APRIL ANNUAL REPORT 2024

Australasian
Pork Research
Institute Ltd
APRIL

CONTENTS

WELCOME TO APRIL

THE AUSTRALASIAN PORK RESEARCH INSTITUTE LIMITED (APRIL) IS A NOT-FOR-PROFIT (TAX EXEMPT) COMPANY LIMITED BY GUARANTEE THAT OPERATED THE CRC FOR AN INTERNATIONALLY COMPETITIVE PORK INDUSTRY FROM JULY 2005 TO JUNE 2011. THIS WAS THEN SUCCEEDED BY THE CRC FOR HIGH INTEGRITY AUSTRALIAN PORK (PORK CRC LTD) THAT CEASED ITS ACTIVITIES ON 30 JUNE 2019.

BACKGROUND

APRIL was succeeded by the CRC for High Integrity Australian Pork (Pork CRC Ltd.), which completed its objectives on 30th June 2019.

The CRC for an Internationally Competitive Pork Industry and the CRC for High Integrity Australian Pork have delivered on research, education, training and commercialisation objectives to deliver a wide range of relevant research outcomes for the Australasian pork industry.

In total, these CRC programs represented a combined total investment of more than $210 million into the pork industry. Their establishment reinvigorated pork industry research and development and education and training in Australasia and demonstrated the value of collaborative research investment to pork producers and allied businesses associated with the value chain.

In addition to research outcomes directly applicable on farm and post-farm gate, the CRCs have delivered numerous commercial outcomes that will generate financial returns to APRIL into the future.

In 2014, the Pork CRC Ltd. Board began discussions on a transition model after 30 June 2019. Industry acknowledged a need beyond the Pork CRC for continued investment in collaborative activities in research and development, education and training, and commercialisation, to continue the legacy of the two Pork CRC programs and complement Australian Pork Limited's work.

Australian Pork Limited, representing Australian pork producers, along with the New Zealand Pork Industry Board, allied pork industry businesses, and tertiary and research organisations, determined that APRIL was an appropriate vehicle to continue these activities. As such, APRIL adds additional expertise and benefits to the Australasian pork industry through its diverse and broader base of membership that includes all sectors participating in the pork value chain.

Since 2019, associated with the Board's approval of APRIL's first Strategic Plan 2019–2022, APRIL has developed a solid collaborative investment portfolio that has been driven by end-users for the benefit of the Australasian pork industry. Resources associated with research and development, education and training, and commercialisation activities have been invested to ensure value chain sustainability and delivery. In turn, APRIL has successfully leveraged more money into the pork industry for these activities.

This document draws on outcomes of the consultation process to define the strategic directions for APRIL from 2022 until 2025. These directions pertain to key operational elements of the APRIL business as well as research, education and training, and commercialisation initiatives.

VISION

APRIL will be a vehicle for change and innovation in the Australasian pork industry by:

- Working collaboratively with its Members and stakeholders to propose, address and solve key issues of concern and relevance for the Australasian pork industry.
- Successfully delivering innovative solutions and outcomes for the Australasian pork industry.
- Contributing to successful education and training programs that sustain the Australasian pork industry and engage future generations.
- Creating and fostering commercialisation opportunities that enhance end-user benefits.
- Enriching its membership and investment portfolio to ensure future security in delivering its objectives.
- Supporting Australian Pork Limited and the New Zealand Pork Industry Board in building an industry shared vision to enable a thriving pork industry.

MISSION

Be a thought leader in the Australasian pork industry, to undertake new and high priority research and development, education and training, and commercialisation activities for the profitability and sustainability of the industry.

THE PORK INDUSTRY HAS ACKNOWLEDGED THE NEED FOR CONTINUED INVESTMENT IN COLLABORATIVE RESEARCH AND DEVELOPMENT SO APRIL WILL INVEST IN AND MANAGE:

- **COLLABORATIVE RESEARCH AND DEVELOPMENT**
- **EDUCATION AND TRAINING**
- **EXPLORE COMMERCIALISATION OPPORTUNITIES**

FOR THE BENEFIT OF THE AUSTRALASIAN PORK INDUSTRY

MESSAGE FROM THE CHAIR

NEW ARRANGEMENTS FOR PORK R&D SHOULD SEE GREATER COORDINATION AND GREATER LINKS TO CURRENT AND FUTURE INDUSTRY NEEDS. THE CHANGES REFLECT APRIL'S DESIRE TO DELIVER THE BEST POSSIBLE VALUE FOR THE RESOURCES PROVIDED BY STAKEHOLDERS.

APRIL is a unique arrangement for conducting R&D in Australia. Our voluntary resourcing base makes us highly accountable to the stakeholders providing those resources (which is how things should be).

During this year, significant changes have been implemented to reflect that accountability and ensure we are in the best possible position to serve the industry. Firstly, we have moved to a 'participant' based model to allow us to better deliver for participants. This means we can provide greater value to our research-providing stakeholders.

We know it is a big ask in Australia's university environment for universities to pay a fee to participate in APRIL. They are under pressure on many fronts, and changes in international student intakes threaten their revenue base. The changes we implemented over the past year give great assurance to universities that they'll receive more opportunities to collaborate with APRIL. Likewise, those universities that only participate occasionally in APRIL projects will contribute a higher proportion of the total project cost.

All Australian research organisations are being encouraged to work more closely with industry. The pork industry is highly science-driven and has long and successful relationships with our universities. I hope the new arrangements will deepen those relationships even further, and I thank the university managers who have recognised the value.

The second major change has been the move to have a Chief Scientist for the Australian pork industry. Our CEO, Dr John Pluske, has taken up that role and moved to be a Director of APRIL and Australian Pork Limited. John oversees the "Green Paper" process, which should see a more direct and faster line of sight from industry issues and opportunities through to its R&D needs. John has guided APRIL since the end of the Pork CRC and has done a great job.

I look forward to his success in this important new role.

Charlie Rikard-Bell has become our Executive Officer, taking on additional duties to his Commercial Manager role. Charlie has distinguished himself in serving the pork industry and APRIL, and he'll do a great job going forward.

Our long-serving Company Secretary/CFO, Geoff Crook, resigned this year. We are very grateful to Geoff, who has kept APRIL organised and on track. His replacement, Sally Vardy, is in place and quickly learning the ropes.

We spent considerable time and effort responding to the Inquiry into pig welfare in Victoria. The pork industry can be proud of its continuous efforts to improve pig welfare. Consumers have every right to expect animals to be treated with respect and dignity. It's impossible to remove emotions from this debate, but the long-term investment in pig welfare science by APRIL, APL, and our preceding organisations must feature in that debate. At the time of writing, the full implications of the inquiry haven't played out. However, there is no doubt the industry worked exceptionally well together in addressing the inquiry in a professional, well-organised and science-driven approach. Australian Pork Limited deserves praise for its leadership on this critical issue.

Professor Bronwyn Harch resigned from the Board during the year. Bronwyn was a great Director for us and remains extremely supportive. We wish her well in her very senior role at Griffith University.

Thanks to all our members, participants, scientists, and students for your support this past year. As APRIL itself continues to evolve, the constant factor will be the support of those involved for excellent quality, highly applied R&D that makes a difference.

Dr Tony Peacock

MESSAGE FROM THE CEO

THE REPORTING YEAR 2023–24 IS MY LAST AS CHIEF EXECUTIVE OFFICER AND CHIEF SCIENTIST OF APRIL AS I MOVE TO A CHIEF SCIENTIST ROLE FOR THE AUSTRALIAN PORK INDUSTRY. AS SUCH, IT IS TIMELY TO REFLECT ON WHAT HAS BEEN ANOTHER VERY BUSY AND PRODUCTIVE 12 MONTHS AS APRIL CONTINUED ITS WORK OF INVESTING AND PARTICIPATING IN COLLABORATIVE, INNOVATIVE, AND EFFECTIVE RESEARCH AND DEVELOPMENT, EDUCATION AND TRAINING, AND COMMERCIALISATION ACTIVITIES FOCUSED ON PRIORITIES AND DELIVERABLES TO ENSURE THE SUSTAINABILITY OF AUSTRALASIAN PORK PRODUCTION.

The reporting period saw the culmination of several years' work with the ratification of the Participant Model by the Board in June 2024. This decision represents a major change to the ways that APRIL will conduct its activities in the future. Fundamentally, APRIL is a tax-exempt scientific institution and as such must adhere to certain overarching rules and regulations, one of which is not providing direct benefits to Members. A private tax office ruling in 2023 meant that APRIL could maintain its tax-exempt status whilst offering a limited number of rights and benefits under a participant model. Such a model will offer greater scope with the tiers of participation better suiting the needs of organisations that want to work with us. Having greater capacity to cater to these needs will increase APRIL's value to those organisations and potentially attract greater participation with organisations wishing to contribute to Australia's pork R&D and education and training ecosystem.

The approval of the Participant Model, and the subsequent signing of a Participant Agreement between APRIL and those organisations that consented to join under this model, means now that calls for research projects and awards, such as undergraduate and postgraduate student scholarships, can proceed in the current financial year.

Applications for research projects will still be open to all organisations, but under this new operating model, organisations not joining as an APRIL participant will pay more of the costs associated with doing that research, and not be entitled to some of the rights and benefits that existed under the previous model.

Nevertheless, eight Innovation Projects approved earlier in 2023 were contracted during the reporting period. These are also reported in this Annual Report. Congratulations to all those involved in the successful projects, and we look forward to seeing the outcomes from the projects and the benefits to the industry.

A two-day workshop was held in August 2023 in Melbourne that brought together the first Pork Industry Insight Panel (PIIP) and culminated in the 'Green Paper', a non-binding document that for the first time and in a single place, documents a snapshot of the many challenges, opportunities, and (potential) targets for the Australian pork industry across the entire value chain. Developing a more efficient, cohesive and better directed R&D (and education and training) program between APL, APRIL and industry would contribute to improving the return on industry R&D investment and assist in bridging the gap between research providers and the needs of industry.

Facilitated by Professor Robert van Barneveld, Group CEO and Managing Director of the SunPork Group, and assisted by Margo Andrae, CEO of APL, pork industry representatives, pork producers and staff, and researchers came together to discuss what the current challenges, opportunities and targets are for the industry that potentially could direct investments in R&D in the future. As one would anticipate with such an audience, wide-ranging discussions occurred, and different views and thoughts were expressed reflecting the various segments of the value chain. There are simply not enough research dollars in the system to address every single issue that was raised through R&D, but the Green Paper is an excellent start to guide how and where limited dollars may be directed to achieve most positive effects for the industry.

It was opportune then that in February 2024, the Boards of both APRIL and Australian Pork Limited (APL) again came together in Canberra to discuss matters of shared relevance and importance and agree on ways forward that can benefit the industry. I provided a preliminary overview of the major findings from the Green Paper at that meeting, and I am pleased to say that the Green Paper has now been finalised and distributed to PIIP members. The Green Paper will be discussed further in 2024–25 including another iteration of the PIIP.

The annual APRIL Stakeholders' Forum was held in Brisbane in November 2023, and this coincided with the 19th biennial meeting of the Australasian Pig Science Association (Inc.) (APSA) where APRIL was again the Co-Principal Sponsor with APL. I am pleased to say that a total of 14, 1-page papers originating from APRIL-supported research were presented at the conference, a majority of these by students, and nicely displayed the broad cross-section of projects being supported. Having missed the 2021 APSA conference because of Covid-19 restrictions, it was nice to be able to enjoy and participate in a face-to-face conference again.

The Stakeholders' Forum provided an excellent opportunity for exchange, interaction and communication of APRIL's various activities and future plans, with 68 registrants attending. Following the AGM, where APRIL Chair Dr Tony Peacock was re-elected and Dr Rebecca Morrison was appointed to the Board, the introduction by Dr Peacock set the scene for the afternoon, emphasising the importance of getting the science right, the importance and benefits of collaboration, producing useful outcomes for the industry, and thanking all of the researchers, students, technical staff and others involved in APRIL projects.

Translating science into practice was a key focus title of the Stakeholders' Forum, and Dr Kate Plush (SunPork Group) and Dr Rebecca Morrison (Rivalea (Australia) Pty Ltd.) very nicely explained some of the challenges, as well as the benefits, in doing this. Research findings can be adopted directly into practice, although they often must be translated into a useful format for producers. Drs Plush and Morrison cited several practical translation examples such as the adoption of a single diet for grower-finisher pigs, the use of the sow block to enhance enrichment, the application of AusScan Online for dietary formulation, and benefits arising from welfare and housing systems research.

Thanks need to go also to everyone else that contributed to the success of the 2023 Stakeholders' Forum.

A new initiative from APRIL commencing in 2022–23 was the APRIL Enterprise Award. This award was developed to promote innovation and excellence in one or more of the following themes, i.e., innovations resulting in new products, new methodologies, new services, the potential for accelerated adoption of an innovation to improve performance and efficiency, and the potential for commercialisation opportunities through APRIL. In 2023, Professor Travis Beddoe and Dr Gemma Zerna (La Trobe University) were the joint winners of the Enterprise Award, for their work exploring a "spinycterin" vaccine platform for vaccine development.

IN 2023, PROFESSOR TRAVIS BEDDOE AND DR GEMMA ZERNA (LA TROBE UNIVERSITY) WERE THE JOINT WINNERS OF THE ENTERPRISE AWARD, FOR THEIR WORK EXPLORING A "SPINYCTERIN" VACCINE PLATFORM FOR VACCINE DEVELOPMENT

In late March 2024, APRIL Chair Dr Tony Peacock and I appeared at the Legislative Council Economy and Infrastructure Committee's Inquiry into Pig Welfare in Victoria. Much has been said and written already about this and will continue to be, but in short, the Terms of Reference that this Committee had been asked to consider were as follows: (1) the scope, application, compliance with and enforcement of relevant existing regulatory frameworks and their ability to promote pig welfare outcomes; (2) the ability of the most common methods used to stun pigs before slaughter (including electrical stunning and exposure to high concentrations of carbon dioxide gas) in Victorian slaughterhouses to minimise pain, suffering and distress and prevent injury, and available alternatives; (3) the outcomes of the 2017 industry-led phase out on the use of sow stalls; (4) current industry breeding and housing practices particularly the use of different forms of confinement; (5) international comparisons to determine industry adherence to best practice standards; and (6) any other relevant matter.

Submissions and public representations were made by a cross-section of the pork industry including APL, Rivalea (Australia) Pty Ltd.-JBS, the SunPork Group, Apiam Animal Health, individuals and pork producers. Our hearing with the Committee, done in conjunction with Dr Chris Richards and Dr Kate Savage from Apiam Animal Health, was a useful chance to highlight the impact R&D and science has had on the Australian pork industry over the decades that both Tony and I have been involved.

The reporting year saw several projects come to completion, and some of these are highlighted in this Annual Report. Of note, a 3-year Transformation Project, *Early life experiences and stress resilience in pigs*, was completed. This Australian Research Council-Linkage Project has produced some very interesting and important findings relating early life experiences of piglets to aspects of stress and production. Overall, the project indicated that early human handling, housing system and maternal contact can have both immediate and longer-term consequences on the stress resilience of pigs. This research substantially contributes to a growing body of work on the importance of the pig's early environment on its immediate and long-term welfare. Of interest, as a source of enrichment, positive human interactions provide several advantages: close interactions with piglets usually occur several times daily, positive interactions can be combined with routine checks, human interactions invariably provide variability in their predictability which will minimise habituation, and positive interactions may not require additional physical environmental enrichment resources, such as foraging material.

The project was administered through The University of Melbourne, with Partner Organisations being APRIL, The University of Queensland, SunPork Pty Ltd., Rivalea (Australia) Pty Ltd., University of Veterinary Medicine, Vienna, and the USDA – Agricultural Research Service,

USA. All in all, this project was a good example of where APRIL funds can be used to leverage external funds to conduct worthwhile R&D, as well as contributing to positive education and training outcomes.

The submission and completion of Final Reports in a timely manner is important because it allows for communication, extension and feedback to members and stakeholders. Thank you to all the researchers for adhering to the milestones as much as possible in your projects, although I have noticed, and especially of late, more and more late reports – both quarterly and final reports – being submitted, or not being submitted at all, within reasonable timeliness. Undoubtedly the impacts of Covid-19 were responsible for some of these delays, and I hope that in the future, this situation will be rectified.

All Final Reports and Project Summaries are accessible through the website (available at https://apri.com.au/research/project-reports/) and will continue to be placed on there as and when they become available, subject to any confidentiality restrictions.

As APRIL matures, it is pleasing to see an increasing number of conference presentations and publications emanating from the research projects that APRIL supports. These have been listed in each quarterly edition of APRIL NEWS.

A key pillar of APRIL's current Strategic Plan is to further build human capacity for the pork industry, hence a key goal for APRIL, together with Australian Pork Limited, is investment in education and training. During the reporting period, APRIL was pleased to be able to continue supporting a number of undergraduate and postgraduate scholarship awards at Australian universities (shown below). It is also pleasing to see APRIL-supported students graduate from their studies, with Dr Soraya Leedham (nee Haynes), whose Doctor of Philosophy thesis (*An exploration of the anti-infective potential of plant-sourced natural products*) was conferred at Murdoch University.

Honours awards were granted to Tanishka Munjal, The University of Melbourne, for a project exploring the effects of placentophagia on sow and piglet performance in confined and loose housing systems, and to Amelia Sofra, also from The University of Melbourne, for a project investigating aspects of free-range pork production and quality assurance.

