Soil Health Program, charged with the coordination and delivery of the long-term investment needed to research and develop solutions to the industry’s soil-based constraints.

Josh Keith, Rocky Point grower Josh Keith is enthusiastic that SIX EASY STEPS guidelines are being created for his district, after having been completed for all other districts.

1. I kept hearing that when people use SIX EASY STEPS they are saving money and are more profitable,” Josh said. “So, I thought: that’s what I want.”

Some of the SIX EASY STEPS team has been in the region recently, digging 11 soil pits and collecting samples on a range of different soil types and conditions. This information will be used to create a soils booklet for the district and the local SIX EASY STEPS nutrient management guidelines for growers.

**OUTCOMES**

Outstanding and improved profitability through farming systems that optimise returns (particularly income, water and energy) and enhance soil health to support sustainable production.

**SUSTAINABILITY**

Maintained industry social licence to operate and enhanced sustainability through improved uptake of proven technologies and proven practices that optimise input use, improve natural resource health and minimise off-farm impacts.

**CAPABILITY**

Increased capability through appropriate and timely evidence-based knowledge transfer between researchers, industry, investors and the advisory sector.

**ORGANISATIONAL EXCELLENCE**

Enhanced organisational excellence through established regional networks, as well as collaborative working relationships and communication between researchers, industry, investors and the advisory sector.

**NEW**

KFA2: Soil health, nutrient management and sustainability

**PRIORITY FOR 2019/20**

Continue to develop resources that assist in improving the soil physical, chemical and biological properties of sugarcane soils with the view to improving soil health and the resultant productivity and profitability of the Australian sugar industry.

Continue to improve our understanding of the drivers of nutrient use efficiency and develop tools that assist in strategic and tactical on-farm decision making.

Continue to develop an understanding of the value of EEF as tools to improve productivity and water quality outcomes through industry wide testing and modelling.

**OUTPUTS FOR 2019/20**

Soil health: improve understanding of soil fertility, soil biology and chemical and physical attributes.

KFA2/DL1 Continued development of a soil health hub as an industry resource for the improvement of soil health. Ongoing


KFA2/DL3 90% of growers using SIX EASY STEPS by 2022. Increase on previous year’s result towards 90%.

**FORECAST 2019/20 INVESTMENT BUDGET – $4.9M**

| KFA2/KPI3 | 90% of growers using SIX EASY STEPS by 2022. | Increase on previous year’s result towards 90%. |

**KEY IMPACTS**

**PROFITABILITY**

Safeguarded and improved profitability through farming systems that optimise returns (particularly income, water and energy) and enhance soil health to support sustainable production.

**SUSTAINABILITY**

Maintained industry social licence to operate and enhanced sustainability through improved uptake of proven technologies and proven practices that optimise input use, improve natural resource health and minimise off-farm impacts.

**CAPABILITY**

Increased capability through appropriate and timely evidence-based knowledge transfer between researchers, industry, investors and the advisory sector.

**ORGANISATIONAL EXCELLENCE**

Enhanced organisational excellence through established regional networks, as well as collaborative working relationships and communication between researchers, industry, investors and the advisory sector.

**KFA2: Soil health, nutrient management and sustainability**

**OUTCOMES**

Improved natural resource health

**PRIORITIES**

**INCORPORATED INTO PROGRAMS**

Integrated and focused soil health program and improved nutrient management through enhanced SIX EASY STEPS guidelines

**KEY PERFORMANCE INDICATORS**

**MILESTONES FOR 2019/20**

**TIMEFRAME**

| KFA2/DEL1 | Continued development of a soil health hub as an industry resource for the improvement of soil health. | Ongoing |
| KFA2/DEL2 | Baseline population data obtained using DNA-based assays for Pachymeta, parasitic nematodes and a range of soil biological parameters at key soil health project sites, including FAT sites in both the Wet tropics and Central regions. | Jul-19 |
| KFA2/DEL3 | Identification of dynamic keystone soil borne fungal communities in response to fallow treatments. | May-20 |
| KFA2/DEL4 | Optimised subset of indicators of soil health and impacts of farming practices on soil properties determined. | Nov-19 |
| KFA2/DEL5 | Decisions made on a package of relevant DNA-based assays selected for continued application in collaborative trials. | Jan-20 |
| KFA2/DEL6 | Optimised and cost-effective field sampling design for estimating root system health. | May-20 |
| KFA2/DEL7 | Refinement and calibration of the root DNA health assay for improved assessment of root system health. | May-20 |
| KFA2/DEL8 | Two economic case studies completed on long-term paired transition sites investigating impact of farming systems on soil properties. | May-20 |
| KFA2/DEL9 | Preliminary assessment of the impact of additional organic inputs, mixed species fallow cropping and intercropping on soil condition. | May-20 |
| KFA2/DEL10 | Extension package developed for soil health field kit. | Nov-19 |
| KFA2/DEL11 | Web-based decision support tools and evidence which provides farm-specific guidance to advisors and growers on refining the SIX EASY STEPS recommendations in relation to a range of situations (including case studies), and in which advisors and growers have increased confidence. | Jan-20 |
| KFA2/DEL12 | Improved understanding of the nitrogen use efficiency of yield-constrained crops and the impact of late harvested and variable climatic conditions presented to the SIX EASY STEPS Advisory Committee and included in the specific nitrogen guidelines and modelling simulations in the SIX EASY STEPS toolbox. | Jun-20 |
| KFA2/DEL13 | Improved understanding of the effects of soil properties and different management practices on mineralisation and nitrification of leached nitrogen, including economic assessment of potentially nitrogen-efficient management strategies. | Jun-20 |
| KFA2/DEL14 | Optimised understanding of EEF management practices on productivity, profitability and nitrogen use efficiency through harvesting, assessment and re-establishment of 60 trial sites across sugarcane regions. | Jun-20 |
| KFA2/DEL15 | Basis for prototype smartphone app developed and linked to web-based NutriCalc for decision-making on crop nutrition. | May-20 |
| KFA2/DEL16 | Validation and cost-effectiveness of an online NIR spectroscopic analysis system to quantify availability of key nutrients in mill by-products. | Jun-20 |
| KFA2/DEL17 | Ongoing industry consultation surrounding Bureau of Meteorology (BOM) risk maps for heat, cold and rainfall. | Ongoing |
| KFA2/DEL18 | Impact of climatic conditions and harvest time on crop yields and simulated nitrogen response assessed for major soils in the Herbert region. | May-20 |
| KFA2/DEL19 | Industry-wide dataset on soil greenhouse gas (GHG) emissions, denitrification and nitrogen use efficiency from sugarcane. | Ongoing |
| KFA2/DEL20 | Ongoing testing and implementation of an extension approach to enhance the adoption of improved pest and herbicide practices in the Tully, South Johnstone and Mulgrave Mills areas for improved water quality outcomes. | Sep-19 |
| KFA2/DEL21 | Feasibility assessment of using sorbents to capture end-of-row chemical and nutrient run-off. | Jun-20 |

* MFA 2 to 5 also cover projects that contribute to environmental sustainability and social licence to operate.
**Key Focus Area 3: Pest, disease and weed management**

**Yellow Canopy Syndrome (YCS) research portfolio.**

Cairns grower John Ferrando says biosecurity awareness is crucial for both maintaining a productive crop, and for the long-term sustainability of the industry. “Feral pigs do lots of damage to the cane here,” Mr Ferrando said. “We also know that things can go horribly wrong when there is an incursion of an exotic pest or disease. “It could take years for the industry to get on top of the problem, or worse, there could be no chemical controls for a new pest – so it’s far better that we be vigilant and keep things clean to begin with.”