Postgraduate scholarship awards were awarded to: (1) Cintia Amaral, Murdoch University, for a PhD involving lean meat measures in pig carcases; (2) Abadi Reda, University of New England, for a PhD that will determine the genetic components of the incidence of tail biting and to estimate its correlated effects on productivity traits; (3) Isabel Stanley, The University of Melbourne, for a MSc project investigating pre-weaning tail biting behaviour in pigs reared with intact tails in an Australian commercial setting; (4) Dirk van Winden, University of New England, for a PhD aiming to identify genetic and genetic-environment interaction factors for pig tail biting; (5) Paul Bogere, The University of Queensland, for a PhD investigating the application of integrated 'omics' technologies to better identify characteristics between slow- and fast-growing piglets in the peri-weaning period; and (6) Astrid del Rocio Coba Cedeno, The University of Queensland, for a PhD investigating dietary strategies, metabolic biomarkers, and the microbiome signature relating to heat tolerance in lactating sows.

THE REPORTING PERIOD ALSO SAW THE GRANTING OF THE FIRST TWO RECIPIENTS OF THE APRIL POST-DOCTORAL FELLOWSHIP SCHEME, WITH DR BRYONY TUCKER (PIRSA-SARDI) AND DR GEMMA ZERNA (LA TROBE UNIVERSITY) BEING THE SUCCESSFUL RECIPIENTS

APRIL was pleased to announce Patrick Hurley (SunPork Group) as an additional Industry Placement Program (IPP) awardee, joining Dr Max Muller (The University of Queensland), Dr Nandi van Wyk (Apiam Animal Health/ Portec) and Samantha Sterndale (Westpork Pty Ltd.) in the program. The Board's continued support of the IPP assists with production- and science-based training for the benefit of the pork industry.

The reporting period also saw the granting of the first two recipients of the APRIL Post-Doctoral Fellowship Scheme, with Dr Bryony Tucker (PIRSA-SARDI) and Dr Gemma Zerna (La Trobe University) being the successful recipients. The APRIL Post-Doctoral Fellowship Scheme aims to attract and retain high calibre early career researchers for the benefit of the pork industry, provide a Post-Doctoral Fellow with the time and support to develop their demonstrated research potential and track record, and assist in establishing a Post-Doctoral Fellow with a successful career trajectory.

Dr Tucker will use the award for research finding natural alternatives to reduce the need for antibiotics in piglets and weaner pigs, whilst Dr Zerna will conduct research associated with advancing pig health and production using a spinycterin vaccine platform against rotavirus, and potentially other pathogens.

During the reporting period, DSM-fermenich ceased their membership with APRIL. I would like to thank DSM-fermenich for supporting APRIL over the years. In this regard, I am also highly appreciative of the current Members for their continued support of APRIL.

I am highly grateful to the APRIL staff in Dr Charles Rikard-Bell, Mr Geoff Crook (Company Secretary) and Dr Sophie Ward (Early Career Scientist) for their efforts in contributing to APRIL's functions and objectives. Geoff Crook resigned as Company Secretary in April 2024, but APRIL is very grateful he has stayed on as a Contracts Officer. APRIL now welcomes Sally Vardy as the new Company Secretary.

I would also like to express my thanks to staff at APL and especially Kelly Goh, Glenn Eppelstun, Dimitra Lyras and Margo Andrae, for their assistance and advice in helping APRIL during 2023–24.

Finally, many thanks also to the APRIL Chair, Dr Tony Peacock, and fellow Directors for their support, feedback and encouragement during the year.

Dr John Pluske
Chief Scientist and CEO, APRIL

STRATEGIC PL

KEY OBJECTIVES OF APRIL

TO ACHIEVE APRIL'S VISION AND MISSION, APRIL HAS DEFINED THE FOLLOWING KEY OBJECTIVES THAT FORM THE FOUNDATIONS OF APRIL'S STRATEGIC PLAN (2022–2025):

Be a thought leader, strategic enabler, and strategic co-funder of research and development, education and training, and commercialisation activities for the benefit of the Australasian pork industry.

Act as a catalyst for innovation in the Australasian pork industry through strategic investments in research and development, education and training, and commercialisation activities.

Manage income arising from commercialisation activities, and generate further commercialisation activities and income.

Re-invest commercial income in research activities, and education and training, relevant to the Australasian pork industries.

Expand the total pool of funding available for research and development, education and training, and commercialisation.

Assist and be aligned with Australian Pork Limited in growing the overall science, infrastructure, and human capacity base in the industry.

AN SUMMARY

CORE VALUES OF APRIL

TO ACHIEVE THESE KEY OBJECTIVES, APRIL WILL APPLY THE FOLLOWING CORE VALUES:

INNOVATION

APRIL always looks for industry solutions.

FOCUS

APRIL's members and the Australasian pork industry are its highest priorities.

EXCELLENCE

APRIL strives for the best quality in research and development, education and training, and commercialisation activities and opportunities.

NETWORKS

APRIL will collaborate locally, nationally and internationally to enhance capacity to solve local challenges and meet goals.

OPPORTUNITY

APRIL will take considered risks to achieve desired outcomes.

COMMUNICATION

APRIL will build strong relationships through open communications.

DEDICATION

APRIL staff and the APRIL Board are driven to deliver the APRIL Strategic Plan on behalf of the Australasian pork industry.

APRIL'S STRATEGIC PILLARS

BASED ON APRIL'S KEY OBJECTIVES AND CORE VALUES, THE FOLLOWING CORE STRATEGIES HAVE BEEN DEVELOPED:

PILLAR 1: FURTHER DEVELOPING THE APRIL BUSINESS

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	IMPLEMENTATION
Seek additional investment to deliver APRIL's activities	• Leverage APRIL investment in research and commercialisation by stakeholder co-investment in applicable projects.	Ongoing
	• Identify external opportunities for co-investment in APRIL activities and where feasible, and where appropriate, drive the bid process.	Ongoing
	• Monitor major external funding programs and strategically apply for funds as an applicant or as a co-applicant with e.g., a member or members: – Development/submission of at least two major Transformational Projects application (> 5:1 project leverage on APRIL funds) to an external funding body, per annum.	Ongoing
	• Exploit APRIL's 'freedom to operate' and strong collaborative culture among members to seek investment in its project portfolio from non-traditional funding sources.	Ongoing
	• Increase Member and non-Member revenue of APRIL: – At least two new Ordinary Members by February 2024 (over December 2021 membership). – Additional revenue (up to $100,000 per annum) from non-membership activities, including from external strategic investment of cash reserves.	Ongoing
Nurture and grow collaborative alliances	• Review member benefits and expectations to ensure APRIL can deliver appropriately and sustain support.	2022
	• Grow relationships/partnerships with relevant investors to advance progress in mutually beneficial activities.	Ongoing
Review operational capability to ensure management efficiency	• Operational resources and staffing are adequate to ensure all activities can be implemented according to this Strategic Plan.	Ongoing
	• Employees and consultants have effective and sustainable employment arrangements.	Ongoing
	• Suppliers that deliver services to, or on behalf of APRIL, enhance APRIL's ability to operate effectively and without conflict.	Ongoing

PILLAR 2: EFFECTIVE MANAGEMENT AND DELIVERY OF RESEARCH AND DEVELOPMENT AND EDUCATION AND TRAINING FOR THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	IMPLEMENTATION
Review the APRIL R&D activities portfolio	• Review research investment to ensure an appropriate portfolio of Transformational, Innovation, and Commercialisation Projects, with > 60% of the available funds for R&D directed to Transformational Projects. • Ensure research investments are not duplicative, but complementary, with Strategic Plans of APL and NZPIB. • Reassessed targets for investment after each funding round and adjust targets accordingly, e.g., balance strategic research domains with research opportunities, enable continuation of completed projects having high potential for industry outcomes, assessment of APRIL commercial income versus direct industry benefits.	2022, and then annually Annually Annually
Initiate key Transformational Projects for the Australasian pork industry	• Ensure at least four Transformational Projects, for longer-term, collaborative, inter- and multi-disciplinary 'big picture' projects, are prepared and submitted annually, with major external funding support sought where possible, in priorities to be determined.	Ongoing
Support for Innovation Projects	• Funding support annually (20–30% of applicable funds) for smart, innovative and 'out of the box' projects that stimulate change and innovation in the industry and can be a commercialisation pipeline. • Change the Innovation Project guidelines to make the (potential) path to commercialisation clearer.	Annually
Assist with human capacity building in the Australasian pork industry	• Make annual investments into maintaining and building education and training for the industry, to support undergraduate and postgraduate students and the Industry Placement Program (IPP): – Offer at least three full scholarship Masters or PhD awards per annum. – Four undergraduate students completed an Honours project by June 2022, with at least two Honours students completing a project per year thereafter. – Three DVM or BSc/BVMS students completed a project by June 2022, with at least two DVM or BSc/BVMS students completing a project per year thereafter. – Four postgraduate students working on APRIL or APRIL-related projects being trained by 2022, and each year thereafter. – A minimum of three IPP awardees embedded in industry organisations at any one time.	Ongoing
Support for Facility Funding	• Ongoing support for appropriate, diversified and cost-effective facility funding for the Australasian pork industry.	Annually
Support for Kickstart program	• Ongoing support for the Kickstart program, to provide funding to assist with the preparation and submission of a specific, targeted and agreed major external funding application (or applications) in partnership with APRIL and other partners.	Annually
Support for APRIL Enterprise Award	• Create an annual APRIL Enterprise Award to support on-farm creativity and innovation for practical application.	Annually

PILLAR 3: INDUSTRY RELEVANT COMMERCIALISATION ACTIVITIES FOR THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY DELIVERABLES	IMPLEMENTATION
Be the single point of contact, referral and guidance for commercialisation activity in Australia	• Formalise an agreement and processes with Australian Pork Limited to become the single point of contact, referral and guidance for commercialisation activities in Australia	Ongoing
Support a viable, innovative and expanding commercialisation business	• Effectively continue to manage current commercialisation arrangements to ensure they are sustainable and providing a return to APRIL: – Commercialisation income > $450,000 per annum, by 2025. – At least one new product/service successfully commercialised and generating revenue for APRIL, by 2025. • Conduct a Product Development Scheme program in conjunction with commercial partners to enhance investment and product adoption into the industry, and permit an acceptable financial return to APRIL: – Three new projects launched by 2025. – Reinvest up to $100,000 per annum into new product development. • Maintain the operation and function of the Commercialisation Advisory Panel. • Communicate a commercialisation report as a Standing item at each APRIL Board meeting.	Ongoing
Ensure commercialisation processes are efficient and are generating optimal returns	• Assess the commercialisation potential of relevant research activities or proposals and develop commercialisation plans for approved projects with commercial potential. • Review all existing commercialisation projects and ensure markets with greatest potential are adequately resourced, including potential to exploit overseas markets: – AusScan (China). – Sow Block (USA, Europe). – Lawsonia qPCR Test (USA, Europe). • Reinvest commercial income from investment in product development in applicable APRIL activities.	Ongoing
Support for Commercialisation Projects	• Funding support on a continuous basis for projects that increase APRIL's commercialisation pipeline and lead to greater commercial returns to APRIL and potential benefits to industry.	Ongoing
Continued engagement with growAG	• Continue engagement with growAG to promote commercialisation opportunities arising from R&D activities and ad hoc commercial opportunities.	Ongoing

PILLAR 4: CONNECTING WITH MEMBERS AND THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY DELIVERABLES	IMPLEMENTATION
Implement an effective and appropriate communication plan	• Initiate an appropriate communication framework that effectively disseminates APRIL activities and associated outcomes.	2022 and reviewed annually
Develop activities that are collaborative and inclusive across the member and stakeholder base	• All projects to involve at least one Member organisation. • Maintain the Board Director-Ordinary Member buddy system to enable one-on-one communication with Ordinary Members (4–5 times annually). • Invite Members and key stakeholders to attend the APRIL Annual Stakeholder Day (and other events as appropriate) to extend latest results and receive direct feedback on outcomes and progress. • Provide an APRIL update at APL Delegates' Forum events/annual joint APRIL–APL Board discussion (at least once annually).	Ongoing
Present updates of APRIL's activities and progress at producer and scientific forums	• Present on APRIL activities and outcomes to representatives of a wide member and producer base in Australia and New Zealand through industry seminars/meetings, and to international conferences and forums (where appropriate): – Present at a minimum of one international conference per annum, from March 2022. – Present at a minimum of two member-based conferences per annum, from March 2022.	Ongoing
Participate in strategic sponsorship/partnerships	• Raise and reinforce APRIL's contributions to the Australasian pork industry by providing strategic sponsorship or partnerships (e.g., APSA conference, State field/industry days, member events).	Ongoing
Keep industry and stakeholders informed of APRIL's activities and outcomes	• Provide timely and relevant media releases to the rural press including at least 10 articles per annum in the Australian Pork Newspaper/Pork Journal. • Write a quarterly newsletter to all members. • Conduct strategic/targeted scientific seminars and updates (two per year, from March 2022). • Financial support for selected peer-reviewed publications in internationally recognised journals (up to five papers supported per year, to a total value of $7,500).	Ongoing
Maintain an independent website for information and promotion of APRIL activities	• Maintain the APRIL website for communication of research, education and training and commercialisation outcomes, and APRIL news, and maintain links to the Pork CRC website.	Ongoing
Review and dissemination of project success	• For applicable projects and where appropriate and robust mechanisms exist, evaluate the return on investment into APRIL for the pork industry.	Ongoing

COMMERCIALI
REPORT

SATION

THE APRIL BOARD DIRECTS COMMERCIAL DECISIONS REGARDING IP AND STRATEGY, SUBSEQUENTLY THE COMMERCIALISATION AND ADOPTION ACTIVITIES ARE REPORTED DIRECTLY TO THE APRIL BOARD. IN TERMS OF COMMERCIALISATION REVENUE AND ACTIVITIES, THE FOLLOWING OUTCOMES AND OPPORTUNITIES WERE ACHIEVED AND/OR DEVELOPED IN THE REPORTING PERIOD:

AUSSCAN

The AusScan Online usage in 2023–24 has for the third year in a row recorded the highest number of scans in a financial year to date since the launch in 2015–16 representing an increase of 1.11% (84,511 scans) over the 2022–23 scan numbers (Figure 1.). The consistent performance of AusScan enabled the enterprise to remain the dominant contributor to APRIL's commercialisation income stream for 2023–24. In this reporting period AusScan Online continued to provide valuable reports to the animal feed industry including monthly cereal grain characteristics, technical updates on cereal calibrations, progressed assessment of a miniature NIR hand held device and the advancement of calibration studies to improve the pig faecal and ileal digestible energy (DE) and the layer hen apparent metabolisable energy (AME) cereal predictions.

The record number of scans for 2023–24 included 41,635 from Australian sub-licensors, which is the highest number of scans recorded from this group since 2016–17 and represents a 1.6% increase in scans from 2022–23. The global scan numbers reached 42,876, a 0.6% improvement over 2022–23 and represent the 3rd highest scan numbers in AusScan Online's nine (9) year history.

AusScan Online continued to publish the Early Harvest Reports in the Australian Pork News, providing Nutritionists and Feed industry personnel with valuable insights on key energy and cereal grain characteristics as the industry transitions from old to new seasons grain. Over the transition period of November 2023 through to April 2024 the reports evaluated a total of 2,030 barley and 8,040 wheat samples across different growing regions in Australia. The mean values for each variable and grain type across all regions are shown in Table 1.

FIGURE 1

Total scans for AusScan Online for each Financial Year.

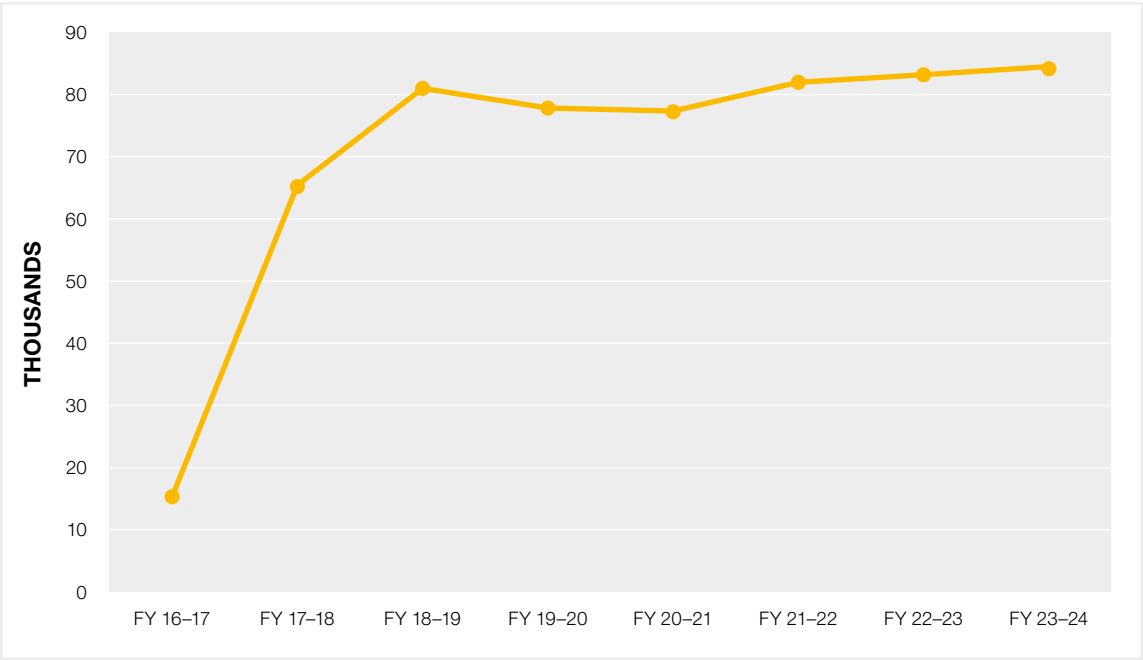


TABLE 1

Mean values for Pig faecal DE, Broiler AME and Protein % for wheat and barley samples using AusScan Online NIR calibrations.

GRAIN	SAMPLE NUMBER	PIG FAECAL DE (MJ/kg)	BROILER AME (MJ/kg)	PROTEIN %
Barley	2,030	12.77	11.78	9.56
Wheat	8,040	13.76	12.81	11.20

These reports provide an assessment of the variation of key grain characteristics within and between regions which is invaluable information for feed mills and nutritionists tasked with the production and formulation of diets for livestock. As an example, for the 2023–24 season, the mean pig faecal DE values for barley were significantly different between the regions but showed little variation within a region and, including the outliers (denoted by coloured symbols outside the quartile markers), the range was 2.2 MJ/kg across all regions and excluding outliers the range was 1.2 MJ/kg (Figure 2). In contrast, the mean pig faecal DE values for wheat are similar across all regions with a range of 3.5 MJ/kg (including outliers). However, excluding outliers the range in predicted DE values reduced to approximately 0.5 MJ/kg (Figure 3).

THESE REPORTS PROVIDE AN ASSESSMENT OF THE VARIATION OF KEY GRAIN CHARACTERISTICS WITHIN AND BETWEEN REGIONS WHICH IS INVALUABLE INFORMATION FOR FEED MILLS AND NUTRITIONISTS TASKED WITH THE PRODUCTION AND FORMULATION OF DIETS FOR LIVESTOCK

FIGURE 2

Distribution of Pig Faecal DE (MJ/kg) by region for barley samples from November 2023 through to April 2024 as predicted by AusScan Online.

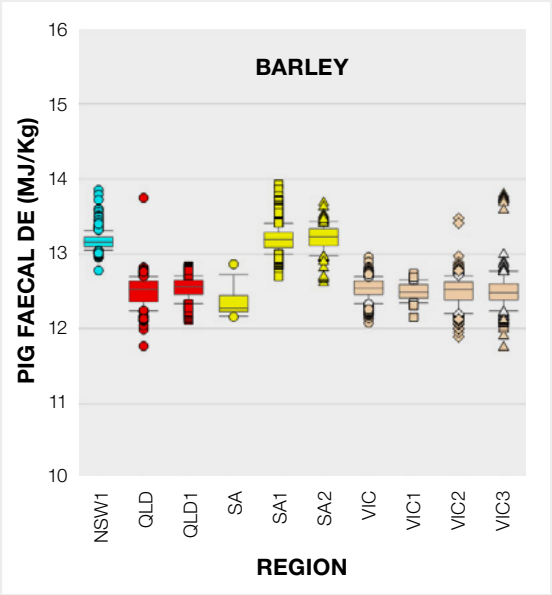
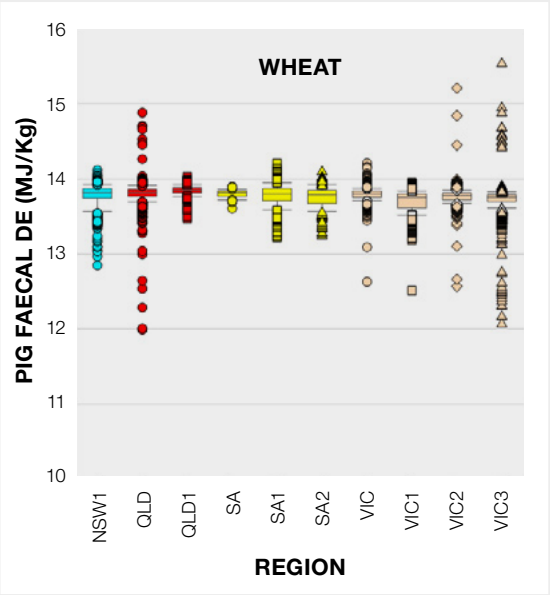


FIGURE 3

Distribution of Pig Faecal DE (MJ/kg) by region for wheat samples from November 2023 through to April 2024 as predicted by AusScan Online.



AusScan Online provides calibrations for ground and unground (whole grain) samples. Customers have queried whether there are differences in cereal energy predictions depending on how a sample is prepared prior to NIR scanning? To settle this question 48 ground grain (100 micron) and 48 whole grain paired samples consisting of wheat (20), barley (9), triticale (4), sorghum (5) and maize (10) were sent to the NSW Department of Primary Industries, EnviroAg Testing Services Laboratory, Wagga Wagga for NIR analysis using a FOSS XDS machine. The results (Table 2) indicate that the mean differences between ground and whole grain samples for Broiler AME and Pig Faecal DE contents were 0.34 and 0.19 MJ/Kg respectively and although significant, are small and less than the standard error of the corresponding calibration. Therefore, one would expect similar predicted energy values for whole and ground grain samples. AusScan Online published a full description of the study in the APN (March 2024 Edition).

Finally, during this reporting period, progress has been made in the South Australian Research and Development Institute (SARDI) led layer AME and The University of Melbourne led pig DE studies supported by Australian Eggs and APRIL respectively. The 2024–25 reporting period will see the completion of the Pig DE study, and all five of the Layer AME experiments by the end of 2024 enabling updated calibrations for the Pig Faecal and Ileal DE and the Layer AME predictions in the first quarter of 2025. The foundations have been laid for the potential application of a hand-held device in late 2024 capable of accurately predicting the AusScan energy values for cereal grains which would be a gamechanger for the livestock industries. The pig industry continues to support this technology and in return AusScan Online provides accurate predictions and valuable reports in the assessment of feed grains for livestock.

TABLE 2

Statistical output from a paired T-test for mean in vivo energy values of 96 cereal grain samples of ground (n=48) and whole (n=48) and the corresponding standard error of the calibration for each parameter.

PARAMETER	$\mu_{Ground} \pm$ S.E (MJ/Kg)	$\mu_{Whole} \pm$ S.E (MJ/Kg)	DIFFERENCE ($\mu_{Ground} - \mu_{Whole}$) (MJ/Kg)	SIGNIFICANCE	STANDARD ERROR OF THE CALIBRATION (MJ/Kg)
Broiler AME	13.40 ± 0.16	13.06 ± 0.17	0.34	P < 0.001	0.39
Pig Faecal DE	13.85 ± 0.05	13.66 ± 0.08	0.19	P < 0.001	0.21
Pig Ileal DE	11.30 ± 0.07	11.35 ± 0.10	–0.05	P = 0.282	0.39

BARASTOC SWINE BLOCK

The Barastoc Swine Block sales continue to be steady with a total of 46.6 t sold in this reporting period, which is similar to the 2022 and 2021 financial years of 46.2 and 47.0 t respectively.

A recent study supported by Ridley in conjunction with SunPork farms found that less carcass damage was observed for pigs that received an enrichment block treatment immediately after ear or tail damage was first observed compared to pigs that had a block treatment on entry to the grower-finisher shed or no treatment at all. Indicating that strategic use of an enrichment block may reduce body damage at slaughter.

In this reporting period progression for patent protection of the Barastoc Swine Block continued with the European and Canadian jurisdictions, whilst New Zealand patent No. 733249 “Product and method for providing enrichment and facilitating expression of natural behaviors in pigs” was granted on the 27 February 2024.

THE APRIL PIPELINE

The APRIL pipeline projects have stemmed from proof of concept studies and through the commercialisation process may show potential to be patented, commercialised or as an outcome of further research not progressed. The following is an update on pipeline projects:

ASSESSING THE APPLICATION OF RAPID TECHNOLOGIES FOR THE DETECTION OF BOAR TAINT IN CARCASES

In June 2023, an APRIL Commercialisation Project (7C–004 *Assessing the use of rapid technologies for the detection of boar taint in carcases*) commenced with AgResearch New Zealand and freshPork NZ. Boar taint is characterized by an unpleasant odour of cooked pork due to excess levels of androstenone, skatole and indole, typically accumulating in fat and is a significant problem for the pork industry in Australasia and globally. In this reporting period the project and final report were completed.

The project aims were to confirm that non-destructive technologies [Hyperspectral imaging (HSI), near-infrared spectroscopy (NIR), rapid evaporative ionisation mass spectroscopy (REIMS)] are feasible options to measure boar taint in samples of pork neck. The project involved the analysis of 226 pork neck samples (165 Non-Improvac boars; 61 Improvac treated boars) at 70–90 kg dead weight from 13 farms of which 3 farms were implementing Improvac treatments. Each technology scanned skin, fat, and muscle taken from the pork neck region and key boar taint compounds (androstenone, skatole, indole) were measured with chemical analysis.

The major outcomes were as follows:

1. For androstenone, 74 (47%) non-Improvac and 8 (12%) Improvac samples exceeded the sensorial detection threshold of 1 µg/g fat, indicating that improvac treatment has a strong effect on reducing boar taint markers. Only a small number of samples exceeded detection thresholds for skatole (4; 1.7%) and indole (3; 1.3%) using 0.2 µg/g and 0.15 µg/g, respectively. There was no clear relationship between the boar taint markers and weight (See Figure 4).
2. HSI and NIR spectroscopy were not able to detect any boar taint markers when analysing the entire set. However, when only using non-Improvac samples a predictive model for androstenone using NIR of fat was developed (See Figure 5) with moderate accuracy (coefficient of determination, $R^2 = 0.49$).
3. REIMS was not able to differentiate samples based on boar taint compounds. However, multivariate analysis of REIMS data was able to differentiate samples based on Improvac status and the extremes of the sensory scores. Skin and meat showed better performance at differentiating these parameters than fat, though results from fat analysis were still acceptable.
4. Preliminary sensory evaluation. The sensorial evaluation only had a weak correlation with androstenone (0.17, $P<0.02$), and for indole and skatole the data was not statistically significant (a limited range for indole and skatole). Additionally, the sensory evaluation included an untrained panel of 4 participants.

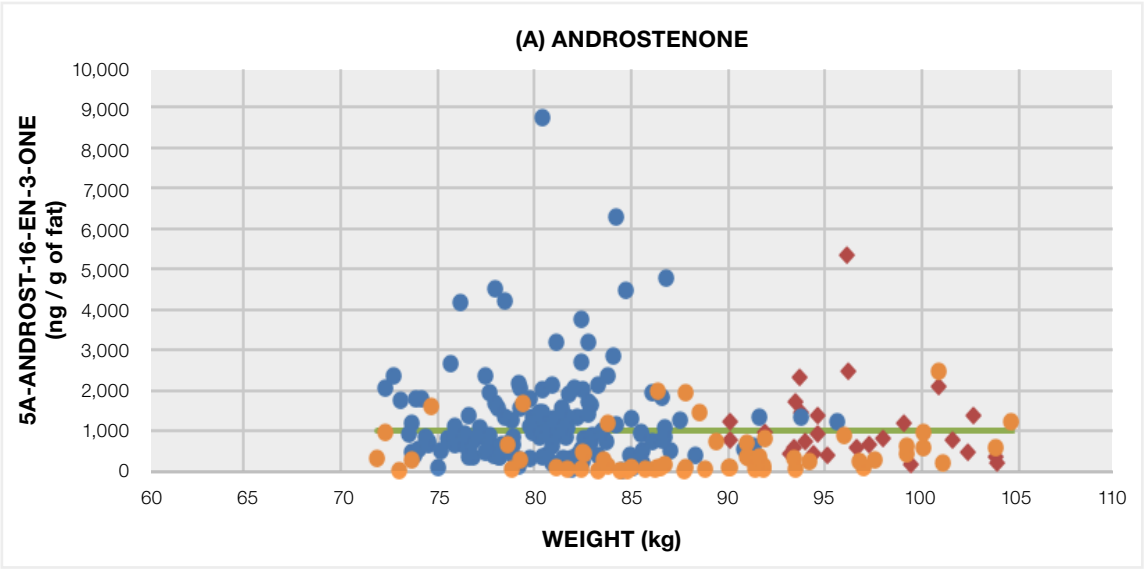
It was also noted that the percentage of Improvac™ boars above the sensorial detection threshold should not exceed 3%, whereas the value in this study was observed at 12% and requires further investigation into why this occurred, e.g., timing of the second vaccination and/or was the second vaccination missed? Coincidentally, a similar value of 11% was observed in the earlier Pork CRC study.

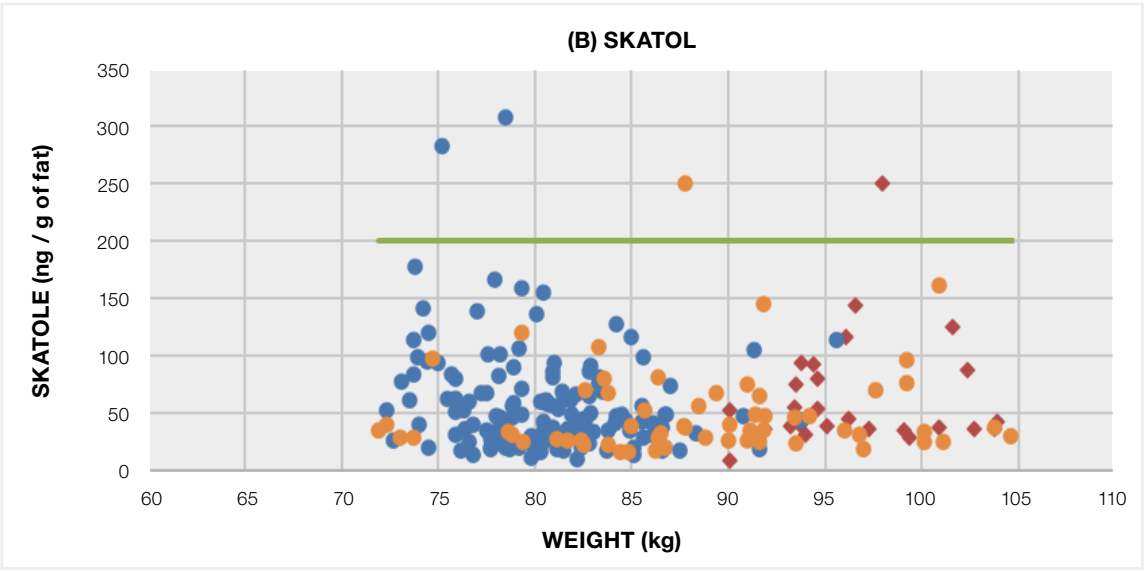
Approximately 60% of male pigs produced in Australia are treated with Improvac™ and the cost of Improvac™ treatment regimens are between 9–11 cents / kg of pork produced. If Improvac™ failure rates exceed 10% in commercial operations, identification of these carcasses at processing is potentially warranted. If carcasses containing boar taint are identified at processing then decisions on product pathways can be made without affecting consumer eating experiences.

The moderate accuracy of the predictive model for androstenone using NIR of fat in non-Improvac males (Point 2, above) would not be suitable for rapid (online) detection. Whilst, there is a sufficient range of androstenone levels to develop predictive models, it was concluded that the research project has not provided strong evidence that HSI and NIR technologies are suitable for quantifying the likelihood of boar taint in meat and fat.

FIGURE 4

Boar taint marker measurements for:
(A) Androstenone
(B) Skatol
(C) Indole
plotted against carcass weight.