John Ferrando

**Outcomes**
- Reduced or avoided yield losses and/or added input costs
- Integrated new precision technologies and activities on a cost/benefit basis

**Priorities (incorporated into programs)**
- Enhanced organisational excellence
- Improved understanding of the mechanisms by which Soldier fly larvae damage sugarcane
- Continuing investigations of midia lisp and herbicide loss minimisation through formulation, adjuvant addition, placement and application
- Field management options determined for YCS, including the use of different insecticides
- Ongoing assistance to industry to manage soil-borne diseases caused by Pachymetra root rot and nematodes through provision of soil assays (cost-recovery basis)
- Evaluation of the leaf sheath biopsies (LSB) qPCR (LSB-qPCR) diagnostic tool and a decision made on its adoption as the standard diagnostic tool
- Rapid screening tests for chlorotic streak disease developed and tested
- Feasibility of a diagnostic service for chlorotic streak disease assessed
- Work with Biosecurity Queensland to declare area freedom in central region for Fiji Leaf Gall
- Disease management: improve disease management strategies and technologies
- Controlled research on approaches that minimise off-site movement of insecticides and herbicides and where appropriate extend to growers
- Herbicide phytotoxicity ratings ascribed to newly released SRA varieties to allow the informed selection of herbicides for weed control
- Effect of mill mud and mill ash on herbicide run-off and efficacy defined
- Ongoing

**Outcomes for 2019/20**
- Biosecurity: enhance capacity to manage biosecurity risks
- Disease management: improve disease management strategies and technologies
- Pest control: enhance capability to deal with pests
- Sustained and increased profitability through reduced or avoided losses (yields minus added input costs) due to prevented, eliminated or reduced weeds, pests and biosecurity incursions
- Enhanced sustainability through biosecurity protection, reduced reliance on chemical interventions, and pest, disease and weed management strategies with potentially reduced environmental impacts

**Priorities for 2019/20**
- Maintain expertise and preparedness, both within SRA and the Australian sugar industry, in the event of an exotic incursion
- Continue to evaluate management strategies for Soldier fly including determining the needs to lower overall cane damage to sugarcane
- Continue to evaluate new insecticides that could be used as an alternative to imidacloprid for the management of cane grubs
- Continue to research approaches that minimise off-site movement of insecticides and herbicides and where appropriate extend to growers
- Determine the role of insects in the expression of YCS and commence the refinement of management strategies

**Forecasts 2019/20 Investment Budget: $4.2M**

**Key Performance Indicators**

**Milestones for 2019/20**

**KFA3/PKI**
- Up-to-date datasets reflecting current knowledge for high-risk exotic threats, reviewed annually

**KFA3/PKII**
- At least 20% of growers adopted new and/or improved pest management strategies within last five years
- At least 2000 clones from various stages of the selection programs, parents, and donor clones screened annually

**Forecast 2019/20 Investment Budget: $4.2M**
KFA4: Farming systems and harvesting

Key Focus Area 4 houses SRA’s research and development activities dedicated to optimisation of sugarcane farming and harvesting systems. The portfolio encompasses precision agriculture, water management and on-farm energy efficiency research. KFA4 also contains SRA’s flagship harvesting best practices (HBP) program which is driving improvements in harvester design and practices with promising industry outcomes emerging from the harvesting groups participating in SRA’s demonstration trials.

Outcomes
- Improved farm input-output efficiencies and profitability.

Priorities (incorporated into programs)
- Economic analyses and demonstration of new or improved technology, farm management practices and analysis tools.

Key impacts
- Profitability
  - Increased profitability through optimised sugarcane farming and harvesting practices and industry value chain efficiencies.
- Sustainability
  - Optimised sustainable sugarcane production through application of evidence-based farming and harvesting systems that maintain or enhance the value of natural capital both on and off farm.
- Capability
  - Enhanced regional research, growers, harvesters and advisory sector capability in improved farming and harvesting systems.
- Organisational excellence
  - Enhanced organisational excellence through application of farming best management practices on SRA stations, establishment of regional collaborations for practical demonstration and case studies, and attraction and retention of researchers, agronomists and adoption officers with on-ground sugarcane knowledge and networks.

Chinders grower and harvesting contractor Michael Russo harvests about 105,000 tonnes of cane each year using best practice strategies.

“Some of the main changes have been slowing our ground speed down, changing the parameters on our primary extractor fan and slowing the fan down to suit different field conditions,” Michael said.

“The has resulted in much better quality of cane supply going to the mill. For the grower it represents more profit because there’s less wastage in the field.”

Michael said the changes had resulted in better yields, higher CCS and better ratoonability.

Michael Russo

Key Performance Indicators

<table>
<thead>
<tr>
<th>Key Performance Indicators</th>
<th>Milestones for 2019/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFA4/PI1 Positive input-output efficiency ratios resulting from adoption of new technology and practices</td>
<td>Case studies demonstrating research yielding improved farming input-output efficiencies.</td>
</tr>
<tr>
<td>KFA4/PI2 Industry engagement continues regarding demonstration of harvesting best practice.</td>
<td>20 harvesting best practice trials completed with emphasis on Central and Burdekin regions.</td>
</tr>
</tbody>
</table>

Priorities for 2019/20
- Continue irrigation efficiency research and develop resources to assist growers to reduce energy costs.
- Assess methods by which farming systems can be improved to achieve increased productivity, profitability and sustainability.
- Maintain industry focus on the reduction of losses during the harvest process to maximise returns to the whole value chain.

Forecasts 2019/20 Investment Budget – $1.3M

Outcomes for 2019/20
- Water management: improve irrigation and water management.
- Harvesting systems and cane cleaning: improve technology and identify and demonstrate harvesting best practice.
- Irrigation efficiency research and develop resources to assist growers to reduce energy costs.

Timeframe
- Dec-19
- Dec-19
- May-20
- May-20
- Jan-20
- Jan-20
- Ongoing
- Aug-19
- Sep-19
- Dec-19
- Mar-20
- Mar-20
- Jun-20

...
Key Focus Area 5 houses SRA’s investments pursuing greater milling process efficiency and utilisation, optimised cane quality and transport and improved sugar quality. The KFA includes SRA’s internal near infra-red (NIR) capability supporting Australian millers in the ongoing installation and calibration of Cane, Sugar and Bagasse Analysis Systems and adoption of laboratory and online NIR solutions. KFAs also includes SRA’s Small Milling Research Program providing a vehicle for targeted investment in small milling investor projects that develop a product, service or process that delivers tangible outputs with almost immediate outcomes within the sugar factory.

**Key Impacts**

**Profitability**
Increased profitability through reduced costs of production, improved market access due to high quality product and improved capital utilisation.

**Sustainability**
Enhanced sustainability through improved processing and energy efficiency and waste management strategies.

**Capability**
Improved capability of milling technicians and professionals through training, peer-learning and knowledge exchange.

**Organisational Excellence**
Enhanced organisational excellence through establishment of strong relationships and collaborations with milling technicians and professionals.

**Outcomes**
Optimised production, improved capital utilisation and waste minimisation

**Priorities**
Enhanced capability and new technology for improving processing and energy efficiency

**Forecast 2019/20 Investment Budget**
$1.9M

**Key Focus Area 5**
Milling efficiency and technology

**Industries**

**Priorities**

**Forecast for 2019/20**

**Profitability**

**KFA5:** Milling efficiency

**Milestones for 2019/20**

**Timeframe**

**KFA5/DEL1**
Industry represented Milling Program Steering Committee established to oversee development of a holistic milling RD&A investment program.
Jul-19

**KFA5/DEL2**
Recommendations on Milling Program presented to SRA Board for commissioning targeted research investment.
Dec-19

**KFA5/DEL3**
Report on novel methods to manage raw sugar quality.
Oct-19

**KFA5/DEL4**
Finalised analyses of effect of pan boiling techniques on sugar quality.
May-20

**KFA5/DEL5**
Provision of Cane NIR Systems (CAS), Bagasse NIR systems (BAS), Sugar NIR Systems (SAS) and Laboratory NIR solutions to Australian sugar factories.
Ongoing

**KFA5/DEL6**
NIR calibration development and maintenance for NIR installations in Australian sugar factories.
Ongoing

**KFA5/DEL7**
Established potential for NIR calibrations to estimate plant available nutrient levels in mill mud.
Jun-20

**KFA5/DEL8**
Data analysed from 2018 season factory trials of pan design and operation for low pressure vapour, and 2019 trials on four pans completed.
Oct-19

**KFA5/DEL9**
Computational fluid dynamics (CFD) models developed for batch pans in sugar factories.
Oct-19

**KFA5/DEL10**
Effect of evaporation operation on factory process streams, sucrose losses and acid formation during the 2018 season determined at four factories.
Dec-19

**KFA5/DEL11**
First-in factory performance measurements completed of tube coatings and tube materials, chosen for their resistance to erosion and corrosion, installed into boilers.
May-20

**KFA5/DEL12**
Understanding of the best noxious gas piping arrangement to produce condensate at pH above 6 from all vessels to minimise corrosion and minimise maintenance requirements.
May-20

**KFA5/DEL13**
Understanding of the effect of juvenile prt on the condensate pH levels in the evaporator train.
May-20

**KFA5/DEL14**
Recommendations on performance characteristics and key operational issues associated with installing, operating and maintaining falling film tube evaporators.
May-20

**KFA5/DEL15**
Recommendations on performance characteristics, operational issues and cost/benefits associated with fixed element crystallisers.
May-20

**KFA5/DEL16**
Best practice manual for the design, maintenance and operation of cleated belt intermediate carriers.
Jun-20

**KFA5/DEL17**
A theory of operation of shredder feed rolls and guidelines for their design and setting, which will be made available to all milling companies.
Jun-20

**KFA5/DEL18**
New technology to eliminate arcing of mill rollers.
Jun-20

**KFA5/DEL19**
Modules for high and low grade fusulating, sugar drying, and cooling crystalliser modules completed in the New Learning Management System for Australian mills.
Dec-19

**KFA5/KPI1**
Miller Performance rating for SRA.
60% of millers rate SRA’s performance ‘high’ to ‘very high’ (representing a 2% year-on-year increase towards an overall 10% improvement by 2022).