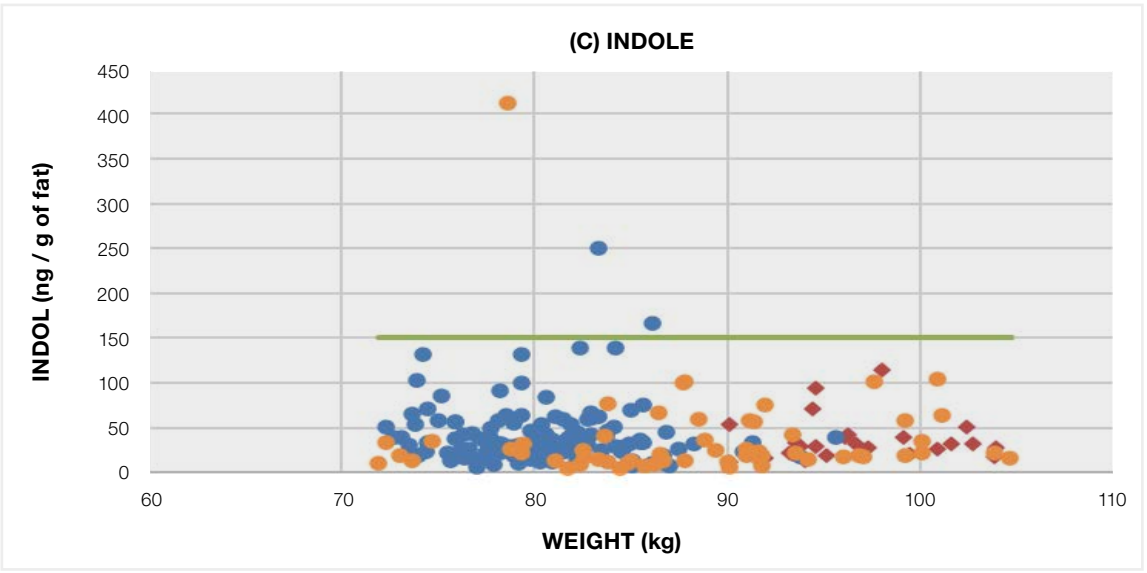
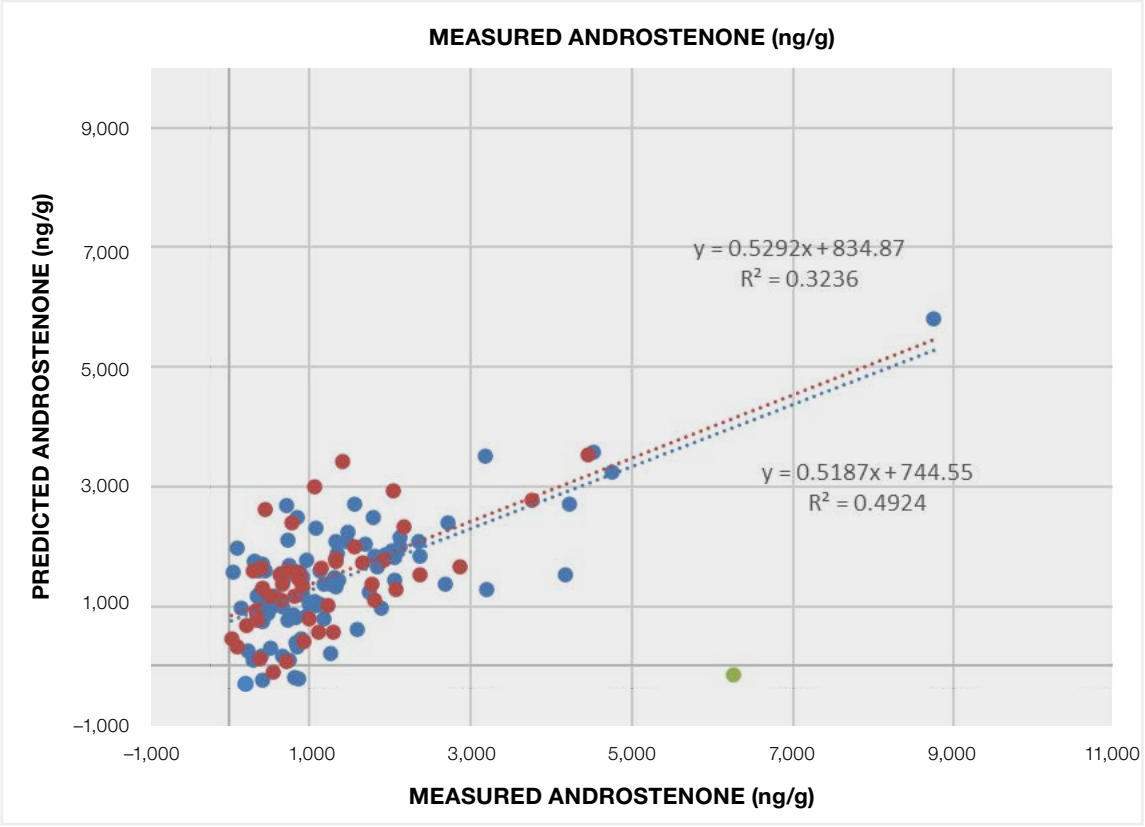


FIGURE 5

Androstenone prediction compared to measured reference.

This model is developed for VIS-NIR spectra of fat for exclusively non-Improvac. Calibration (blue) and Validation (red) datasets performed similarly, indicating the model is fitted appropriately.



- Calibration
- Validation
- Outlier

LARGE CREEP PELLETS

In this reporting period results from validation study 7C–006 *Easing the weaning transition: pellet form and size to reduce the post-weaning growth check* conducted at SunPork farms did not verify the positive behavioural changes towards larger pellets and improved intake on large semi moist extruded creep (SMEC) pellets observed in APRIL Study 6A–103. It was therefore decided in November 2023 not to progress towards a full patent submission. For more details see Feature Project: 7C-006, p24.

NCG SUPPLEMENTATION

Innovation study 5A–105: *Oral means of increasing endogenous GH levels and enhancing the performance and carcass characteristics of growing pigs* indicated that supplementation of N- carbamyl glutamate (NCG) to finishing pigs is a novel strategy to reduce P2 backfat thickness in lean genotypes. A provisional patent was lodged in February 2023 which contained data sets for boars and gilts but not Improvac™ treated boars. Therefore, study 7C–008 investigated the effect of NCG (0.3%) supplementation on growth performance, backfat and meat quality of finisher gilts and improvac™ treated boars. The study was completed in February 2024 and the results confirmed NCG supplementation tended to reduce (P=0.088) carcass P2-site backfat from 10.2 to 9.8 mm (standardised at 91 kg live weight). The reduction in backfat was more pronounced in male pigs (10.1 vs 9.4 mm) than in female pigs (10.3 vs 10.2 mm). In terms of loin quality, NCG slightly reduced (P=0.05) the 24 h pH from 5.59 to 5.54 without affecting (all P>0.10) 45 min pH, colour, drip loss, cooking loss or shear force.

The study confirmed that 0.3% NCG supplementation in the finisher diet can reduce carcass backfat of commercially group-housed lean-genotype pigs in Australia. An International Patent Application No. PCT/AU2024/050124 “Animal Supplement and Uses Thereof” was lodged on 20 February 2024. At present the intention is to only apply for Australian and NZ jurisdictions.

NOVEL ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST) PLATES A COMMERCIALISATION STUDY WITH AQUILA SCIENTIFIC

A unique Commercialisation project was approved by the APRIL Board in April 2024. The objective of the commercialisation project 7C–009 *Commercialisation of potential outcomes from Novel Antimicrobial Susceptibility Testing plates* will involve developing a proprietary brand of 96 well plates with long shelf life that can be shipped and stored at room temperature for diagnostic testing and surveillance. The first stage of the project commenced at Murdoch University in June 2024. Outcomes of this project will be reported in the next Annual Report.

Finally, APRIL continues to work with AgriFutures to present some of our commercial projects and opportunities to a wider network of investors, Universities, start-ups, government and industry bodies through the AgriFutures website GrowAg.com. The AgriFutures team continue to create connections with research bodies, marketing groups and potential partners that may enhance current and future APRIL commercial projects.

STRATEGIC PLAN DELIVERABLES

A summary of progress against the Strategic Plan deliverables is provided below:

PILLAR 3: INDUSTRY RELEVANT COMMERCIALISATION ACTIVITIES FOR THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY OUTCOMES / DELIVERABLES	2024 STATUS
Be the single point of contact, referral and guidance for commercialisation activity in Australia	Formalise an agreement and processes with Australian Pork Limited to become the single point of contact, referral and guidance for commercialisation activities in Australia.	● Not achieved this year – ongoing
Support a viable, innovative and expanding commercialisation business	Effectively continue to manage current commercialisation arrangements to ensure they are sustainable and providing a return to APRIL:	✔ Achieved for the year – ongoing
	• Commercialisation income > $450,000 per annum, by 2025.	● Partly achieved this year – ongoing
	• At least one new product/service successfully commercialised and generating revenue for APRIL, by 2025.	● In progress
	Conduct a Product Development Scheme program in conjunction with commercial partners to enhance investment and product adoption into the industry, and permit an acceptable financial return to APRIL:	✔ Achieved for the year – ongoing
	• Three new projects launched by 2025.	● Not achieved this year – ongoing
	• Reinvest up to $100,000 per annum into new product development.	✔ Achieved for the year – ongoing
	Maintain the operation and function of the Commercialisation Advisory Panel.	✔ Achieved for the year – ongoing
	Communicate a commercialisation report as a Standing item at each APRIL Board meeting.	✔ Achieved for the year – ongoing
Ensure commercialisation processes are efficient and are generating optimal returns	Assess the commercialisation potential of relevant research activities or proposals and develop commercialisation plans for approved projects with commercial potential.	✔ Achieved
	Review all existing commercialisation projects and ensure markets with greatest potential are adequately resourced, including potential to exploit overseas markets:	● In progress
	• AusScan (China).	● In progress
	• Sow Block (USA, Europe).	● In progress
	• Lawsonia qPCR Test (USA, Europe).	● In progress
	Reinvest commercial income from investment in product development in applicable APRIL activities.	● In progress
Support for Commercialisation Projects	Funding support on a continuous basis for projects that increase APRIL's commercialisation pipeline and lead to greater commercial returns to APRIL and potential benefits to industry.	✔ Achieved for the year – ongoing
Continued engagement with growAG	Continue engagement with growAG to promote commercialisation opportunities arising from R&D activities and ad hoc commercial opportunities.	✔ Achieved for the year – ongoing

FEATURE PROJECT: 7C–006

EASING THE WEANING TRANSITION: PELLET FORM AND SIZE TO REDUCE THE POST-WEANING GROWTH CHECK

PROJECT LEADER:
Dr Kate Plush, SunPork Group

PROJECT PARTICIPANTS:
Robert Hewitt, Jessica Zemitis (SunPork), Robert Parkes (Ridley Agriproducts Pty Ltd)

AIMS AND OBJECTIVES

This project seeks to confirm the findings of the previous study (APRIL 6A–103, Easing the transition: large piglets from large pellets) in a commercial setting with an older weaning age (~26 days), testing the primary hypothesis that piglets that receive semi-moist large (diameter) pellets will have an increased body weight at day 28 following weaning, and secondly, that piglets receiving the semi-moist large pellet will have an improved growth performance in the first week after weaning.

KEY FINDINGS

Unlike the previous study (6A–103) where the shorter lactation length restricted the ability of creep feeding to influence post-weaning performance, this project was able to show that using a large diameter pellet in a managed creep feeding program was able to positively influence post-weaning growth. There was no difference in average daily gain from the start of creep feeding at day 8 of lactation through to day 21. However, from day 21 until weaning at day 26, piglets receiving the standard creep feed grew significantly faster than those fed semi-moist pellets.

FIGURE 6

Treatment diets offered to piglets during lactation and the first week following weaning.

Large standard formula pellet (a), small standard formula pellet (b), large semi moist extruded creep (SMEC) pellet (c), and small semi-moist extruded creep (SMEC) pellet (d). Scale graduation 10 mm.

Average daily gain in the first 9 days after weaning was significantly affected by both pellet size and creep feed presentation. Piglets that received the large pellet in both lactation and as a transition feed at the start of the nursey phase grew faster than those receiving the small pellet (127 *vs* 96 g/d, P<0.001), whilst those piglets receiving the standard creep diet grew faster than those receiving the semi-moist feed (135 *vs* 88 g/d, P<0.001). These treatment differences were additive, with the large-standard diet treatment growing at 160 g/d in the first 9 days after weaning, compared to the small SMEC-fed piglets growing at 82 g/d (P=0.002).

Applications to Industry: This project showed that using a large diameter pellet in a managed creep feeding program positively influenced post-weaning growth, adding further support to previous studies where lactation lengths were greater than 25 days. Although this study was likely under-powered for determining differences between treatments in piglet removals, a larger percentage of pigs receiving the small pellets failed to exit the nursery, consistent with previous findings.

Behavioural observations in this study support the exploratory behaviour data that were observed in the previous study. The destructible nature of the pellets that deliver nutritional value to the pig means they are a more relevant form of enrichment than indestructible, inedible objects, and their ability to be picked up and carried is more likely to stimulate object play. Moreover, larger diameter pellets have advantages over more traditional sources of enrichment such as straw, that are less compatible with slatted floors and liquid effluent systems.

A limiting factor on the application of this research is the willingness of feed mills to change to larger diameter dies for the smaller volumes of creep feed required, and the inclusion of shorter shelf-life raw materials such as milk powders means large production runs and subsequent storage is likely problematic. There are mills that currently produce larger diameter pellets for extensive pig production operations; however, the availability of raw materials and the ability to bag feed to extend shelf-life are some of the issues that likely require further work before commercialisation.

COMMUNICATI
REPORT

INTRODUCTION

APRIL's communication framework, as part of its Strategic Plan (2022–2025), has continued to evolve ensuring that all stakeholders are provided with relevant and timely information. During the reporting period, extensive dissemination of information through in-person presentations at producer and industry-related events, attendance at conferences and meetings, via media such as APRIL NEWS and the Australian Pork Newspaper, and through publications, has occurred.

Of note, the communications framework contains mechanisms for Members and other stakeholders to provide feedback to APRIL management and to the Board. The Strategic Plan puts communication at the heart of APRIL's operations and extension agenda, with Pillar 4 devoted to connecting with our stakeholders.

ON

THE KEY COMPONENTS OF THE COMMUNICATION FRAMEWORK ARE:

- **Maintain the Director-Ordinary Member buddy system.**
- **Convene an annual Stakeholders' Forum for all APRIL stakeholders.**
- **Arrange annual meetings with APRIL Members to understand needs and promote outcomes.**
- **Keep industry and stakeholders informed of research and development, education and training, and commercialisation activities and outcomes.**
- **Maintain an independent website as a repository for key information and promotion of APRIL activities.**
- **Present regular updates of APRIL's progress and outcomes at producer and scientific forums.**
- **Conference and events sponsorship.**
- **Publication of research in journals and conference proceedings.**

COMMUNICATION ACTIVITIES

MAINTAIN DIRECTOR-ORDINARY MEMBER BUDDY SYSTEM

The Director-Ordinary Member Buddy system is a standing agenda at each Board meeting, where Directors are expected to contact their allocated Ordinary Members to provide an opportunity for Members to raise any issues at Board level.

CONVENE AN ANNUAL STAKEHOLDER DAY FOR ALL APRIL MEMBERS AND STAKEHOLDERS

The Annual Stakeholders' Forum in November 2023, in Brisbane, was held prior to the Australasian Pig Science Association's 19th Biennial conference. As always, the Forum provided an excellent opportunity for exchange and communication of APRIL's activities and future plans, with 68 registrants attending.

A detailed account of the 2023 Stakeholders' Forum is provided in the CEO Report. In brief, Dr Robert van Barneveld (SunPork Group) led the audience through the basic framework and the need for an industry Green Paper. Professor Paul Hemsworth (The University of Melbourne) provided an overview *on Early stress experiences and stress resilience and emotionality in pigs*, and the challenges for researchers in *translating science into practice* was delivered by Dr's Kate Plush (SunPork Group) and Rebecca Morrison (Rivalea Australia). Further updates on APL Research and Innovation and APRIL's Commercialisation activities and future pipeline projects were presented which was followed by the presentation of the APRIL Enterprise Award.

Registrants then enjoyed a networking function and dinner at the completion of the event.

ARRANGE ANNUAL MEETINGS WITH APRIL MEMBERS TO UNDERSTAND NEEDS AND PROMOTE OUTCOMES

During the reporting period APRIL staff, along with APRIL Chair Dr Tony Peacock, engaged regularly with APRIL Members and stakeholders. A number of meetings were held with a representative (or representatives) from Members, resulting in more regular commentary and feedback being received, particularly in areas related to APRIL's transition towards the proposed participant model. Feedback was also received through regular email and telephone communications.

In April 2024, The University of Queensland hosted some members of the APRIL Board and management at its Gatton Campus. A tour of the new experimental feed mill and some of the facilities, including the meat science laboratories, occurred, as well as interactions with staff and students. Professor Eugeni Roura is thanked for organsing this visit.

KEEP INDUSTRY AND STAKEHOLDERS INFORMED OF RESEARCH, EDUCATION AND TRAINING, AND COMMERCIALISATION ACTIVITIES AND OUTCOMES

In conjunction with the activities listed above and those on the APRIL website, Dr John Pluske and Dr Charles Rikard-Bell achieve this through regular monthly articles in Australian Pork Newspaper (APN), email distribution (e.g., of completed projects), and (or) through APRIL NEWS. In this reporting period, four editions of APRIL NEWS were produced and 12 articles in the APN were published. All contain information and updates of interest with regard to the research program (e.g., funded projects, project Final Reports, funding calls), education and training (e.g., student awards) and commercialisation (e.g., AusScan Online updates, Early Harvest Reports) activities and outcomes, a Research Snapshot from completed or ongoing projects, and news and events of relevance and importance to APRIL Members and other stakeholders.

MAINTAIN AN INDEPENDENT WEBSITE FOR PROMOTION OF APRIL ACTIVITIES

The APRIL website apri.com.au has continued to be revamped and contains a significant amount of information regarding all APRIL's funding opportunities as well as results of APRIL research projects, students' theses, information pertaining to reporting and governance, and APRIL's current Strategic Plan. The website also holds the Final Reports from the two Pork CRC programs (2005–2019), as well as a host of other CRC content.

PRESENT REGULAR UPDATES OF APRIL'S PROGRESS AT PRODUCER AND SCIENTIFIC FORUMS

The APRIL CEO and Chief Scientist Dr John Pluske presented the following during the reporting period, or attended the following events. These events also provided opportunities to interact and discuss issues and matters pertaining to APRIL with Members and stakeholders:

1. **26–28 July 2023:** Recent Advances In Animal Nutrition, Gold Coast, QLD. Presentation of paper.
2. **1–2 August 2023:** Australasian Pig Science Association committee meeting, Brisbane, QLD.
3. **18 August 2023:** attendance and presentation at SA Pork Industry Day, Tanunda, SA.
4. **21–23 August 2023:** visit to research sites and APRIL project collaborators, New Zealand.
5. **20–22 September 2023:** attendance at Pig Research Summit, Denmark.
6. **13 November 2023:** APRIL Stakeholders Forum and AGM, Sofitel Brisbane, QLD.
7. **13–16 November 2023:** Australasian Pig Science Association Conference, Sofitel Brisbane QLD.
8. **8–9 February 2024:** APL/APRIL Joint Board Meeting and Dinner; APRIL Board Meeting; Canberra, ACT.
9. **27 February 2024:** attendance and presentation at APL Benchmarking Day, Melbourne, VIC.
10. **28 February 2024:** visit and presentation to staff, Faculty of Science, The University of Melbourne, VIC.
11. **26 March 2024:** attendance and presentation to Victorian Pig Inquiry.
12. **12 April 2024:** attendance at WAPPA Industry Day, Perth, WA.
13. **22–23 April 2024:** APRIL Board Meeting and visit to The University of Queensland, Gatton Campus, QLD.
14. **13–15 May 2024:** Food with Purpose Conference and Trade show (PIX, AMC and APL), Gold Coast Convention Centre, QLD.

IN THIS REPORTING PERIOD, FOUR EDITIONS OF APRIL NEWS WERE PRODUCED AND 12 ARTICLES IN THE APN WERE PUBLISHED

The APRIL Manager, Commercialisation and Research Impact, Dr Charles Rikard-Bell, attended the following events during the year:

1. **17–19 July 2023:** Australian Pig Veterinarian Conference, Twin Waters, Sunshine Coast, Qld.
2. **26–28 July 2023:** Recent Advances In Animal Nutrition, Gold Coast, Qld. Presented paper.
3. **18 August 2023:** Pork SA Pig Industry Day, Tanunda, SA.
4. **6 September 2023:** Rivalea Australia visit, Tails CRC-P Introduction to the Decision Support Tool Prototype 1.
5. **7 September 2023:** SunPork Group (Dr Bernie Gleeson) Tails CRC-P Introduction to the Decision Support Tool Prototype 1.
6. **8 September 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Bendigo, Victoria.
7. **11 September 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Toowoomba, Qld.
8. **12 September 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Murgon, Nth Qld.
9. **14 September 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Gunnedah, Nth NSW.
10. **19 September 2023:** WestPork – Tails CRC-P Introduction to the Decision Support Tool Prototype 1; Milne Feeds – AusScan Online update; Grains Australia – AusScan Update. Perth, WA.

11. **20 September 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Technology Park, Bentley, WA.
12. **28 September 2023:** DSM visit APRIL, Gawler SA.
13. **18 October 2023:** APL/APRIL Roadshow – Tails CRC-P Introduction; Heat Stress; AusScan Online Update; Young, NSW.
14. **8 November 2023:** AgTech Growth Fund, Primary Industries and Regions South Australia (PIRSA), Nth Terrace, Adelaide.
15. **13 November 2023:** APRIL Stakeholders Forum and AGM, Sofitel Brisbane, Qld.
16. **13–16 November 2023:** Australasian Pig Science Association Conference, Sofitel Brisbane Australia.
17. **7 December 2023:** Online Zoom meeting with the Sunner Group (Broiler producer – China), Introduction to AusScan Online.
18. **8–9 February 2024:** APL/APRIL Joint Board Meeting and Dinner; APRIL Board Meeting; Canberra, ACT.
19. **12 February 2024:** APRIL Education Advisory Committee meeting via Zoom, Education Awards.
20. **19–20 February 2024:** Australian Poultry Science Symposium, Sheraton Hotel, Sydney, NSW.
21. **22 March 2024:** Pork SA Pig Industry Day, Tanunda, SA.
22. **22–23 April 2024:** APRIL Board Meeting and visit to University of Queensland, Gatton Campus, Qld.
23. **13–15 May 2024:** Food with Purpose Conference and Trade show (PIX, AMC and APL), Gold Coast Convention Centre, Qld.
24. **21–22 May 2024:** Tails CRC-P workshop with Square V – Milestone 5, Development of a Decision Support Tool. Novotel, Barossa Valley, SA.
25. **25 June 2024:** APRIL Board Meeting held via Zoom.

CONFERENCE AND EVENTS SPONSORSHIP

A key mechanism to engage with Members and stakeholders and extend information on APRIL's various activities is the sponsorship of conferences and events. During the reporting period, APRIL was able to offer support for a number of these events including the Australasian Pig Science Association Conference; the Australian Pig Veterinarians' Conference; PIX AMC and APL Food with Purpose Conference and Trade show; Recent Advances in Animal Nutrition Conference; Pork SA Pig Industry Day.

PUBLICATION OF RESEARCH IN JOURNALS AND CONFERENCE PROCEEDINGS

During the reporting period, the following publications arising from APRIL and Pork CRC supported research were published:

1. Abdallah, A., Kumar, A., Navarro, M., Muller, M., Tilbrook, A.J., Plush, K.J., D'Souza, D.N. and Roura, E. (2023). Stocking density increases the incidence of tail biting in post-weaned pigs. *Animal-Science Proceedings* 14: 827-828.
2. Babington, S., Tilbrook, A.J., Maloney, S.K., Fernandes, J.N., Crowley, T.M., Ding, L., Fox, A.H., Zhang, S., Kho, E.A. and Blache, D. (2024). Finding biomarkers of experience in animals. *Journal of Animal Science and Biotechnology* 15: 28.
3. Bogere, P., Taylor, S., Navarro, M., Muller, M., Pascal, N., Ibanez, C., Tedo, G., Wong, M. and Roura, E. (2023). The volatile organic compound profile in commercial post-weaning diets differ from gestating or lactating diets potentially contributing to neophobic feeding behaviours in piglets. *Animal-Science Proceedings* 14: 889-890.
4. Coba, A., Muller, M., Navarro, M., Soumeh, E.A., Pluske, J.R., van Wettere, W.H.E.J., Cottrell, J.J., Dunshea, F.R., Gaughan, J.B. and Roura, E. (2023). Low crude protein diets improve heat stress indicators in lactating sows under cyclic hyperthermal temperatures. *Animal-Science Proceedings* 14: 849-850.
5. Coba, A., Muller, M., Navarro, M., Soumeh, E.A., Pluske, J.R., van Wettere, W.H.E.J., Cottrell, J.J., Dunshea, F.R., Gaughan, J.B. and Roura, E. (2023). Physiological responses related to acute heat stress decrease over time as lactating sows become acclimated to a hyperthermic environment. *Animal-Science Proceedings* 14: 855-856.
6. Collins, A. and Bowring, B. (2023). Pre-treatment with bromelain prevents intestinal dysbiosis in pigs with post-weaning diarrhea, without Increasing antimicrobial resistance in *Escherichia coli. Animals* 13: 3229.
7. Collins, A. and Collins, C. (2024). Epidemiology tools to evaluate the control of proliferative enteropathy in commercial pig herds. *Animals* 14: 1357.
8. Cottrell, J.J., Green, M.P., Dunshea, F.R., Liu, F., Plush, K.J. and Zhao, W. (2023). Identification of how future climates may impact the reproductive herd and what this may mean for nutrition. *Journal of Animal Science* 101 (Supplement 3): 208-209.
9. Dunshea, F.R., Pluske, J.R. and Ponnampalam, E.N. (2024). Dietary iron or inulin supplementation alters iron status, growth performance, intramuscular fat and meat quality in finisher pigs. *Meat Science* 213: 109496.
10. Galea, R., Hemsworth, L., Lucas, M., Plush, K., Morrison, R., Jorquera-Chavez, M., Zemetis, J., Hemsworth, P., Tilbrook, A. and Stevenson, M. (2023). The incidence of tailbiting in pigs reared under commercial conditions in Australia. In The 56th Congress of ISAE, p. 108.
11. Hewitt, R.J.E., Jannusch, S., Tritton, S.M., Plush, K.P. and D'Souza, D.N. (2023). Large pellets stimulate object play in piglets during lactation. *Animal-Science Proceedings* 14: 830-831.

12. Hewitt, R.J.E., Sampaio, M.O., Corso, A.C., Bradshaw, W., Plush, K.J. and D'Souza, D.N. (2023). Supplementation of a protected complex of bio factors and antioxidants reduces inflammation in weaner pigs. *Animal-Science Proceedings* 14: 881-882.
13. Lucas, M., Galea, R., Stevenson, M., Hemsworth, P., Morrison, R., Jorquera-Chavez, M. and Hemsworth, L. (2023). Direct observations of tail posture as a proxy for tail damage in pigs. In The 56th Congress of ISAE 2023, p. 241.
14. Lucas, M.E., Hemsworth, L.M., Butler, K.L., Morrison, R.S. Tilbrook, A.J., Marchant, J.N., Rault, J.-L., Galea, R.Y. and Hemsworth, P.H. (2024). Early human contact and housing for pigs – Part 1: Responses to humans, novelty and isolation. *Animal* 18: 101164.
15. Lucas, M.E., Hemsworth, L.M., Butler, K.L., Morrison, R.S. Tilbrook, A.J., Marchant, J.N., Rault, J.-L., Galea, R.Y. and Hemsworth, P.H. (2024). Early human contact and housing for pigs – Part 2: Resilience to routine husbandry practices. *Animal* 18: 101165.
16. Lucas, M.E., Hemsworth, L.M., Butler, K.L., Morrison, R.S. Tilbrook, A.J., Marchant, J.N., Rault, J.-L., Galea, R.Y. and Hemsworth, P.H. (2024). Early human contact and housing for pigs – Part 3: Ability to cope with the environment. *Animal* 18: 101166.
17. Lucas, M.E., Hemsworth, L.M. and Hemsworth, P.H. (2023). Review: Early life piglet experiences and impacts on immediate and longer-term adaptability. *Animal* 17: 100889.
18. Marchant, J., Rikard-Bell, C. and Jongman, E. (2023). The effects of a molasses block enrichment on behavior and welfare of sows post-mixing. In The 56th Congress of ISAE 2023, p. 131.
19. Muller, M., Coba, A.,Navarro, M., Tedo, G., Cottrell, J.J., Dunshea, F.R., Pluske, J.R., van Wettere, W.H.E.J. and Roura, E. (2023). Umami feed flavouring in lactating sow sunder heat stress stimulates litter growth irrespective of the crude protein content of the diet. *Animal-Science Proceedings* 14: 851-852.
20. Plush, K.P., Tritton, S.M., Zemetis, J.E., Balog, G., Hewitt, R.J.E. and D'Souza, D.N. (2023). A coarser ground diet fed to sows in gestation improves reproductive performance. *Animal-Science Proceedings* 14: 854-855.
21. Pluske, J.R., Murphy, K.J., Dunshea, F.R. (2024). Pork nutritional value and relationships with human health. In: Dikeman, M. (Ed.), Encyclopedia of Meat Sciences III, vol. 1. Elsevier, pp. 587–595.
22. Pluske, J.R., Turpin, D.L., Kim, J.C., Trezona, M., Abraham, S. and Dunshea, F.R. (2023). Impacts of feeding lauric acid on performance of late-finishing, Improvac-treated male pigs. *Animal Production Science* 63 (18): xii.
23. Rikard-Bell, C.V., Taber, N. and Pluske, J.R. (2023). Does the falling-number value impact the adjusted digestible energy content of weather-damaged wheats for pigs? *Animal Production Science* 63 (18): xiv.
24. Sharif-Islam, M., Henryon,M., van der Werf, J.H.J., Chu, T.T., Wood, B.J. and Hermesch, S. (2023).Comparing pedigree and genomic relationships to control inbreeding in optimum-contribution selection restricting the number of sires in pigs. *Animal-Science Proceedings* 14: 877-878.
25. Staveley, L.M., Hermesch, S., Hewitt, R.J.E., Plush, K.P. and D'Souza, D.N. (2023). The use of post-cervical artificial insemination to improve reproductive performance in sows. *Animal-Science Proceedings* 14: 841-842.

26. Taylor, S.M., Navarro, M., Muller, M., Pascal, N., Ibanez, C., Wong, M., Tran, V.H. and Roura., E. (2023). Volatile Organic Compound (VOC) fingerprint in Australian swine feed formulations: Signature groups and nutrient precursors. *Animal-Science Proceedings* 14: 886-887.
27. Tomas, K., Savaglia, J., Plush, K.J., D'Souza, D.N., Butler, K.L., Hemsworth, P.H. and Tilbrook, A.J. (2024). Maternal contact and positive human interactions during lactation impact on pig stress resilience post-weaning. *Applied Animal Behaviour Science* 276: 106326.
28. Tomas, K., Savaglia, J., Plush, K.J., D'Souza, D.N., Butler, K.L., Hemsworth, P.H. and Tilbrook, A.J. (2024). Maternal contact and positive human interactions during lactation impacts piglet performance and behaviour during lactation. *Frontiers in Animal Science* 4: 1289518.
29. Tomas, K., Savaglia, J., Plush, K.P., D'Souza, D.N., Butler, K.L., Hemsworth, P.H. and Tilbrook, A.J. (2023). Early life maternal contact has long-term impacts on pig growth. *Animal-Science Proceedings* 14: 816-817.
30. Tomas, K., Saviglia, J., Plush, K., D'Souza, D., Butler, K., Hemsworth, P. and Tilbrook, A. (2023). Early-life positive human contact causes quicker stabilisation of piglet behaviour following weaning. In The 56th Congress of ISAE 2023, p. 39.
31. Tran, V.H., Navarro, M., Omaleki, L., Roura, E. and Turni, C. (2023). Preliminary screening of the gut microbiota of piglets for antibiotic-resistant genes using a metagenomic approach. *Animal-Science Proceedings* 14: 879-880.
32. Tucker, B.S., Jorquera-Chavez, M., Petrovski, K.R., Craig, J.R., Morrison, R.S., Smits, R.J. and Kirkwood, R.N (2023). Comparing surface temperature locations with rectal temperature in neonatal piglets under production conditions. 51: 212-219.
33. Van Kerschaver, C., Turpin, D.L., Michiels, J. and Pluske, J.R**.** (2023). Reducing weaning stress in piglets by pre-weaning socialization and gradual separation from the sow: A review. *Animals* 13**:** 1644.
34. Ward, S., Pluske, J.M.,Plush, K.P., Pluske, J.R. and Rikard-Bell, C.V. (2023). Decision support tools for mitigating tail biting in pigs: Analysing methodologies and predictive outputs. *Animal-Science Proceedings* 14: 826-827.
35. Ward, S.A., Pluske, J.R., Plush, K.J., Pluske, J.M. and Rikard-Bell, C.V. (2024). Assessing Decision Support Tools for Mitigating Tail Biting in Pork Production: Current Progress and Future Directions. *Animals* 14: 224.
36. Weaver, A.C., Braun, T.C., Braun, J.A., Golder, H.M., Block, E. and Lean, I.J. (2024). Effects of negative dietary cation-anion difference and calcidiol supplementation in transition diets fed to sows on piglet survival, piglet weight, and sow metabolism. *Journal of Animal Science* 102: skae027.
37. Zemetis, J.E., Plush, K.P.,Hewitt, R.J.E., Balog, G., Staveley, L.M., Tritton, S.M. and D'Souza, D.N. (2023). The impact of pellet size and moisture level of creep feed on post-weaning performance of pigs. *Animal-Science Proceedings* 14: 831-832.

STRATEGIC PLAN DELIVERABLES

A summary of progress against the Strategic Plan deliverables is provided below:

PILLAR 4: CONNECTING WITH MEMBERS AND THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	2024 STATUS
Implement an effective and appropriate communication plan	Initiate an appropriate communication framework that effectively disseminates APRIL activities and associated outcomes (2022 and reviewed annually).	✔ Achieved for the year – ongoing
Develop activities that are collaborative and inclusive across the member and stakeholder base	All projects to involve at least one Member organisation.	✔ Achieved for the year – ongoing
	Maintain the Board Director-Ordinary Member buddy system to enable one-on-one communication with Ordinary Members (4–5 times annually).	✔ Achieved for the year – ongoing
	Invite Members and key stakeholders to attend the APRIL Annual Stakeholder Forum (and other events as appropriate) to extend latest results and receive direct feedback on outcomes and progress.	✔ Achieved for the year – ongoing
	Provide an APRIL update at APL Delegates' Forum events/annual joint APRIL–APL Board discussion (at least once annually).	✔ Achieved for the year – ongoing
Present updates of APRIL's activities and progress at producer and scientific forums	Present on APRIL activities and outcomes to representatives of a wide member and producer base in Australia and New Zealand through industry seminars/meetings, and to international conferences and forums (where appropriate):	✔ Achieved for the year – ongoing
	• Present at a minimum of one international conference per annum, from March 2022.	✔ Achieved for the year – ongoing
	• Present at a minimum of two member-based conferences per annum, from March 2022.	✔ Achieved for the year – ongoing
Participate in strategic sponsorship/partnerships	Raise and reinforce APRIL's contributions to the Australasian pork industry by providing strategic sponsorship or partnerships (e.g., APSA conference, State field/industry days, member events).	✔ Achieved for the year – ongoing
Keep industry and stakeholders informed of APRIL's activities and outcomes	Provide timely and relevant media releases to the rural press including at least 10 articles per annum in the Australian Pork Newspaper/Pork Journal.	✔ Achieved for the year – ongoing
	Write a quarterly newsletter to all members.	✔ Achieved for the year – ongoing
	Conduct strategic/targeted scientific seminars and updates (two per year, from March 2022).	✔ Achieved for the year – ongoing
	Financial support for selected peer-reviewed publications in internationally recognised journals (up to five papers supported per year, to a total value of $7,500).	● Not achieved for the year – ongoing
Maintain an independent website for information and promotion of APRIL activities	Maintain the APRIL website for communication of research, education and training and commercialisation outcomes, and APRIL news, and maintain links to the Pork CRC website.	✔ Achieved for the year – ongoing
Review and dissemination of project success	For applicable projects and where appropriate and robust mechanisms exist, evaluate the return on investment into APRIL for the pork industry.	● In progress

PROGRESS AGAINST PILLAR 2

EFFECTIVE MANAGEMENT AND DELIVERY OF RESEARCH AND DEVELOPMENT AND EDUCATION AND TRAINING FOR THE AUSTRALASIAN PORK INDUSTRY

APRIL'S PROGRESS AGAINST THE KEY OUTCOMES AND DELIVERABLES FROM PILLAR 2: EFFECTIVE MANAGEMENT AND DELIVERY OF RESEARCH AND DEVELOPMENT AND EDUCATION AND TRAINING FOR THE AUSTRALASIAN PORK INDUSTRY IS SET OUT BELOW, AND EXPLAINED FURTHER IN THE FOLLOWING RESEARCH AND EDUCATION AND TRAINING REPORTS.