**KFA5/KPI2**
Miller satisfaction with SRA.
Average rating of 4 out of 5.
**KFA6: Product diversification and value addition**

Key Focus Area 6 comprises SRA’s product diversification and value addition portfolio. Investment in KFA6 encompasses the identification of new opportunities and uses for sugarcane, economic and market analysis of value-add opportunities and prioritisation of future industry diversification options. The focus area invests in the development of diversification and by-product revenue streams to safeguard enduring industry profitability and sustainability.

**Outcomes**
- Diversified revenue streams and product innovation

**Priorities**
- Prioritised diversification opportunities for further R&D activity or market analysis

**Key impacts**

- **Profitability**
  - Sustained industry profitability secured through diversified sugarcane and sugarcane by-product revenue streams and maximised value addition through product innovation.

- **Sustainability**
  - Enhanced sustainability of industry through diversified product streams, including alternative uses for sugarcane waste.

- **Capability**
  - Enhanced capability through access to expanded product and value add opportunities, as well as advanced technologies and modern processing and engineering methods.

- **Organisational excellence**
  - Enhanced organisational excellence through established effective processes to monitor and assess sugarcane industry diversification opportunities.

The topic of product diversification and value addition was a topic of discussion at the Industry Futures Forum in 2017. Mackay grower Joe Muscat attended the Futures Forum and said that the Australian industry needs to look at different end-products.

“Relying on one product is hard,” Mr Muscat said. “85 percent of what we produce in sugar goes into the world market and that is a very volatile market.

“We need to do more work on adding value to our commodity. With our input costs always increasing, we have to find ways to manage that and keep a profitable business. I see value adding as an opportunity going forward.”

**Outputs for 2019/20**

**Timeframe**

| KFA6/DE1 | Report on diversification options for Australian sugarcane industry finalised and communicated to growers and millers. | Jul-19 |
| KFA6/DE2 | Watching brief on market trends and diversification opportunities (including bio-fuels, plastics, animal feed, densified biomass) communicated to SRA investors. | Ongoing |
| KFA6/DE3 | Pilot-scale production of new feed ingredients for feeding trials in monogastric and ruminant animals. | Jun-19 |
**KFA7: Knowledge and technology transfer and adoption**

Key Focus Area 7 concentrates on the development and implementation of knowledge transfer and adoption strategies, processes and activities to ensure transfer of research outputs and translation into on-the-ground outcomes. The focus area houses SRA’s internal Adoption unit and a contestable research portfolio facilitating specific adoption activities, research to understand and improve knowledge transfer and projects to improve sugarcane farm business, risk management and decision making. KFA7 also encompasses SRA’s Communication unit and industry engagement through the delivery of timely and professional publications and other communication across several mediums.

### OUTCOMES

Targeted, measurable practice improvement through the increased uptake and implementation of new and existing technologies

### PRIORITIES

**INTEGRATED INTO PROGRAMS**

- Development of structures and strategies that identify industry needs, priorities and targeted solutions at regional and industry levels

### KEY IMPACTS

#### PROFITABILITY

- Increased profitability through improved efficiency and optimised production along the value chain.

#### SUSTAINABILITY

- Enhanced sustainability through increased uptake of technology and proven practices that improve natural resource health, reduce inputs and minimise waste.

#### CAPABILITY

- Increased capability through appropriate and timely knowledge transfer between researchers, industry and advisory sector.

#### ORGANISATIONAL EXCELLENCE

- Enhanced organisational excellence through communication processes and leveraged partnerships that ensure effective knowledge transfer and adoption.

**Herbert grower-contractor Darren Reinaudo said economics was a core driver of current farming and harvesting practices and growers need hard data from local field trials to determine whether there were financial benefits to changing practices.**

> “When making the decision to change or improve practices, we need to measure the difference between the existing practice and the recommended practice to understand whether the benefits in one area outweigh the costs in another,” Mr Reinaudo said.

> “We’ve participated in a SRA harvesting trial and we’re looking forward to working through the economic analysis from that trial. If the data demonstrates that there’s a better way, it’s important we all work together to improve our situation.”

### KEY PERFORMANCE INDICATORS

<table>
<thead>
<tr>
<th>KEY PERFORMANCE INDICATORS</th>
<th>MILESTONES FOR 2019/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFA7/KPI5 Average grower and miller satisfaction with SRA adoption and communication activities rating of 4 out of 5, achieved by 2022.</td>
<td>Increase on previous year result towards target of 4 out of 5.</td>
</tr>
<tr>
<td>KFA7/KPI6 Improved industry adoption outcomes through implementation of the Strategy for Industry Led Adoption Activities.</td>
<td>Industry and regional priority adoption projects identified, developed and implemented.</td>
</tr>
</tbody>
</table>

### PREFERENCES FOR 2019/20

- Continue implementation of the Strategy for Industry Led Adoption Activities in the Sugar Industry (the Adoption Strategy) and accelerated application of technologies and practices which lead to targeted and measurable practice change.

- Develop and implement effective extension, education and training initiatives to support adoption of SRA’s R&D outputs.

### OUTPUTS FOR 2019/20

- Knowledge transfer and adoption: establish a contemporary strategy and regionally-based partnerships to promote awareness and uptake of new research knowledge and technology.

- Industry-supported and regionally-tailored strategies and plans for collaborative facilitation of technology transfer and practice change.

- Regionally-tailored project-based activities that upskill growers, millers, advisors and other relevant stakeholders, utilizing a range of methods, including in-person, electronic and web-based activities, along with field trials and demonstrations of new technology and practices across regions.

- Coordination, facilitation and support of project-based activities designed to deliver targeted and measurable practice change to enhance industry productivity, profitability and sustainability.

- Adoption activity and practice change monitoring and evaluation framework to measure and assess the impact of SRA’s adoption activity and research outcomes for growers and millers.

- Delivery of timely communication material across multiple mediums to industry, including CaneConnection and Milling Matters publications, e-newsletters and CaneClips videos.

- Maintain availability with accessibility to research reports, papers and research literature.

- Completion of annual Grower and Miller Surveys.

- Publication and promotion of evidence-based case studies, impact assessments, evaluations and performance reports.

- Platform for growers, researchers and extension advisors to agree on and test potential solutions to better match herbicide, pesticide and nutrient application to growers’ specific requirements and monitor associated impacts on water quality in multiple priority catchments of the Great Barrier Reef.

- Evaluation of improvement in pesticide application and management by growers that is attributable to project activities.

- Productivity drivers identified for three milling entities.

**FORECAST 2019/20 INVESTMENT BUDGET – $6.3M**

**KFA7/DEL1 Industry-supported and regionally-tailored strategies and plans for collaborative facilitation of technology transfer and practice change.**

**KFA7/DEL2 Regionally-tailored project-based activities that upskill growers, millers, advisors and other relevant stakeholders, utilizing a range of methods, including in-person, electronic and web-based activities, along with field trials and demonstrations of new technology and practices across regions.**

**KFA7/DEL3 Coordination, facilitation and support of project-based activities designed to deliver targeted and measurable practice change to enhance industry productivity, profitability and sustainability.**

**KFA7/DEL4 Site of technical resources that assist the extension and advisory sector to work with growers and millers to enhance productivity, profitability and sustainability.**

**KFA7/DEL5 Adoption activity and practice change monitoring and evaluation framework to measure and assess the impact of SRA’s adoption activity and research outcomes for growers and millers.**

**KFA7/DEL6 Delivery of timely communication material across multiple mediums to industry, including CaneConnection and Milling Matters publications, e-newsletters and CaneClips videos.**

**KFA7/DEL7 Maintain availability with accessibility to research reports, papers and research literature.**

**KFA7/DEL8 Completion of annual Grower and Miller Surveys.**

**KFA7/DEL9 Publication and promotion of evidence-based case studies, impact assessments, evaluations and performance reports.**

**KFA7/DEL10 Platform for growers, researchers and extension advisors to agree on and test potential solutions to better match herbicide, pesticide and nutrient application to growers’ specific requirements and monitor associated impacts on water quality in multiple priority catchments of the Great Barrier Reef.**

**KFA7/DEL11 Evaluation of improvement in pesticide application and management by growers that is attributable to project activities.**

**KFA7/DEL12 Productivity drivers identified for three milling entities.**

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**Darren Reinaudo**

**Herbert grower-contractor**

[Note: The image contains a table with milestones for 2019/20, highlighting various key performance indicators and their associated milestones.]
Key Focus Area 8 covers SRA’s efforts and investment towards ensuring the Australian sugarcane industry is highly skilled and is supported by a research workforce with the knowledge, capability and capacity to meet current and future industry needs. Through KFA8, SRA also actively invests in ‘industry good’ collaborative initiatives, such as social and scientific research into social licence to operate and trade policy, and cross-sectoral collaborations to leverage knowledge and resources, and extend SRA’s capacity to deliver value to industry and government investors.

**OUTCOMES**
Enhanced industry and research capability and capacity.

**PRIORITIES**
Leveraged industry, government and research partnerships and enhanced human capability programs

**KEY IMPACTS**

**PROFITABILITY**
Increased profitability through accelerated innovation resulting from enhanced industry and research capability and capacity.

**SUSTAINABILITY**
Maintained social licence to operate and delivered environmental and social benefits through leveraged investments in cutting-edge cross-sectoral and collaborative RD&A.

**CAPABILITY**
Increased researcher and industry capability through leveraged expertise and resources and appropriate and timely learning and development programs.

**ORGANISATIONAL EXCELLENCE**
Enhanced organisational excellence through proactive engagement and collaboration in researcher, industry and cross-sectoral skill development, innovation and networks.

**KFA8: Collaboration and capability development**

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The Next Crop program is a new investment by SRA in industry leadership and capability, starting for the first time in 2019. Through Next Crop, participants undertake a range of leadership and development activities.

Burdekin grower Chris Lyne has been one of nine participants in the program and said he was excited to take part.

“The future of the sugar industry depends on strong leadership at a range of levels, and this program is an opportunity to develop these critical skills,” Mr Lyne said.

“It is a chance to learn with other growers from across the industry and bring our new skills back to our respective regions.”

To learn more, visit nextcropleaders.com.

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**KEY PERFORMANCE INDICATORS**

**MILESTONES FOR 2019/20**

<table>
<thead>
<tr>
<th>KEY PERFORMANCE INDICATORS</th>
<th>MILESTONES FOR 2019/20</th>
<th>TIMEFRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFA8/KPI1 SRA participation and investment in relevant collaborative and cross-sectoral programs.</td>
<td>Demonstrated contribution and support in 2019/20.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>KFA8/KPI2 Maintain a minimum of four postgraduate scholarships and two research awards each year.</td>
<td>At least four scholarships awarded in 2019/20.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>KFA8/KPI3 At least two short-term placements per annum of students and/or professionals in research or industry positions for industry exposure.</td>
<td>At least two placements in 2019/20.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>FORECAST 2019/20 INVESTMENT BUDGET – $1.9M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**PRIORITIES FOR 2019/20**

- Foster, strengthen and extend RD&A partnerships, collaborations and networks to leverage investment, multi-disciplinary capability and multi-institutional resources, and deliver valued impacts for SRA’s investors.
- Support industry good collaborative social and scientific research aimed at revitalising the Australian sugarcane industry, maintaining the industry’s social licence to operate and maintaining the industry’s competitive position in the world sugar market.
- Continue to build capacity in the sugarcane industry by providing Sugar Industry Research Awards, Postgraduate Research Scholarships, Travel and Learning Awards, and leadership and capability development programs.

**OUTCOMES FOR 2019/20**

- Industry good collaboration.
- Economic model delivered and first simulation runs to underpin trade strategies and market access initiatives. Jun-20
- Continued implementation and management of the National Sugarcane Industry RD&E Strategy. Ongoing
- Sugar Milling R&D Capability Building Program active at the Queensland University of Technology (QUT) to develop and enhance long-term milling industry capability and three capability appointments made. Ongoing
- Innovation Catalyst awards providing seed-funding to researchers to discover novel solutions or leads for future funding activity and develop innovative research skill sets. Ongoing
- Review of Next Crop sugarcane industry leadership program. Jun-20
Key Focus Area 9 covers SRA’s RD&A investment management and corporate functions and aims to ensure SRA’s strategic and investment framework, governance processes and fiscal, resource and asset management systems and processes can effectively support the delivery of an RD&A investment portfolio that delivers validated impact and returns on investment.

KFA9 includes initiatives to strengthen organisational effectiveness and drive internal operations towards excellence through the ongoing enhancement of SRA’s values-based culture and performance-centric processes and systems, with a particular focus on improving investment decision-making and securing financial sustainability with a highly skilled, innovative and engaged workforce.

To improve workplace health and safety, and staff engagement, SRA has transitioned to a “Safety 2” culture. This shift in SRA’s approach to safety harnesses the expertise of our people. A Safety 2 culture focuses on being curious about the work we do, engaging with staff, and celebrating when things go well. SRA is committed to understanding the challenges and opportunities its teams face to ensure that staff are fully engaged in safety. This initiative is being led internally by Leader for Health, Safety and Environment, Ms Anne-Louise Slack.

Objectives:
- Monitor and report on RD&A performance and the extent to which investor priorities are addressed and impact is delivered.
- Facilitate access for our researchers to world-class technologies, capabilities and services that will drive innovation and transformational change.
- Provide a safe working environment and transition to a Safety 2 culture focused on harnessing staff engagement to drive safety.
- Develop and maintain an adaptable, skilled and satisfied workforce with a constructive organisational culture.
- Achieve a sustainable financial position with strong financial oversight and stewardship.
- Ensure effective governance and compliance with legislative and statutory funding requirements.
- Apply appropriate technology and information systems that enhance service delivery.

OUTCOMES
- Increased investor satisfaction and returns on investment
- Improved operational efficiency
- Enhanced organisational excellence
- Improved employee engagement
- Enhanced research quality and impact
- Improved research and development outcomes
- Improved organisational culture
- Improved stakeholder engagement
- Improved environmental sustainability
- Improved financial sustainability
- Improved asset management
- Improved waste management
- Improved resource management
- Improved fiscal management
- Improved legal compliance
- Improved risk management

PRIORITIES
- Enhanced RD&A investment strategies and program logic framework developed, monitored and reviewed. Jun-20
- Targeted RD&A investment strategies and program logic framework developed, monitored and reviewed. Jun-20
- Enhanced Stakeholder Engagement Framework and ongoing investor consultation, including regular scheduled meetings, face-to-face and virtual meetings. Ongoing
- Independent Performance Review process commenced. Apr-20
- Culture: embed investor-centric and performance-driven values and culture across SRA. Ongoing
- Culture: embed investor-centric and performance-driven values and culture across SRA. Jun-20
- Culture: embed investor-centric and performance-driven values and culture across SRA. Jun-20
- Continued transition to a Safety 2 culture with enhanced worker safety, wellbeing, physical security and worker engagement and participation, and aligned to SRA’s cultural transformation program. Ongoing
- Continued transition to a Safety 2 culture with enhanced worker safety, wellbeing, physical security and worker engagement and participation, and aligned to SRA’s cultural transformation program. Ongoing
- Enhanced organisational excellence through an RD&A investment portfolio aligned with investor priorities and supported by robust and responsive corporate and governance systems, with highest level of organisational probity, integrity and compliance.
- Enhanced organisational excellence through an RD&A investment portfolio aligned with investor priorities and supported by robust and responsive corporate and governance systems, with highest level of organisational probity, integrity and compliance.