PILLAR 2: EFFECTIVE MANAGEMENT AND DELIVERY OF RESEARCH AND DEVELOPMENT AND EDUCATION AND TRAINING FOR THE AUSTRALASIAN PORK INDUSTRY

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	2024 STATUS
2.1 Review the APRIL R&D activities portfolio	Review research investment to ensure an appropriate portfolio of Transformational, Innovation, and Commercialisation Projects, with > 60% of the available funds for R&D directed to Transformational Projects.	● In progress
	Ensure research investments are not duplicative, but complementary, with Strategic Plans of APL and NZPIB.	✔ Achieved for the year – ongoing
	Reassessed targets for investment after each funding round and adjust targets accordingly, e.g., balance strategic research domains with research opportunities, enable continuation of completed projects having high potential for industry outcomes, assessment of APRIL commercial income versus direct industry benefits.	● In progress
2.2 Initiate key Transformational Projects for the Australasian	Ensure at least four Transformational Projects, for longer-term, collaborative, inter- and multi-disciplinary 'big picture' projects, are prepared and submitted annually, with major external funding support sought where possible, in priorities to be determined.	● Started – on hold
2.3 Support for Innovation Projects	Funding support annually (20–30% of applicable funds) for smart, innovative and 'out of the box' projects that stimulate change and innovation in the industry and can be a commercialisation pipeline.	✔ Achieved for the year – ongoing
	Change the Innovation Project guidelines to make the (potential) path to commercialisation clearer.	✔ Achieved

ENSURE AT LEAST FOUR TRANSFORMATIONAL PROJECTS … ARE PREPARED AND SUBMITTED ANNUALLY, WITH MAJOR EXTERNAL FUNDING SUPPORT SOUGHT WHERE POSSIBLE, IN PRIORITIES TO BE DETERMINED

PILLAR 2: EFFECTIVE MANAGEMENT AND DELIVERY OF RESEARCH AND DEVELOPMENT AND EDUCATION AND TRAINING FOR THE AUSTRALASIAN PORK INDUSTRY *continued*

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	2024 STATUS
2.4 Assist with human capacity building in the Australasian pork industry	Make annual investments into maintaining and building education and training for the industry, to support undergraduate and postgraduate students and the Industry Placement Program (IPP):	✔ Achieved for the year – ongoing
	• Offer at least three full scholarship Masters or PhD awards per annum.	● Not achieved for the year – ongoing
	• Four undergraduate students completed an Honours project by June 2022, with at least two Honours students completing a project per year thereafter.	● Not achieved for the year – ongoing
	• Three DVM or BSc/BVMS students completed a project by June 2022, with at least two DVM or BSc/BVMS students completing a project per year thereafter.	● Not achieved for the year – ongoing
	• Four postgraduate students working on APRIL or APRIL-related projects being trained by 2022, and each year thereafter.	✔ Achieved for the year – ongoing
	• A minimum of three IPP awardees embedded in industry organisations at any one time.	✔ Achieved for the year – ongoing
2.5 Support for Facility Funding	Ongoing support for appropriate, diversified and cost-effective facility funding for the Australasian pork industry.	✔ Achieved for the year – ongoing
2.6 Support for Kickstart program	Ongoing support for the Kickstart program, to provide funding to assist with the preparation and submission of a specific, targeted and agreed major external funding application (or applications) in partnership with APRIL and other partners.	● Not achieved for the year – ongoing
2.7 Support for APRIL Enterprise Award	Create an annual APRIL Enterprise Award to support on-farm creativity and innovation for practical application.	✔ Achieved for the year – ongoing

RESEARCH RE

TRANSFORMAT

PROJECTS

WHAT IS A TRANSFORMATIONAL PROJECT?

APRIL Transformational Projects address major issues for the Australasian pork industry that, if successfully implemented, are likely to result in a step-change. Transformational Projects are highly collaborative, multi-disciplinary, and by their very nature require considerable resources and time to execute. Consequently, Transformational Projects require significant external investment and are targeted at, but not restricted to, the Australian Research Council schemes and the Cooperative Research Centre-Project (CRC-P) scheme.

PORT
TIONAL

KEY THEMES

In the previous Strategic Plan 2019–2022, APRIL identified two key themes for Transformational Projects as follows:

6.1.1 ENHANCED ANTIMICROBIAL STEWARDSHIP IN THE AUSTRALASIAN PORK INDUSTRY THROUGH TARGETED REDUCTION OF IN-FEED MEDICATIONS WITHOUT ADVERSE HEALTH CONSEQUENCES

Judicious use of antibiotics is a high priority for the Australasian pork industry. One of the best ways to reduce total use of antibiotics in pig production systems is to limit the use of in-feed medications. When antibiotics are included in feed, every pig on that feed receives a dose whether they need it or not, and dosage continues until the batch of feed is consumed. Arguably, this contributes to elevated overall use of antibiotics, an increased number of doses per pig and potentially an increase in the mg of active constituent administered per kg of pork produced. While antibiotic use in agriculture has not contributed significantly to antimicrobial resistance to date, the Industry does have an obligation to minimise any chance that application of antibiotics in pork production systems renders any registered agents or high or medium importance ASTAG (Australian Strategic and Technical Advisory Group on Antimicrobial Resistance)-classified antibiotics unsuitable for use in human medicine.

This priority has been identified as a transformational project because of the multidisciplinary nature of the challenge. Reduction of in-feed medications will potentially require a higher reliance on vaccines, novel use of other nutritional mechanisms to control disease, enhanced capacity to apply pulse water medications, better systems for disease surveillance, capacity for targeted individual pig treatments, better piggery hygiene, higher health status herds and sources of genetics and, if in-feed antibiotics are not used, systems that allow efficient and targeted application of other antibiotics.

6.1.2 ELIMINATION OF THE NEED FOR TAIL DOCKING IN AUSTRALASIAN PORK PRODUCTION SYSTEMS

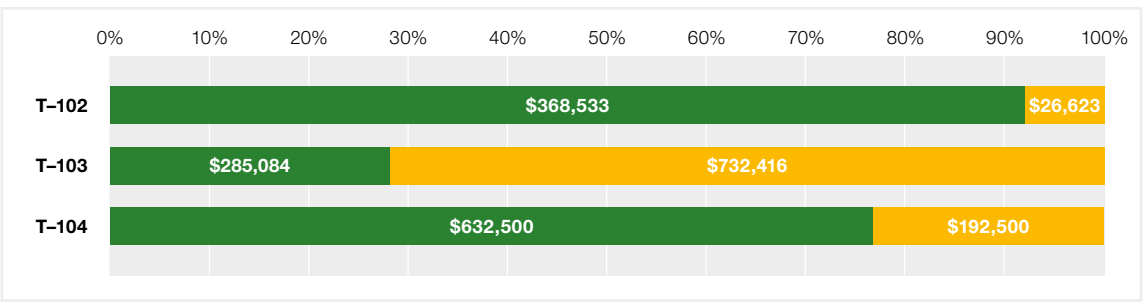
Tail biting is an insidious and costly manifestation that can occur without warning and indiscriminately within commercial pork production systems. Occurrence extends across the entire industry. The cause of tail biting is not understood but is likely to be an interaction between behaviour, environment, management, nutrition, housing and health status, among others, with no one factor necessarily contributing more than another. Costs of tail biting extend to compromised pig welfare, negative behavioural traits, sub-optimal growth rates and feed conversion efficiency, carcase damage and loss of a potentially marketable product (i.e., the tail). Current interventions for the control of tail biting are generally effective yet inconsistent but involve the removal of a portion of the tail shortly after birth without the use of anaesthesia. Other invasive husbandry procedures such as teeth-clipping and ear notching have largely been eliminated from many production systems already, and there is increasing pressure to cease tail docking.

However, to date, the industry has resisted without any alternative approach to eliminate tail biting. As a priority, the pork industry should be focussed on understanding the causal factors and interactions that contribute to tail biting with a view to eliminating or managing these factors, as opposed to investing in research that justifies tail docking based on minimal pain responses or through the introduction of anaesthesia options. The significant current and future costs of tail biting and its management should not be underestimated, nor should the multi-faceted challenge of understanding the causal factors, which is why APRIL has identified elimination of the need for tail docking in commercial production systems as a transformational project.

PROJECTS

NO.	PROJECT NAME	LEAD PARTY
T–101	Pathways to rearing pigs with tails to maximise returns to pork producers	The University of Queensland
T–102	How to make antimicrobials in pig feed redundant, naturally	The University of Queensland
T–103	Novel approaches for combatting critically important antimicrobial resistance development in livestock	Murdoch University
T–104	Eliminating pig tail removal to improve welfare and industry sustainability	SunPork Pty Ltd

TRANSFORMATIONAL PROJECT COMMITMENTS



THE APPLICATION REQUESTED, AND RECEIVED, AN AUSTRALIAN GOVERNMENT CASH INVESTMENT OF $2,892,374 OVER THREE YEARS … WAS ABLE TO LEVERAGE AN ADDITIONAL $3,345,078 OF COMBINED IN-KIND CONTRIBUTIONS FROM THE PARTNERS

T–101: PATHWAYS TO REARING PIGS WITH TAILS TO MAXIMISE RETURNS TO PORK PRODUCERS and T–104: ELIMINATING PIG TAIL REMOVAL TO IMPROVE WELFARE AND INDUSTRY SUSTAINABILITY

In March 2020, APRIL (as Lead Party) submitted a Round 9 CRC-P application *Pathways to rearing pigs with tails to maximise returns to pork producers*. The application involved researchers from The Universities of Queensland, Melbourne and New England, as well as strong industry involvement from Rivalea (Australia) Pty Ltd., SunPork Farms, and Australian Pork Limited. Unfortunately, the round was extremely competitive (8% success rate) and APRIL's application was unsuccessful.

APRIL met with the collaborators and determined that a new CRC-P application should be submitted. A new submission *Eliminating pig tail removal to improve welfare and industry sustainability* was made to the Round 11 CRC-P funding round led by SunPork Pty Ltd. We were informed on 7 September 2021 that this application was successful.

The application requested, and received, an Australian Government cash investment of $2,892,374 over three years, which combined with the project partners' cash contribution of $1,638,742 ($750,000 plus GST from APRIL), was able to leverage an additional $3,345,078 of combined in-kind contributions from the partners. This represents an overall leverage for APRIL of ~10.5:1. Partners in the project are APRIL, Australian Pork Limited, PIC Australasia P/L, Rivalea (Australia) P/L, RSPCA Australia, The University of Melbourne, The University of Queensland, and the University of New England.

This was a good outcome directly addressing one of APRIL's two Transformational Project themes for the Industry, and demonstrating again the value of APRIL in driving large scale industry collaborations. Several workshops were held during the reporting period to update all participants of progress and outcomes, as well as to share information and plan further work.

T–102: HOW TO MAKE ANTIMICROBIALS IN PIG FEED REDUNDANT, NATURALLY

In July 2020, the Australian Research Council (Linkage scheme) announced that it has supported The University of Queensland-administered project 'How to make antimicrobials in pig feed redundant, naturally'. Other organisations involved in the successful grant are The University of Melbourne, the SunPork Group, DSM Nutritional Products, and APRIL.

Chief Investigators in the project are Professor Eugeni Roura (The University of Queensland), Professor Frank Dunshea (The University of Melbourne), Professor Mike Gidley (The University of Queensland), and Associate Professor Pat Blackall (The University of Queensland).

Total cash funding for the four-year project was $1,931,233, with the Australian Research Council contributing $852,000 and partners contributing an additional $1,079,233, of which $359,223 derives from APRIL.

The total value of the project (cash plus in-kind contributions) was $3,835,847.

Again, this is a great example of APRIL partnering with its members to successfully leverage external funding for a major research project of critical industry-wide importance. Research work in the project is progressing well, with there being regular management meetings between partners including updates from the PhD students involved in the program.

T–103: NOVEL APPROACHES FOR COMBATTING ANTIMICROBIAL RESISTANCE IN AUSTRALIAN PIGS: EXPLORING NATURE'S ANTIMICROBIAL ARSENALS, NATURALLY DERIVED FEED ADDITIVES AND NATURAL BACTERIAL FLORA TO COMBAT RESISTANT BACTERIA

The overarching aim of this project, led by Professor Sam Abraham at Murdoch University, is to determine the origin, transmission pathways and public health impact of newly emergent, critically important antimicrobial-resistant (CIA-R) *Escherichia coli* in pigs in order to develop novel control strategies for the pork industry.

This project expects to use advanced high throughput robotics and genomics to understand the extent of the AMR in pigs, significantly maximising the impact of novel integrated control strategies based on nature's antimicrobial arsenal. Using naturally derived feed additives, phages, and natural bacterial flora, the outcomes will enhance our understanding of AMR in pigs and aid in the development of commercially viable solutions. The anticipated outcomes will address one of the most pressing and globally significant animal and public health issues at the moment, namely the development and dissemination of resistance to last-line human use antimicrobials in food-producing animals.

Partners in this 3-year project are Murdoch University, CHM Alliance Pty Ltd., Australian Pork Limited, Feedworks Pty Ltd., Rivalea (Australia) Pty Ltd. and Tecan Australia Pty Ltd.

TOTAL CASH FUNDING FOR THE FOUR-YEAR PROJECT WAS $1,931,233, WITH THE AUSTRALIAN RESEARCH COUNCIL CONTRIBUTING $852,000 AND PARTNERS CONTRIBUTING AN ADDITIONAL $1,079,233, OF WHICH $359,223 DERIVES FROM APRIL.

DR SOPHIE WARD

MY INVOLVEMENT WITH APRIL AND THE TAILS CRC PROJECT

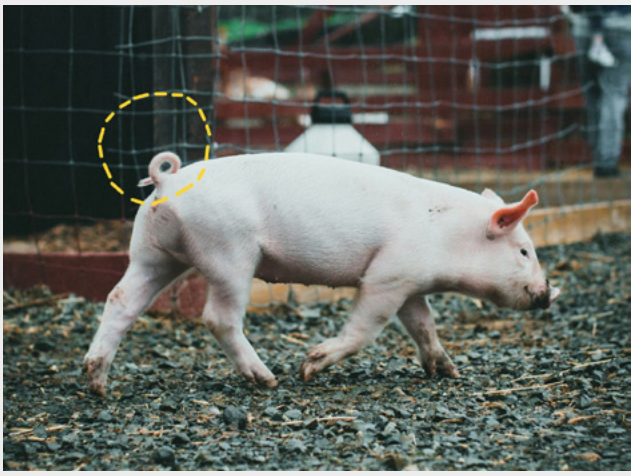
Supported by APRIL as an early career fellow, my role in the Tails CRC-P has been to develop a decision support tool (DST) that will allow producers to evaluate their own units for tail biting risk. Applying for this position at the end of my PhD, this project has given me opportunity to engage with members across the pork industry, visit key producers across Australia and strengthen my passion for working in this field.

The DST will be the result of an industry collaborative project that tracked tail biting behaviour of over 75,000 pigs under normal commercial conditions. Using this information, our aim is to deliver a support tool that allows producers to understand what risks may be present on their own units and select the best strategies to minimise this behaviour.

Throughout this fellowship I have been learning how scientific research can, and should, be applied back to industry to benefit producers. APRIL's recent involvement in the APL roadshow gave me the opportunity to connect with industry members across Australia and understand the current challenges faced on both large and smaller scale units. Tail biting outbreaks seem to be sporadic and unpredictable, with one producer explaining to me:

"… WE HAVE SEVERAL GROUPS OF PIGS GO THROUGH A UNIT WITH SEEMINGLY NO ISSUES, THEN ANOTHER GROUP WILL GO THROUGH THE SAME SHED, PROVIDED THE SAME DIET AND MANAGEMENT AND WE GET A TAIL BITING OUTBREAK…"

THE DST WILL BE THE RESULT OF AN INDUSTRY COLLABORATIVE PROJECT THAT TRACKED TAIL BITING BEHAVIOUR OF OVER 75,000 PIGS UNDER NORMAL COMMERCIAL CONDITIONS



Out of all pigs monitored in our Tails CRC project, less than 5% of the subject population, consisting of both Sunpork and Rivalea units, experienced a tail biting event. This shows the difficulty of capturing tail biting activity in a normal scale project, and the seemingly 'sporadic' nature of this behaviour. Although tail biting is difficult to capture, risk should not be overlooked. A single biting event has the potential to trigger repeat biting not only by the original perpetrator but by other pigs within the group. Without understanding the reasons, or set of reasons, for biting behaviour, outbreaks can be devastating to the producer both economically and from a welfare perspective.