SUGAR RESEARCH AUSTRALIA LIMITED ANNUAL OPERATIONAL PLAN 2019-2020
| KFA9/DEL15 | Workplace health, safety and environmental management, framework and system improvements, reporting and support services. | Ongoing |
| KFA9/DEL16 | People management planning and appraisal, including: leadership development and succession plans; employee performance plans and Executive mid-year performance appraisals; and benchmarking of employee remuneration and entitlements. | Employee performance plans: Jul-19; Mid-year Executive performance appraisals: Dec-19 |
| KFA9/DEL17 | Human Resources (HR) Strategy that will drive a people, leadership and performance focused culture. | Dec-19 |
| KFA9/DEL18 | Review and enhancement of recruitment and HR policies, systems and processes and contemporary best practice performance management and remuneration and reward processes, to support our people and position SRA as an employer of choice. | Dec-19 |
| KFA9/DEL19 | Continued implementation of professional development program. | Jun-19 |
| KFA9/DEL20 | Review and enhancement of recruitment and HR policies, systems and processes and contemporary best practice performance management and remuneration and reward processes, to support our people and position SRA as an employer of choice. | Dec-19 |
| KFA9/DEL21 | New or enhanced business opportunities, partnerships, commercial arrangements and/or alternative funding sources. | Ongoing |
| KFA9/DEL22 | Leveraged alternative funding sources and opportunities. | Ongoing |
| KFA9/DEL23 | Continued deployment of contemporary and compliant finance, treasury management, payroll, governance and operational strategies, management plans, processes, performance, control and reporting systems. | Ongoing |
| KFA9/DEL24 | Review of fixed assets and cost optimisation opportunities. | Jun-19 |
| KFA9/DEL25 | RD&A investment framework, including: project calls and assessment; direct commissioning of projects; portfolio management; systemic portfolio analysis; project and program evaluations and cost-benefit analyses; and portfolio reporting. | Ongoing |
| KFA9/DEL26 | Best practice governance processes and reporting. | Ongoing |
| KFA9/DEL27 | Review and enhancement of SRA’s Compliance Framework, including Compliance Register and Compliance Calendar, linked to SRA’s Risk Management Framework, and allocation of roles and responsibilities to key personnel in specific business areas to be charged with responsibility for compliance. | Sep-19 |
| KFA9/DEL28 | Board and Executive oversight, review and approval of policies consistent with the company’s Strategic Plan and governance arrangements. | Ongoing |
| KFA9/DEL29 | Review and enhancement of SRA’s Risk Management Framework, including strategic and operational risk registers. | Dec-19 |
| KFA9/DEL30 | Delivery of assurance and risk mitigation through execution of independently scrutinised, internal audit reviews. Two to four internal audit reviews performed annually, as prioritised based on ongoing assessment of key strategic risks. | Research Funding Acquisitions Internal Audit Final Report: Aug-19; 2019/20 Internal Audit Program set: Sep-19 |
| KFA9/DEL31 | Levy Payer Register established in collaboration with the Commonwealth Department of Agriculture. | Levy payer register established: Jul-19 |
| KFA9/DEL32 | IP management system for identification and ongoing management of current and future IP generated through SRA’s RD&A portfolio. | Ongoing |
| KFA9/DEL33 | Asset management planning and systems, including: review of fixed assets and cost options; maintenance, refurbishment or redevelopment of facilities; best-practice certification for research station and farm management. | Ongoing |
| KFA9/DEL34 | IP management system for identification and ongoing management of current and future IP generated through SRA’s RD&A portfolio. | Ongoing |
| KFA9/DEL35 | Asset management planning and systems, including: review of fixed assets and cost options; maintenance, refurbishment or redevelopment of facilities; best-practice certification for research station and farm management. | Ongoing |
| KFA9/DEL34 | Redevelopment, launch and maintenance of breeding program database SPIDNET. | Launched: Nov-19 |
| KFA9/DEL35 | Information technology (IT) Strategy is finalised and a staged implementation plan developed for priority areas for system enhancement, capital investment and continual system improvement, including platforms that support SRA activities through enhanced integrated software and hardware; faster network; migration to cloud technology; enhanced data management; sharing, storage and security, and enhanced IT service delivery. | Cloud based data hosting and storage solution: Dec-19; Investigate and implement potential SRA network improvements: Mar-20 |
5. INCOME AND EXPENDITURE FORECAST

FORECAST FINANCIAL POSITION
SRA’s current RD&A investment portfolio is structured to meet our investor priorities and expectations with respect to delivering valued benefits and maximised return on investment. To deliver on this portfolio and achieve the planned outcomes, SRA’s operating expenditure is expected to be greater than our operating income, with a forecast deficit in 2019/20 of $3.1m. The downturn in operating income is due to a range of factors, including forecast reduction in Australian sugarcane production and a sustained negative outlook for world sugar prices. SRA will utilise accumulated financial reserves to fund our RD&A investment and activities for 2019/20, whilst SRA’s Board and Management will continue to implement strategies to work towards a balanced budget and ensure ongoing financial sustainability. A summary of SRA’s Board-approved forecast income and expenditure for 2019/20 is provided in Table 1.

SRA reviews income and expenditure on a monthly basis and undertakes a re-forecasting exercise every quarter of the year to account for changes in SRA’s operating environment and to enable flexibility to respond to immediate and/or emerging challenges and opportunities.

INVESTMENT ACROSS KFAS
Figure 4 details the expenditure allocation across the KFAs. Reflective of investor expectations with respect to SRA’s RD&A investment, and in line with SRA’s Strategic Plan, the majority of investment lies within our plant breeding program under KFA1.

Attachment 2 provides a breakdown of KFA expenditure by projects.

TABLE 1: FORECAST INCOME AND EXPENDITURE 2019/20

<table>
<thead>
<tr>
<th>OPERATING INCOME</th>
<th>2019/19 ($K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Investment</td>
<td>22,120</td>
</tr>
<tr>
<td>Commonwealth co-investment</td>
<td>6,393</td>
</tr>
<tr>
<td>Queensland Government co-investment</td>
<td>3,019</td>
</tr>
<tr>
<td>Collaboration/Service Fee income</td>
<td>7,253</td>
</tr>
<tr>
<td>Interest</td>
<td>850</td>
</tr>
<tr>
<td>Other</td>
<td>840</td>
</tr>
<tr>
<td>Operating income total</td>
<td>40,463</td>
</tr>
<tr>
<td>R&amp;D</td>
<td></td>
</tr>
<tr>
<td>R&amp;D contestable - externally won</td>
<td>8,341</td>
</tr>
<tr>
<td>R&amp;D contestable - internally won</td>
<td>5,790</td>
</tr>
<tr>
<td>R&amp;D internal core</td>
<td>11,974</td>
</tr>
<tr>
<td>Industrial contract research</td>
<td>2,858</td>
</tr>
<tr>
<td>Research Adoption</td>
<td>5,765</td>
</tr>
<tr>
<td>R&amp;D-operational support</td>
<td>4,790</td>
</tr>
<tr>
<td>R&amp;D expenditure total</td>
<td>39,518</td>
</tr>
<tr>
<td>Corporate</td>
<td></td>
</tr>
<tr>
<td>Board and investor relations</td>
<td>1,100</td>
</tr>
<tr>
<td>Corporate support</td>
<td>2,908</td>
</tr>
<tr>
<td>Corporate total</td>
<td>6,008</td>
</tr>
<tr>
<td>Operating expenditure total</td>
<td>43,527</td>
</tr>
<tr>
<td>SRA operating result for the year</td>
<td>($3,063)</td>
</tr>
</tbody>
</table>

SRA RD&A Investment and organisational expenditure

<table>
<thead>
<tr>
<th>KFA</th>
<th>MILLION*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFA1 / OPTIMALLY ADAPTED VARIETIES, PLANT BREEDING AND RELEASE</td>
<td>$13.0M</td>
</tr>
<tr>
<td>KFA2 / SOIL HEALTH, NUTRIENT MANAGEMENT AND ENVIRONMENTAL SUSTAINABILITY</td>
<td>$4.9M</td>
</tr>
<tr>
<td>KFA3 / PEST, DISEASE AND WEED MANAGEMENT</td>
<td>$4.2M</td>
</tr>
<tr>
<td>KFA4 / FARMING SYSTEMS AND HARVESTING</td>
<td>$1.3M</td>
</tr>
<tr>
<td>KFA5 / MILLING EFFICIENCY AND TECHNOLOGY</td>
<td>$1.9M</td>
</tr>
<tr>
<td>KFA6 / PRODUCT DIVERSIFICATION AND VALUE ADDITION</td>
<td>$1.2M</td>
</tr>
<tr>
<td>KFA7 / KNOWLEDGE AND TECHNOLOGY TRANSFER AND ADOPTION</td>
<td>$6.3M</td>
</tr>
<tr>
<td>KFA8 / COLLABORATION AND CAPABILITY DEVELOPMENT</td>
<td>$1.9M</td>
</tr>
<tr>
<td>RD&amp;A Expenditure</td>
<td>$34.7M</td>
</tr>
<tr>
<td>KFA9 / ORGANISATIONAL EFFECTIVENESS</td>
<td>$8.8M</td>
</tr>
<tr>
<td>Total expenditure</td>
<td>$43.5M</td>
</tr>
</tbody>
</table>

*Numbers are rounded.

Assumes crop production of 31.6 million tonnes for 2019 season.
* Commonwealth co-investment made under the 2017-2022 R&D Funding Contract between SRA and the Commonwealth Government, administered by the Department of Agriculture.
+ Includes $2.85m Department of Agriculture and Fisheries contribution and $259k Department of Environment and Science Nitrogen collaborative project income.
+ Includes SRA RD&A Investment for Non RD&A Programmes.
+ Includes $1.36m from Rural R&D for Profit Programme.
+ Includes milestones in current year that complete in following year.
+ Includes operational plant breeding, biosecurity and plant health.
+ Research adoption includes adoption and communications.
+ Includes research funding management, research stations and resources, and research KFA management.
+ Includes Finance, IT, HR, Library and IP.

INCOME AND EXPENDITURE FORECAST

FIGURE 4: EXPENDITURE ACROSS KFAs

RD&A and organisational investment allocation 2019/20
SRA is committed to ensuring it invests, manages and participates in a balanced portfolio of RD&A activities that is appropriate to meeting investor needs and providing an attractive return on investment.

To achieve an optimally-balanced investment portfolio, SRA will undertake to:

• Align RD&A investment with industry and government investor priorities at both regional and industry levels;
• Invest in short, medium and long-term projects across the research pipeline;
• Address current gaps in the existing portfolio in terms of delivering on the objectives of SRA’s Strategic Plan;
• Appropriately manage RD&A risk-profile, with a combination of low-risk projects targeting incremental improvements and higher-risk transformational projects;
• Leverage investment through partnerships and collaborations; and
• Maximise return for our investors through increased adoption and practice change.