A noteworthy aspect of this study is that every pig involved was monitored for any tail biting behaviour from birth until slaughter. Tracking the population across production stages will give us insight of not only what risk factors contribute to biting behaviour, but *when* these factors present the greatest risk. This will be the first support tool of its kind to utilise primary observational data[1], allowing the consideration of age interactions in the predictive model.

As part of developing the DST, APRIL has been working closely with project parties, the University of New England and University of Melbourne as they analyse the data for genetic and non-genetic risk factors associated with tail biting events. Collaborating with these teams has given me an appreciation of the work that goes into an epidemiological study at this scale and how we can use this information to predict on farm risks.

In addition to this large-scale study, the Tails CRC-P includes research involving pigs reared under experimental conditions with intact tails. The first of these projects, led by Dr. Megan Lucas from the University of Melbourne, follows the behaviour of pigs leading up to, and during, a tail biting event. We hope to integrate this information into the DST to help producers recognise early warning signs of tail biting before a possible outbreak. Additionally, this study has provided us with insights into the differences in tail biting prelevance between pigs with docked tails and those without.

The second project, led by PhD candidate Abedin Abdallah, from the University of Queensland is focusing on what variables may induce a tail biting incident under experimental conditions. As mentioned previously, one of the challenges with studying tail biting behaviour is whether a tail biting event will even occur within a project time constraints. By Abedin observing what variables may increase tail biting in pigs, including the presence of undocked tails, higher stocking densities and groupings with variable bodyweights, additional projects can be conducted to improve our understanding of how to mitigate this behaviour. For example, various enrichment items suitable for Australian slatted floors (i.e., not straw based) could be tested for their effectiveness in reducing tail biting risk. This type of project would not only strengthen our knowledge of suitable enrichment materials but give more reason to provide pigs with positive welfare experiences.

The project is in its final stages of data analysis and once the risk factors linked to tail biting are determined, the model can be finalised and the DST presented in producer-focused workshops. APRIL will be responsible for the ongoing extension of the DST and the producer workshops will offer valuable insights into the expectations of this tool and what factors to consider regarding adoption of the DST on farm.

The Tails CRC-P is scheduled to be completed in March 2025.

WE HOPE TO INTEGRATE THIS INFORMATION INTO THE DST TO HELP PRODUCERS RECOGNISE EARLY WARNING SIGNS OF TAIL BITING BEFORE A POSSIBLE OUTBREAK

1 Ward, S. A., Pluske, J. R., Plush, K. J., Pluske, J. M., & Rikard-Bell, C. V. (2024). Assessing Decision Support Tools for Mitigating Tail Biting in Pork Production: Current Progress and Future Directions. Animals, 14(2), 224.)

RESEARCH REPORT

INNOVATION PROJECTS

WHAT IS AN INNOVATION PROJECT?

The overall purpose of APRIL Innovation Projects is for the support of “out of the box” ideas for smart, new approaches to tackle current and emerging challenges for the Australasian pork industry.

Innovation Projects must demonstrate originality, uniqueness and creativity, establish new concepts or challenge existing ones, address significant challenges or critical barriers to progress, and be able to improve or apply new theoretical concepts, methodologies or tools that will benefit industry.

PROJECTS

APRIL has invested in the following Innovation Projects, with the following aims:

5A–101 REAL TIME, IN-FIELD WATER TESTING

PROJECT LEADER: DR LOUISE EDWARDS, (EX) RIDLEY AGRIPRODUCTS PTY LTD

- To determine if portable spectral-based hardware is compatible for the development of a real-time, in-field multi-parameter water testing device.

5A–102 INSECT MEAL FROM PORK PROCESSING DERIVED MATERIAL

PROJECT LEADER: DR KRISTY DIGIACOMO, THE UNIVERSITY OF MELBOURNE

- To measure the growth performance of black soldier fly larvae (BSF) on a range of pork processing waste varying in nutrient content to optimise waste substrates for BSF bioconversion.
- To measure the nutrient composition of BSF and frass fertilizer derived from pork processing waste.
- To evaluate any microbial risks associated with insect meal derived from pork processing waste.
- To evaluate any chemical risks (such as heavy metals) associated with insect meal derived from pork processing waste.

5A–103 DEVELOPMENT OF A *STREPTOCOCCUS SUIS* VACCINE VIA MEASUREMENT OF IMMUNE RESPONSES TO FOUR DIFFERENT *STREPTOCOCCUS SUIS* VACCINE PREPARATIONS, USING AN AUSTRALIAN CPS2 ST25 STRAIN

PROJECT LEADER: DR MARK O'DEA, MURDOCH UNIVERSITY (NOW DPIRD, WA)

- Produce the precursor to a vaccine combination targeting the major strains of *S. suis* associated with disease in Australia.
- Adopt serologic monitoring to better determine the effect of vaccines in a more robust manner than clinical signs alone.
- Determine the effectiveness of different bacterial inactivation methods, which have had little exploration in *S. suis* vaccine production, and which may have more effect in maintaining antigen structure and potency.

5A–104 LOW DOSE DIETARY STRATEGIES IN LATE GESTATION TO ENHANCE BORN ALIVE AND PIGLET SURVIVAL AND PERFORMANCE

PROJECT LEADER: DR JESSICA CRAIG, RIVALEA (AUSTRALIA) PTY LTD

- To evaluate the effects of supplementation of 0.5% arginine and three novel feed additives, B-hydroxy ß-methyl butyrate (HMB), N-Carbamylglutamate (NCG), and Calcium nitrate, on litter characteristics at birth when fed from day 90 of gestation.
- To assess each treatment for piglet vitality, number of still born, number born alive and weaned as well as subsequent reproductive performance of all sows.
- Provide the industry with effective strategies for improving the efficiency of reproduction and progeny performance.

5A–105 ORAL MEANS OF INCREASING ENDOGENOUS GROWTH HORMONE LEVELS AND ENHANCING THE PERFORMANCE AND CARCASS CHARACTERISTICS OF GROWING PIGS

PROJECT LEADER: DR FAN LIU, RIVALEA (AUSTRALIA) PTY LTD

- Validate the effects of NCG and HMB supplementation at two levels (0.15% and 0.3%) when fed to finisher pigs from live weight 60–100 kg for feed intake, growth rate and feed efficiency.
- Validate the effects of NCG and HMB supplementation to enhance commercial carcass traits (carcass weight, dressing percentage, loin muscle depth and back fat thickness) and IGF-1 secretion.
- Determine whether NCG is more potent than feeding arginine itself in increasing blood arginine concentration by measuring arginine plasma levels in control; 1% arginine supplementation and the NCG treatments.
- Determine for treatments that significantly alter either increased growth, feed efficiency, loin eye depth or reduced backfat thickness the magnitude of change in plasma amino acid profiles, and urea nitrogen.

5A–107 USING ALGAL EXTRACTS TO IMPROVE WEANER GROWTH PERFORMANCE AND DIGESTIBILITY

PROJECT LEADER: ROBERT PARKES, RIDLEY AGRIPRODUCTS PTY LTD

- Analyse the effect of supplementing weaner pig diets with different algal extracts on:

  1. Growth, feed efficiency and rate of digestion.
  2. The incidence of diarrhoea.
  3. The change in gut microbial populations and inflammation response markers, when compared to conventional weaner pig diets.

5A–108 WHAT SENSORY ATTRIBUTES ARE MOST CRITICAL FOR CONSUMER EVALUATION WITHIN AN AUSTRALIAN PORK EATING QUALITY PROGRAM?

PROJECT LEADER: PROFESSOR FRANK DUNSHEA, THE UNIVERSITY OF MELBOURNE

- Investigate what are the most critical sensory attributes influencing acceptability (overall liking) of Australian pork with Australian consumers.
- Identify what attributes should be used within an Australian pork eating quality program.
- Assess the effectiveness of the Check all that apply (CATA) rapid sensory method for discriminating sensory properties between six different Australian pork products.

5A–109 INVESTIGATING THE IMPACT OF CIRCULATING CREATINE CONCENTRATIONS IN GESTATION ON VITALITY AND SURVIVABILITY OF LOW BIRTH WEIGHT PIGLETS

PROJECT LEADER: DR TANYA NOWLAND, SARDI

In human pregnancies, maternal creatine levels correlate positively with foetal growth, with low levels linked to foetal growth restriction and reduced birthweight, due primarily to

impaired placental blood flow and metabolism. Previously, it has been demonstrated that supplementing sows with creatine or guanidinoacetic acid (GAA) in late gestation improved piglet viability, particularly when birthweight is below 1.1 kg. This project will determine the relationship between circulating creatine concentrations in pregnant sows and piglet birthweight and survival. The impact of increasing circulating creatine by dietary strategies on piglet birthweight, within litter variation in birthweight and piglet survival, will also be established.

5A–110 REAL TIME DETECTION OF DEEP TISSUE ABSCESSES IN CARCASES USING LEAN MEAT YIELD ESTIMATION

PROJECT LEADER: DR DARRYL D'SOUZA, CHM ALLIANCE PTY LTD (SUNPORK)

APRIL agreed to a request from the Lead Party to cancel this project in 2022 due to technical issues preventing the project from proceeding.

5A–111 ESCAPING THE DAILY GRIND – COARSER GROUND DIETS FOR IMPROVED FOETAL GROWTH

PROJECT LEADER: DR KATE PLUSH, CHM ALLIANCE PTY LTD (SUNPORK)

Diets are processed into fine particle sizes to increase digestibility. This is especially important for the growing pig where feed conversion ratio drives profitability, and in lactating sows where high dietary energy is required for milk production. However, there is a paucity of information on the impact of particle size in gestating sow diets. A coarser grind size will enhance hind gut fermentation, a process which involves the production of butyrate. The impact of increased circulating butyrate concentrations in sows is unknown, but in rats it has been shown to improve foetal growth. This experiment has been designed to determine if a coarser grind size fed to sows throughout gestation improves foetal growth, improving piglet weight and reducing variation at birth.

5A–112 NOVEL ASPIRIN SUPPLEMENTATION DURING GESTATION TO IMPROVE FARROWING RATE AND PIGLET BIRTH WEIGHT OF SOWS MATED IN SUMMER

PROJECT LEADER: DR FAN LIU, RIVALEA (AUSTRALIA) PTY LTD

Sows mated in summer have an increased abortion rate and produce an increased percentage of born-light piglets (≤1.1 kg), which compromises the efficiency of the pig industry and affects supply and market compliance. We propose to trial the supplementation of a low-dose of aspirin (240 ppm; sodium salicylate), a pharmaceutical intervention commonly used for improving conception and foetal development in humans, during the first 80 days of gestation as a strategy to improve farrowing rate and piglet birth weight of multiparous sows mated in summer. If effective, aspirin supplementation could be developed as an economical intervention to alleviate summer infertility and improve piglet birth weight for the pig industry.

5A–113 BRAIN MEASURES OF POSITIVE WELFARE IN PIGS

PROJECT LEADER: PROFESSOR ALAN TILBROOK, THE UNIVERSITY OF QUEENSLAND

"Quality of life" is a central concept in the welfare of production animals. To determine an animal's quality of life, we must understand how the animal's brain processes life experiences. This project is the first attempt to identify objective indicators of brain function in pigs. The project will contribute to the assessment and improvement of pig welfare by providing quantitative biological measures (biomarkers) of brain function during positive and negative experiences. The project will enable development of non-invasive biomarkers, which the Australasian pork industry can use to inform day-to-day management decisions and continuously improve the welfare of pigs.

PROJECT 5A–114 SMART SENSORS FOR ANIMAL WELFARE MONITORING

PROJECT LEADER: ASSOCIATE PROFESSOR ABEL SANTOS, THE UNIVERSITY OF ADELAIDE

This project builds on the findings of APRIL project A1–106 *A lab on a chip for real time pain and animal welfare biomarker measurement,* which successfully developed multiplexed, cheap, portable on-chip sensing technologies to rapidly detect and assess multiple pain and welfare biomarkers in pigs. The technology enables high-throughput label-free detection, quantification, and molecular fingerprinting of biomarkers in biological samples.

The objective of this project is to verify and assess measures from manufactured plasmonic chips relative to previously analysed samples obtained from pigs by the South Australian Research and Development Institute. This will permit optimisation of concentrations of relevant biomarkers of pain and welfare in pigs.

Objective quantification of relevant biomarkers in biological fluids reflecting welfare states is central to improving animal health and welfare standards. Such information has potential to provide the industry with an evidence-informed, decision-making approach for safe, economical, rational, and sustainable assessment of physiological and affective states in pigs related to pain and welfare.

PROJECT 5A–115: IMPROVING THE FERTILITY OF EXTENDED SEMEN

PROJECT LEADER: ASSOCIATE PROFESSOR MARK NOTTLE, THE UNIVERSITY OF ADELAIDE

Artificial insemination (AI) is used in more than 90% of the Australian pig herd. Successful AI involves the collection of semen which is then diluted with extender to produce multiple doses which is then used for up to 5 days. However, AI pregnancy rates are generally lower than natural mating. This is because semen extenders are relatively simple and do not mimic seminal plasma or the female reproductive tract, where sperm undergo their final maturation.

The aim of the present study is to improve boar sperm function by adding factors found in semen back to commercial extenders.

The project is measuring a range of sperm parameters for up to 5 days after collection to mimic the use of extended semen commercially. The more promising factors will then be examined *in vitro* to determine effects on fertilisation and embryo development. Those that show an effect will then be examined in small scale insemination studies, before progressing to larger on-farm trials.

Part of this work was undertaken by Ms Kaitlin Beltakis, an Honours Student at The University of Adelaide, who was awarded an APRIL Honours Scholarship.

PROJECT 5A–116 HEATING UP THE HOUSE: EVALUATING THE EFFECT OF NOVEL MONITORING AND HEATING SYSTEMS ON THE PRODUCTIVITY, WELFARE AND ECONOMICS OF FARROWING HOUSES

PROJECT LEADER: DR MARIA JORQUERA-CHAVEZ, RIVALEA (AUSTRALIA) PTY LTD

Investigation of novel ways to allow real time monitoring of pigs and innovative sustainable heating sources are required to ensure pork production systems are future proof. This project will further investigate the use of thermal imagery technology and FarrowCam (real time monitoring of farrowing) to evaluate health and welfare of sows and survival of piglets. These technologies will be implemented and tested in a project investigating the impact heat lamps have on the thermal comfort of sows and piglets, comparing the overall performance of the conventional heat lamps that are widely used in Australian piggeries, and two new heating-source options (ANIHEATER® and Hog Hearth® Heat Mats).

Due to the positive results reported in several countries, these two new heating methods are expected to provide better thermal conditions for piglets and sows, and to have a lower cost of maintenance than the conventional heat-lamps. This project will provide pork producers with detailed information about novel monitoring devices and more cost-effective heating-sources to be used in farrowing houses, ensuring increased productivity and sustainability.

PROJECT 5A–117 USE OF AN INHIBIN VACCINE TO INCREASE LITTER SIZE IN PIGS

PROJECT LEADER: PROFESSOR PAUL VERMA [AFFILIATE PROFESSOR (THE UNIVERSITY OF ADELAIDE) AND SCIENCE PROGRAM LEADER – PIGS AND POULTRY (SARDI)]

Average litter sizes born in Australia remain lower than those observed in other pork-producing countries, largely as a consequence of restrictions associated with germplasm importation. One method with demonstrated litter size increase in other species, such as sheep, is vaccination against inhibin. Attenuation of the biological activity of inhibin, that regulates the production of follicle stimulating hormone (FSH), leads to an increase in circulating FSH and, consequently, the ovulation rate.

Studies conducted previously in gilts reported marked improvements in reproductive performance following vaccination against inhibin. This project proposes to extend these preliminary results and further assess the efficacy of inhibin vaccination on aspects of reproductive outcomes, thereby offering a possible means to increase fecundity in the herd.

PROJECT 5A–118: UNDERSTANDING THE IMPACT OF CLIMATE ON THE BOAR AND PROGENY THROUGH SPERM NON-CODING RNA

PROJECT LEADER: DR JEREMY COTTRELL, THE UNIVERSITY OF MELBOURNE

The expression of sperm small-noncoding RNAs (sncRNAs) is influenced by the environment. It is hypothesised that challenging events, such as seasonal heat stress, can influence sperm sncRNAs to compromise reproductive and progeny performance. Measurement of sncRNAs could potentially provide a useful selection tool for reducing the seasonality of reproductive performance.

This project will quantify seasonal variation in sperm sncRNAs between high genetic merit boars from a commercial nucleus facility in the summer and cooler months against progeny performance from single-sire matings. The anticipated outcomes of this project will be improved reproductive and progeny performance of the Australian pork industry.

PROJECT 5A–119: PLACENTOPHAGIA: INVESTIGATING ITS EFFECT ON SOW AND PIGLET PERFORMANCE IN CONFINED AND LOOSE HOUSING SYSTEMS

PROJECT LEADER: DR LAUREN HEMSWORTH, THE UNIVERSITY OF MELBOURNE

Placentophagia is a behaviour observed in most female terrestrial eutherian mammals, consisting of the ingestion of some or all of the placental components expelled during parturition. Although sows will consume the placenta if given the opportunity, intensive pig production systems often prevent ingestion of afterbirth due to either its removal following parturition or confinement housing systems that prevent the sow from accessing it.