SRA’s RD&A portfolio comprises both core and contestable RD&A projects. The core projects are undertaken internally by SRA and include plant breeding, biosecurity and adoption activities. The contestable projects are undertaken by both SRA and external providers and cover the gamut of SRA’s KFAs.

SRA’s independent skills-based Research Funding Panel (RFP) and Research Funding Unit (RFU) manage the contestable research investment process and associated review and evaluation of investment projects. The primary objective of the RFP is to ensure transparent, independent and robust review of all RD&A project investment from SRA’s contestable pool of industry and government investment funds.

Research projects are ranked by the RFP, using an Attractiveness/Feasibility process which has been designed to assess the magnitude of potential benefits, taking into account the likely adoption of the project outcomes or innovations (Attractiveness) and the prospects of the project delivering them (Feasibility). Attractiveness is assessed using an input-output-outcome-impact analysis of the project proposals, whilst Feasibility is assessed by considering research risk and quality, using peer assessment and RFP expertise. In 2019/20, the RFP will be implementing an improved investment framework that will incorporate econometric modelling to inform investment decision-making.

The RFP and RFU also undertake a portfolio gap analysis annually to assess progress of the RD&A portfolio against SRA’s Strategic Plan objectives and key outcomes and identify research and strategy gaps to be addressed through targeted investment calls and/or commissioned research.

SRA also has an established Risk Management Framework, including a Risk Management Policy and Risk Appetite Statement approved by the Board and reviewed annually. The Risk Appetite Statement outlines the type of risk and associated risk tolerance that SRA is willing to take in order to meet its strategic objectives. SRA’s current Risk Appetite Statement states that “SRA seeks to balance the risk position between: investing in transformational and step change activities that may provide high impact benefits to the Australian sugarcane industry; and the need to remain a viable organisation with the capacity to continue to work for our members long into the future”.

To ensure SRA continues to provide a balanced portfolio that meets investor needs and expectations, SRA engages and consults on a regular basis with industry and government investors, industry representative bodies and regionally-based advisory groups and committees to identify RD&A priorities – at both a regional and whole-of-industry level – and report on the performance of SRA’s RD&A investment portfolio in terms of outputs, outcomes and return on investment being delivered.
# Alignment of SRA’s KFAS to Industry and Government Priorities

## Stakeholder Priorities

<table>
<thead>
<tr>
<th>National Sugar Industry RD&amp;E Strategy – Themes 44</th>
<th>SRA Key Focus Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Productive uses for sugarcane</td>
<td>1. Optimal Adapted Varieties, Plant Breeding and Release</td>
</tr>
<tr>
<td>2. Productivity: Achieving significant productivity gains and increasing adoption</td>
<td>2. Disease and Weed Management</td>
</tr>
<tr>
<td>4. People: Building the capability of industry and research</td>
<td>4. Value and Technology Value Addition</td>
</tr>
<tr>
<td>National Science and Research Priorities 44</td>
<td>5. Innovation and Technology Transfer and Adoption</td>
</tr>
<tr>
<td>1. Advanced technology</td>
<td>6. Collaboration and Capability Development</td>
</tr>
<tr>
<td>2. Soil and water</td>
<td>7. Organisational Effectiveness</td>
</tr>
<tr>
<td>3. Cybersecurity</td>
<td></td>
</tr>
<tr>
<td>4. Energy</td>
<td></td>
</tr>
<tr>
<td>5. Resources</td>
<td></td>
</tr>
<tr>
<td>6. Resources</td>
<td></td>
</tr>
<tr>
<td>7. Advanced manufacturing</td>
<td></td>
</tr>
<tr>
<td>8. Environmental change</td>
<td></td>
</tr>
<tr>
<td>9. Health</td>
<td></td>
</tr>
<tr>
<td>Rural RD&amp;E Priorities 44</td>
<td></td>
</tr>
<tr>
<td>1. Advanced technology</td>
<td></td>
</tr>
<tr>
<td>2. Biosecurity</td>
<td></td>
</tr>
<tr>
<td>3. Soil, water and managing natural resources</td>
<td></td>
</tr>
<tr>
<td>4. Adoption of R&amp;D</td>
<td></td>
</tr>
<tr>
<td>Queensland Department of Agriculture and Fisheries – Themes Areas for Sugar Research Investment 44</td>
<td></td>
</tr>
<tr>
<td>1. Sugarcane Improvement – to improve productivity, quality and production efficiency</td>
<td></td>
</tr>
<tr>
<td>2. Sugarcane plant protection</td>
<td></td>
</tr>
<tr>
<td>3. Farming Systems broad acre dry land and irrigated, and mixed crop farming systems in Queensland</td>
<td></td>
</tr>
<tr>
<td>4. Soil health</td>
<td></td>
</tr>
<tr>
<td>5. New market opportunities and processes</td>
<td></td>
</tr>
<tr>
<td>6. Agri-intelligent systems</td>
<td></td>
</tr>
<tr>
<td>7. Breaking barriers to adoption</td>
<td></td>
</tr>
</tbody>
</table>

## Alignment of SRA’s KFAS to Industry and Government Priorities

<table>
<thead>
<tr>
<th>SRA Key Focus Areas</th>
<th>STAKEHOLDER PRIORITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Disease and Weed Management</td>
<td></td>
</tr>
<tr>
<td>3. Farming Systems and Harvesting</td>
<td></td>
</tr>
<tr>
<td>4. Value and Technology Value Addition</td>
<td></td>
</tr>
<tr>
<td>5. Innovation and Technology Transfer and Adoption</td>
<td></td>
</tr>
<tr>
<td>6. Collaboration and Capability Development</td>
<td></td>
</tr>
<tr>
<td>7. Organisational Effectiveness</td>
<td></td>
</tr>
</tbody>
</table>

## Project Portfolio and Investment by KFA

The following project type classifications are used within SRA’s investment portfolio:

- C SRA – R&D contestable - internally won;
- C Ext – R&D contestable - externally won;
- CRP – collaborative research project;
- SRA – R&D internal core and corporate support projects.

### KFA1: Optimally-Adapted Varieties, Plant Breeding and Release

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>20150052</td>
<td>Australian support of the International Consortium for Sugarcane.</td>
<td>C Ext</td>
<td>29</td>
</tr>
<tr>
<td>2013022</td>
<td>Exploiting introgression for the development of productive and regionally adapted varieties for New South Wales.</td>
<td>CRP</td>
<td>48</td>
</tr>
<tr>
<td>2015016</td>
<td>Leaf sucrose: the link to diseases such as YCS and enhancement of sugarcane productivity.</td>
<td>C SRA</td>
<td>320</td>
</tr>
<tr>
<td>2016028</td>
<td>Improving early stage selection of SRA breeding program by indirect selection of plant vigour.</td>
<td>C SRA</td>
<td>45</td>
</tr>
<tr>
<td>2016032</td>
<td>Optimising productivity, variety recommendations and mill operations through analysis of mill data.</td>
<td>C SRA</td>
<td>304</td>
</tr>
<tr>
<td>2018004</td>
<td>Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits.</td>
<td>CRP</td>
<td>358</td>
</tr>
<tr>
<td>2018005</td>
<td>Compendium of sugarcane traits and their associated genes.</td>
<td>C Ext</td>
<td>10</td>
</tr>
<tr>
<td>2018006</td>
<td>Validating root system traits for enhanced nutrient capture in challenging environments.</td>
<td>C Ext</td>
<td>248</td>
</tr>
<tr>
<td>2018007</td>
<td>Impact of stool architecture on ratooning: extending current trial to four ratoons to strengthen correlations.</td>
<td>C Ext</td>
<td>127</td>
</tr>
<tr>
<td>2018008</td>
<td>Genetic analysis and marker delivery for sugarcane breeding.</td>
<td>C SRA</td>
<td>377</td>
</tr>
<tr>
<td>2018106</td>
<td>Selecting high value chromosomes from Saccharum species – extension to 2015026.</td>
<td>C Ext</td>
<td>251</td>
</tr>
<tr>
<td>2018104</td>
<td>Genetic analysis and marker delivery.</td>
<td>CRP</td>
<td>86</td>
</tr>
<tr>
<td>2019001</td>
<td>N/A</td>
<td>C SRA</td>
<td>222</td>
</tr>
<tr>
<td>2019002</td>
<td>Validating high throughput phenomics technologies for sugarcane clonal selection.</td>
<td>C SRA</td>
<td>270</td>
</tr>
<tr>
<td>2018001</td>
<td>Seed-based in vitro propagation of crossing progenies for rapid evaluation.</td>
<td>SRA</td>
<td>657</td>
</tr>
<tr>
<td>2018002</td>
<td>Plant breeding – core selection.</td>
<td>SRA</td>
<td>38</td>
</tr>
<tr>
<td>2018003</td>
<td>PLANNTH / PLANNSW / PLANBKN / INNOV7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018004</td>
<td>PLANSTH / BIOMOD / BIODWFD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### KFA1: Optimally-Adapted Varieties, Plant Breeding and Release (continued)

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANCRO</td>
<td>Plant breeding – crossing.</td>
<td>SRA</td>
<td>640</td>
</tr>
<tr>
<td>PLANDNA</td>
<td>Molecular Selection.</td>
<td>SRA</td>
<td>331</td>
</tr>
<tr>
<td>PLANGEN</td>
<td>Plant breeding – introgression.</td>
<td>SRA</td>
<td>351</td>
</tr>
<tr>
<td>PLANINT</td>
<td>Plant breeding – integrated database and crossing systems.</td>
<td>SRA</td>
<td>133</td>
</tr>
<tr>
<td>PLANLAB</td>
<td>Laboratory.</td>
<td>SRA</td>
<td>49</td>
</tr>
<tr>
<td>PLANKIN</td>
<td>Breeding management.</td>
<td>SRA</td>
<td>530</td>
</tr>
<tr>
<td>PLANPBR</td>
<td>Plant Breeder’s Rights.</td>
<td>SRA</td>
<td>53</td>
</tr>
<tr>
<td>PLANCAN</td>
<td>QCANESelect® Support.</td>
<td>SRA</td>
<td>29</td>
</tr>
<tr>
<td>PLANLAB</td>
<td>Laboratory.</td>
<td>SRA</td>
<td>214</td>
</tr>
<tr>
<td>PLANVPD</td>
<td>Variety Propagation and Distribution.</td>
<td>SRA</td>
<td>697</td>
</tr>
</tbody>
</table>

Total Investment KFA1: 12,966

### KFA2: Soil Health, Nutrient Management and Environmental Sustainability

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015065</td>
<td>Improving nitrogen-use efficiency for sugarcane crops with constrained yield potential.</td>
<td>C SRA</td>
<td>63</td>
</tr>
<tr>
<td>2015907</td>
<td>More profit from nitrogen enhancing the nutrient use efficiency on intensive cropping and pasture systems.</td>
<td>C Ext</td>
<td>47</td>
</tr>
<tr>
<td>2016804</td>
<td>Complete nutrient management planning for cane farming.</td>
<td>CRP</td>
<td>9</td>
</tr>
<tr>
<td>2016805</td>
<td>Improved water quality outcomes from on-farm nitrogen management.</td>
<td>CRP</td>
<td>31</td>
</tr>
<tr>
<td>2016807</td>
<td>Reef Trust 4 – cane farmer trials of enhanced efficiency fertiliser in the catchments of the Great Barrier Reef.</td>
<td>CRP</td>
<td>1,398</td>
</tr>
<tr>
<td>2017004 / 2017805</td>
<td>SIX EASY STEPS – continuing perspectives in time and space.</td>
<td>CRP</td>
<td>1,087</td>
</tr>
<tr>
<td>2017005</td>
<td>Measuring soil health, setting benchmarks and driving practice change in the sugar industry.</td>
<td>C SRA</td>
<td>679</td>
</tr>
<tr>
<td>2017009</td>
<td>Unravelling the influence of climate and harvest time on nitrogen fertiliser requirements.</td>
<td>C SRA</td>
<td>384</td>
</tr>
<tr>
<td>2018003</td>
<td>Implementation of root system diagnostics to deliver a field-based measure for root health.</td>
<td>C Ext</td>
<td>247</td>
</tr>
<tr>
<td>2018007</td>
<td>Greenhouse gas emissions from sugarcane soils: strategies for increasing nitrogen use efficiency and reducing environmental pollution.</td>
<td>C Ext</td>
<td>282</td>
</tr>
<tr>
<td>2018008</td>
<td>Establishing sugarcane farming systems to improve soil health.</td>
<td>C SRA</td>
<td>288</td>
</tr>
<tr>
<td>2018013</td>
<td>SIX EASY STEPS Tool Box.</td>
<td>C SRA</td>
<td>146</td>
</tr>
</tbody>
</table>

Total Investment KFA2: 4,856

### KFA3: Pest, Disease and Weed Management

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014049</td>
<td>Solving YCS.</td>
<td>C SRA</td>
<td>622</td>
</tr>
<tr>
<td>2015804</td>
<td>Soldier fly management.</td>
<td>CRP</td>
<td>105</td>
</tr>
<tr>
<td>2015812</td>
<td>YCS screening.</td>
<td>CRP</td>
<td>7</td>
</tr>
<tr>
<td>2016003</td>
<td>Identifying new-generation insecticides for canegrub control as contingency for loss of amenity with the existing product.</td>
<td>C SRA</td>
<td>377</td>
</tr>
<tr>
<td>2016064 / 2016806</td>
<td>Investigation of biotic causes of YCS.</td>
<td>CRP</td>
<td>310</td>
</tr>
<tr>
<td>2017008</td>
<td>Keeping chemicals in their place – in the field.</td>
<td>C SRA</td>
<td>359</td>
</tr>
<tr>
<td>2017010</td>
<td>Delivering solutions for chlorotic streak disease.</td>
<td>C SRA</td>
<td>78</td>
</tr>
<tr>
<td>2017808</td>
<td>Feeding behaviour of Soldier Fly.</td>
<td>CRP</td>
<td>92</td>
</tr>
<tr>
<td>2017809</td>
<td>Modern diagnostics for a safer Australian sugar industry.</td>
<td>CRP</td>
<td>310</td>
</tr>
<tr>
<td>2017902</td>
<td>Improving plant pest management through cross-industry deployment of smart sensors, diagnostics and forecasting.</td>
<td>C Ext</td>
<td>205</td>
</tr>
<tr>
<td>2018009</td>
<td>Development of commercial molecular biological assays for improved sugarcane soil health and productivity.</td>
<td>C SRA</td>
<td>186</td>
</tr>
<tr>
<td>2018110</td>
<td>Moth Borers – how are we going to manage them when they arrive?</td>
<td>C SRA</td>
<td>140</td>
</tr>
<tr>
<td>2019003</td>
<td>Ratoon stunting disease (RSD) detection at the factory – disease detection blueprint.</td>
<td>C SRA</td>
<td>178</td>
</tr>
<tr>
<td>BI01802</td>
<td>Development for an improved commercial assay for ratoon stunting disease (RSD).</td>
<td>SRA</td>
<td>8</td>
</tr>
<tr>
<td>BIO1802 / BIO2802 / 201802</td>
<td>Biosecurity entomology.</td>
<td>SRA</td>
<td>22</td>
</tr>
<tr>
<td>BIO1804 / BIO2804 / 201804</td>
<td>Biosecurity pathology.</td>
<td>SRA</td>
<td>357</td>
</tr>
<tr>
<td>BIO1806 / BIO2806 / 201806</td>
<td>Quarantine pathology.</td>
<td>SRA</td>
<td>258</td>
</tr>
<tr>
<td>BI01808</td>
<td>RSD laboratory.</td>
<td>SRA</td>
<td>219</td>
</tr>
<tr>
<td>BIO2808</td>
<td>Soil pathogen laboratory.</td>
<td>SRA</td>
<td>393</td>
</tr>
<tr>
<td>INNOV13</td>
<td>Develop a methodology to screen cane varieties for their tolerance to pre-emergence herbicides.</td>
<td>SRA</td>
<td>16</td>
</tr>
<tr>
<td>INNOV14</td>
<td>Integrated solution for ‘on farm’ pathogen detection for sugarcane diseases.</td>
<td>SRA</td>
<td>14</td>
</tr>
<tr>
<td>INNOV15</td>
<td>Plant health management.</td>
<td>SRA</td>
<td>253</td>
</tr>
</tbody>
</table>

Total Investment KFA3: 4,200
### KFA4: Farming Systems and Harvesting

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014048</td>
<td>Increased harvest recovery: reducing sugar loss and stool damage.</td>
<td>C SRA</td>
<td>240</td>
</tr>
<tr>
<td>2015007</td>
<td>Assessment of new management strategies and varieties for marginal soils</td>
<td>C SRA</td>
<td>252</td>
</tr>
<tr>
<td>2016062</td>
<td>Remote sensing platform for precision agriculture.</td>
<td>C Ext</td>
<td>1.30</td>
</tr>
<tr>
<td>2016952</td>
<td>Understanding interactions between basestalks and other forward-feed components with the cane stalk, and determining practical strategies to minimise damage as harvester speed increases.</td>
<td>C Ext</td>
<td>295</td>
</tr>
<tr>
<td>2017012</td>
<td>Southern sugar solutions.</td>
<td>C Ext</td>
<td>1.62</td>
</tr>
<tr>
<td>2017014</td>
<td>Seeing is believing: managing soil variability, improving crop yield and minimising off-site impacts in sugarcane using digital soil mapping</td>
<td>C Ext</td>
<td>104</td>
</tr>
<tr>
<td>2019004</td>
<td>Harvest losses assessment by real-time Machine Vision Systems.</td>
<td>C Ext</td>
<td>61</td>
</tr>
<tr>
<td>AGROMGT</td>
<td>Agronomy Management.</td>
<td>SRA</td>
<td>28</td>
</tr>
<tr>
<td>INNOV8</td>
<td>Leveling paddocks while maintaining permanent beds.</td>
<td>SRA</td>
<td>22</td>
</tr>
</tbody>
</table>

Total Investment KFA4: 1,296

### KFA5: Milling Efficiency and Technology

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015013</td>
<td>Investigation into modifying pan boiling techniques to improve sugar quality.</td>
<td>C Ext</td>
<td>192</td>
</tr>
<tr>
<td>2016019</td>
<td>Developing online analysis systems to measure the available nutrients in mill mud.</td>
<td>C SRA</td>
<td>298</td>
</tr>
<tr>
<td>2016020</td>
<td>Reducing boiler maintenance costs and deferring capital expenditure through improved technology.</td>
<td>C Ext</td>
<td>19</td>
</tr>
<tr>
<td>2017006</td>
<td>Managing aspects of raw sugar quality in the Australian sugar industry – Part II.</td>
<td>C Ext</td>
<td>249</td>
</tr>
<tr>
<td>2017007</td>
<td>Investigations to mitigate the effects of sucrose degradation and acid formation in factory evaporators on sugar recovery and quality, corrosion and effluent loadings.</td>
<td>C Ext</td>
<td>131</td>
</tr>
<tr>
<td>2018012</td>
<td>Pan design and operational changes to suit Australian pan stages operating on low pressure vapour.</td>
<td>C Ext</td>
<td>1.89</td>
</tr>
<tr>
<td>2019005</td>
<td>Improved strategies to process soft canes.</td>
<td>C Ext</td>
<td>139</td>
</tr>
<tr>
<td>2019006</td>
<td>Australian Sugar Industry Training – Development of factory training modules – Phase 2.</td>
<td>C Ext</td>
<td>1.54</td>
</tr>
<tr>
<td>2019201</td>
<td>Falling film evaporators.</td>
<td>C Ext</td>
<td>50</td>
</tr>
<tr>
<td>2019202</td>
<td>Fixed element crystalliser.</td>
<td>C Ext</td>
<td>50</td>
</tr>
<tr>
<td>2019203</td>
<td>Cleated belts.</td>
<td>C Ext</td>
<td>29</td>
</tr>
<tr>
<td>2019204</td>
<td>Surgeing in shredders.</td>
<td>C Ext</td>
<td>19</td>
</tr>
<tr>
<td>NIODER</td>
<td>NIR at Meringa.</td>
<td>SRA</td>
<td>109</td>
</tr>
<tr>
<td>PLANRCS</td>
<td>CAS Service and Support.</td>
<td>SRA</td>
<td>304</td>
</tr>
</tbody>
</table>

Total Investment KFA5: 1,932

### KFA6: Product Diversification and Value Addition

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016001</td>
<td>Australian Research Council (ARC) linkage project: manipulation of carbon partitioning to enhance the value of sugarcane.</td>
<td>CRP</td>
<td>9</td>
</tr>
<tr>
<td>2019902</td>
<td>Beneficiaries for Profit – Phase 2.</td>
<td>C Ext</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Total Investment KFA6: 1,209

### KFA7: Knowledge and Technology Transfer and Adoption

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016002</td>
<td>Protecting our chemicals for the future through accelerated adoption of best management practices.</td>
<td>C SRA</td>
<td>289</td>
</tr>
<tr>
<td>2017011</td>
<td>Productivity improvements through energy innovation in the Australian sugar industry.</td>
<td>C Ext</td>
<td>180</td>
</tr>
<tr>
<td>2017810</td>
<td>Pathways to water quality improvements in the Myrtle Creek sub-catchment.</td>
<td>CRP</td>
<td>104</td>
</tr>
<tr>
<td>2018803</td>
<td>Case to Creek 2.0.</td>
<td>CRP</td>
<td>660</td>
</tr>
<tr>
<td>2018804</td>
<td>Pilot Agricultural Extension Work Placement Program.</td>
<td>CRP</td>
<td>22</td>
</tr>
<tr>
<td>COPAMGIR</td>
<td>SRA communications, marketing and graphic design.</td>
<td>SRA</td>
<td>643</td>
</tr>
<tr>
<td>EXCEPCL</td>
<td>Executive management – research adoption.</td>
<td>SRA</td>
<td>426</td>
</tr>
<tr>
<td>PREDOMM</td>
<td>Research adoption – non-project related.</td>
<td>SRA</td>
<td>4,054</td>
</tr>
</tbody>
</table>

Total Investment KFA7: 6,338

### KFA8: Collaboration and Capability Development

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>DESCRIPTION</th>
<th>PROJECT TYPE</th>
<th>2019/20 $K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007003</td>
<td>Collaboration, cross-sectoral and industry good investment.</td>
<td>C Ext</td>
<td>456</td>
</tr>
<tr>
<td>2019900</td>
<td>Contributions to Council of Rural Research and Development Corporations (CRRDC).</td>
<td>C Ext</td>
<td>30</td>
</tr>
<tr>
<td>2014200</td>
<td>Research workshops.</td>
<td>C SRA</td>
<td>433</td>
</tr>
<tr>
<td>2014201</td>
<td>Board approved uncontracted 2019/20 capability investment.</td>
<td>C Ext / SRA</td>
<td>254</td>
</tr>
<tr>
<td>2014401</td>
<td>PhD Scholarship: Combining controlled-release and nitrification inhibitor properties to deliver improved fertiliser nitrogen use efficiency in high-risk environments.</td>
<td>C Ext / SRA</td>
<td>30</td>
</tr>
<tr>
<td>2016102</td>
<td>PhD Scholarship: Development and modelling of novel controlled-release fertilisers for improved nutrient delivery.</td>
<td>C Ext</td>
<td>30</td>
</tr>
<tr>
<td>2017013</td>
<td>Integrated standardised competency based training for sugar milling operations.</td>
<td>C Ext</td>
<td>67</td>
</tr>
<tr>
<td>2017014</td>
<td>PhD Scholarship: Re-evaluating the biology of the sugarcane root system: new knowledge allows for assessment of production impacts and implications for yield decline.</td>
<td>C Ext</td>
<td>42</td>
</tr>
<tr>
<td>2017102</td>
<td>PhD Scholarship: Microwave sensors for sugarcane sugar analysis.</td>
<td>C Ext</td>
<td>30</td>
</tr>
<tr>
<td>2017402</td>
<td>Early Career/Mid-Career Research Award.</td>
<td>C SRA</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Investment KFA8: 2,763
### ATTACHMENT 3

#### ABBREVIATIONS AND ACRONYMS

- AOP: Annual Operational Plan
- ARC: Australian Research Council
- BAS: Bagasse NIR systems
- BoM: Bureau of Meteorology
- C Ext: R&D contestable - externally won
- C SRA: R&D contestable - internally won
- CAS: Cane NIR Systems
- CCS: Commercial cane sugar
- CEO: Chief Executive Officer
- CRC: Cooperative Research Centre
- CRP: Collaborative research project
- CRRDC: Council of Rural Research and Development Corporations
- CSIRO: Commonwealth Scientific and Industrial Research Organisation
- Cth: Commonwealth
- DNA: Deoxyribonucleic acid
- EEF: Enhanced efficiency fertiliser
- FAT: Final assessment trial
- GHG: Greenhouse gases
- HBP: Harvesting Best Practice
- HR: Human resources
- IP: Intellectual property
- IT: Information technology
- K: Thousand
- KFA: Key focus areas
- KPIs: Key performance indicators
- LSB: Leaf sheath biopsy
- M: Million
- MoU: Memorandum of Understanding
- NIR: Near infra-red
- NRM: Natural resource management
- NSW: New South Wales
- PNG: Papua New Guinea
- PBR: Plant Breeder's Rights
- PhD: Doctor of Philosophy
- PCR: Polymerase chain reaction
- qPCR: Quantitative polymerase chain reaction
- QLD: Queensland
- QUT: Queensland University of Technology
- RD&A: Research, development and adoption
- RD&E: Research, development and extension
- RFP: Research Funding Panel
- RFU: Research Funding Unit
- RSD: Ratoon stunting disease
- SCHLOT: Sugarcane Harvesting Logistics Optimisation Tool
- SMRP: Small Milling Research Program
- SNP: Single nucleotide polymorphism
- SRA: Sugar Research Australia Limited
- STLA: Sugar Industry Travel and Learning Award
- SAS: Sugar NIR Systems
- SSMV: Sugarcane Streak Mosaic Virus
- UAV: Unmanned aerial vehicle
- YCS: Yellow canopy syndrome