The relevant literature suggests that ingestion of the placenta may provide a range of benefits for both the sow and her piglet, via endocrine, analgesic and (or) nutritional effects. These benefits may include greater maternal behaviour through increased sow-piglet interactions, improved postpartum sow recovery, increased milk production and piglet growth and survival. The proposed discovery study aims to better understand the incidence and impacts of placentophagia in pigs.

PROJECT 5A–120: NUTRITIONAL STRATEGIES TO INCREASE INTRAMUSCULAR FAT

PROJECT LEADER: PROFESSOR FRANK DUNSHEA, THE UNIVERSITY OF MELBOURNE

Selection for reduced fatness has inadvertently resulted in Australian pork having a very low concentration of intramuscular fat (IMF), with possible negative implications for pork eating quality. A meta-analysis identified that

collagen concentration is negatively related to beef eating quality, and further work from this laboratory has also shown that collagen content is negatively related to objective pork tenderness, particularly in leg muscles.

Previous work supported by the Pork CRC demonstrated that dietary inulin, a polysaccharide (fructan) from chicory, increased visible marbling, whilst lecithin (glycerophospholipids) decreased collagen concentrations in loins from pork. The loin has similar IMF but lower collagen than leg muscles, hence, this project will use these two dietary strategies to improve the eating quality of a pork.

PROJECT 5A–121: AUTOMATIC ADJUSTMENT OF GESTATING SOW LIVE WEIGHT

PROJECT LEADER: DR DAVID CADOGAN, FEEDWORKS PTY LTD

The innovation in this project will be to use newly-developed software to automatically optimise sow weight during gestation depending on their parity and genotype, which will be conducted by using the ideal weight range set by the PIC genetic company. The optimisation of body weight is predicted to produce 1 pig per sow per year and improve number of sows retained in the herd by 10%.

5A–122: CAN THE PROVISION OF SILAGE AT WEANING IMPROVE SOW WELFARE AND SUBSEQUENT REPRODUCTION?

PROJECT LEADER: DR LAUREN STAVELEY, CHM ALLIANCE PTY LTD / SUNPORK FARMS

Weaning is arguably a stressful period for a sow, as not only is she separated from her piglets but is also mixed with numerous other sows in a new environment and fed a new diet, with feed intake often limited.

A potential strategy to lessen the negative welfare implications weaning can have on sows is to provide enrichment. This not only provides distraction but also induces satiety, which is proven to reduce aggression in gestating sows. Studies have shown that increased glucose and roughage offered prior to mating can have positive effects on reproductive outcomes. This project aims to identify if the provision of silage offered to sows at weaning improves both welfare and productive outcomes.

5A–123 MUM ISN'T HOME: IDENTIFYING GAPS IN KNOWLEDGE IN CREEP FEEDING AND DEVELOPING NOVEL SOLUTIONS TO IMPROVE POST-WEANING ADJUSTMENT IN PIGLETS

PROJECT LEADER: DR MARIA JORQUERA-CHAVEZ, RIVALEA (AUSTRALIA) PTY LTD

For pigs in commercial conditions, the abrupt weaning process not only involves the mother-piglet separation, but also a profound modification of piglets' feeding, feeding habits, environment, and social interactions. This complex period leads to stressful changes for piglets, becoming a great concern for producers and researchers. This project aims to investigate strategies to improve piglets' performance and wellbeing around weaning. This project will investigate (i) the main scientific gaps about the role that creep feeding has in the performance of piglets around weaning transition and its effect in their lifetime performance; and (ii) whether factors such as the characteristics of the creep feeding, the impacts of weaning age and parity, the farrowing environment (pen type etc.), and the time/frequency they offered to young piglets impact their survival and growth rate around weaning.

Ultimately, this project proposes an investigation about novel and inexpensive creep feeding techniques that could facilitate the learning process in piglets, which would consequently trigger eating behaviours that promote growth, reduce piglets' stress and improve their survival during the weaning transition. This would not only improve weaners' welfare, but also the productivity of piggeries. This project will provide science-based, industry-relevant information that could assist the management around weaning transition.

5A–124 POSTNATAL STRATEGIES TO INCREASE MYOFIBRE PROLIFERATION FOR IMPROVING LEAN TISSUE DEPOSITION

PROJECT LEADER – DR FAN LIU, RIVALEA (AUSTRALIA) PTY LTD

Lean meat deposition is positively related with the total myofibre number of pigs. Challenging the classical theory that the myofiber number is fixed by late gestation, some studies showed the myofibre number increases with the proliferations of tertiary myofibre during the first four weeks after birth, implying a novel time window for interventions. We propose to investigate the effects of two oral strategies during the suckling phase to increase myofibre number postnatally. The successful strategy may improve the muscle deposition rate of pigs with positive implications to lean growth, feed efficiency, carcass value, and meat quality.

5A–125 IMPROVING THE FERTILITY OF EXTENDED PIG SPERM

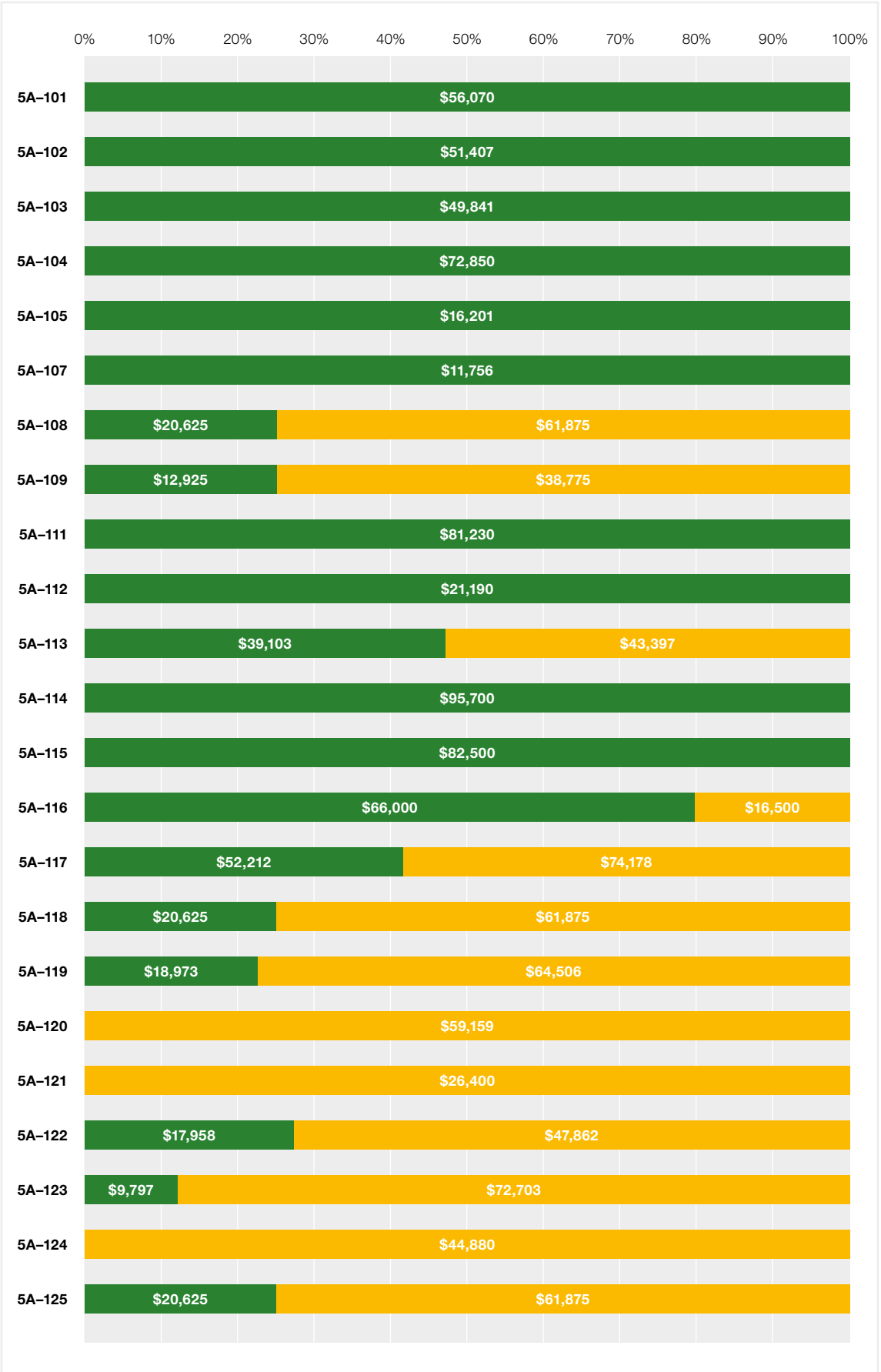
PROJECT LEADER – ASSOCIATE PROFESSOR MARK NOTTLE, THE UNIVERSITY OF ADELAIDE

Artificial insemination (AI) is used in more than 90% of the Australian pig herd. AI involves the collection of semen which is then diluted with extender to produce multiple doses which is then used for up to 5 days. However, AI pregnancy rates are generally lower than natural mating. This is because semen extenders are relatively simple and do not include factors in seminal plasma which are thought to be important in sperm function (motility) and quality. We have recently shown that certain factors found in the female reproductive tract and in seminal fluid, can markedly improve the fertility of extended pig sperm. We have also shown that these increases improve embryo development following in vitro fertilisation. This is the first time to our knowledge that treated sperm has been shown to improve embryo development, providing a novel approach for improving the fertility of extended semen. The aim of the present study is to determine whether the factor under investigation can improve the fertility of extended pig semen.

PART OF THIS WORK WAS UNDERTAKEN BY MS KAITLIN BELTAKIS, AN HONOURS STUDENT AT THE UNIVERSITY OF ADELAIDE, WHO WAS AWARDED AN APRIL HONOURS SCHOLARSHIP AND HOPES TO CONTINUE WORKING IN THE FIELD

NO.	PROJECT NAME	LEAD PARTY
5A–101	Real time, in-field water testing	Ridley Agriproducts Pty Ltd
5A–102	Insect meal from pork processing derived material	The University of Melbourne
5A–103	Development of a *Streptococcus suis* vaccine via measurement of immune responses to four different *Streptococcus suis* vaccine preparations, using an Australian cps2 ST25.strain	Murdoch University
5A–104	Low dose dietary strategies in late gestation to enhance born alive and piglet survival and performance	Rivalea (Australia) Pty Ltd
5A–105	Oral means of increasing endogenous GH levels and enhancing the performance and carcass characteristics of growing pigs	Rivalea (Australia) Pty Ltd
5A–107	Using algal extracts to improve weaner growth performance and digestibility	Ridley Agriproducts Pty Ltd
5A–108	What sensory attributes are most critical for consumer evaluation within an Australian Pork eating quality program?	The University of Melbourne
5A–109	Investigating the impact of circulating creatine concentrations in gestation on vitality and survivability of low birth weight piglets	SARDI
5A–110	Real time detection of deep tissue abscesses in carcases using lean meat yield estimation	CHM Alliance Pty Ltd (SunPork Solutions)
5A–111	Escaping the daily grind – coarser ground diets for improved foetal growth	CHM Alliance Pty Ltd (SunPork Solutions)
5A–112	Novel aspirin supplementation during gestation to improve farrowing rate and piglet birth weight of sows mated in summer.	Rivalea (Australia) Pty Ltd
5A–113	Brain measures of positive welfare in pigs	The University of Queensland
5A–114	Smart Sensors for Animal Welfare Monitoring	The University of Adelaide
5A–115	Improving the fertility of extended semen	The University of Adelaide
5A–116	Heating up the house: Evaluating the effect of novel heating and monitoring systems on the productivity, welfare and economics of farrowing houses	Rivalea (Australia) Pty Ltd
5A–117	The use of inhibin vaccine to increase litter size in pigs	The University of Adelaide
5A–118	Understanding the impact of climate on the boar and progeny through sperm non-coding RNA	The University of Melbourne
5A–119	Placentophagia: investigating its effect on sow and piglet performance in confined and loose housing systems.	The University of Melbourne
5A–120	Nutritional strategies to increase intramuscular fat.	The University of Melbourne
5A–121	Automatic adjustment of gestating sow live weight	Feedworks Pty Ltd
5A–122	Can the provision of silage at weaning improve sow welfare and subsequent reproduction?	CHM Alliance Pty Ltd (SunPork Solutions)
5A–123	Mum isn't home: Using sows' vocalisations and artificial-sound stimuli as novel strategies to improve post-weaning adjustment in piglets.	Rivalea (Australia) Pty Ltd
5A–124	Postnatal strategies to increase myofibre proliferation for improving lean tissue deposition	Rivalea (Australia) Pty Ltd
5A–125	Improving the fertility of extended pig sperm	The University of Adelaide

APRIL INNOVATION PROJECT COMMITMENTS



RESEARCH REPORT

LEGACY PROJECTS

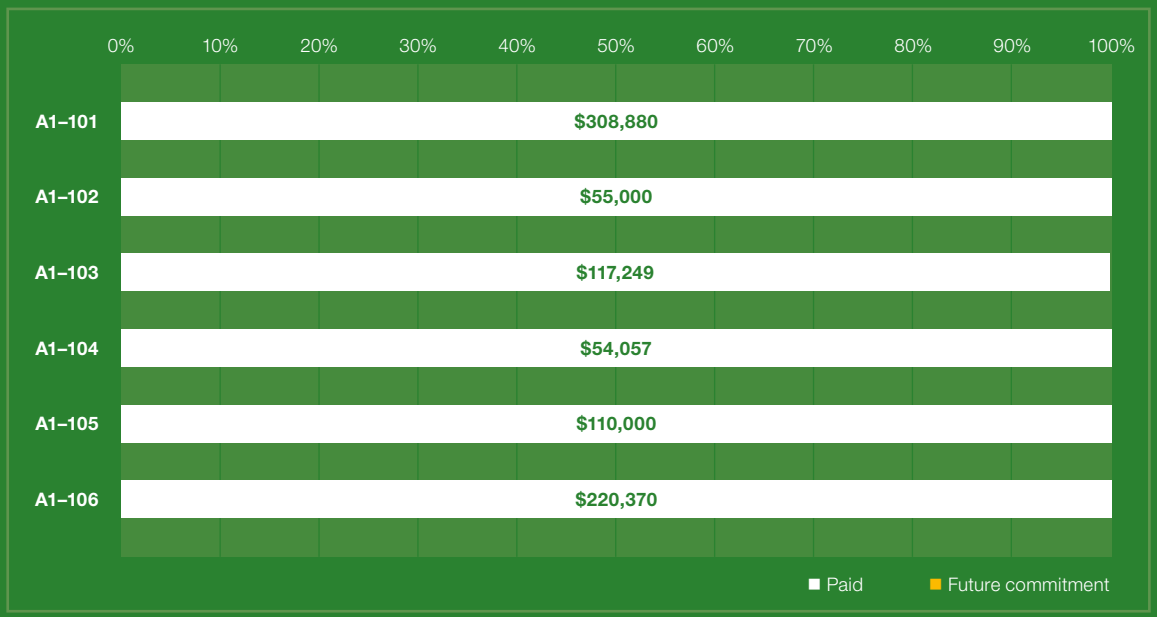
WHAT IS A LEGACY PROJECT?

Legacy projects fall into two main categories – APRIL Investment Round 1 projects approved prior to adoption of the Strategic Plan in 2019 and Industry Priority projects that addressed APRIL's strategic plan 2019–2022 have also been moved to this section.

PROJECT COMMITMENTS
APRIL ROUND 1 PROGRAM 1

APRIL ROUND 1 PROGRAM 1 PROJECT COMMITMENTS PROGRAM 1 – RESILIENCE

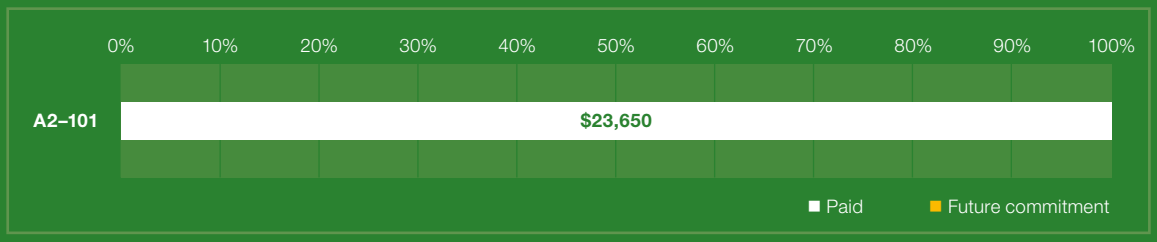
NO.	PROJECT NAME	LEAD PARTY
A1–101	Novel approaches for reducing antimicrobial resistant and pathogenic Gram-negative bacteria in the porcine gut	Murdoch University
A1–102	Proof of concept: Oral Fluids and quantitative assessment for Porcine Chronic Respiratory Disease (PCRD) in Australian field conditions	Rivalea (Australia) Pty Ltd
A1–103	Improving enteric health, understanding impact on gut microbiome and weaner performance through the use of protease enzymes	CHM Alliance Pty Ltd (SunPork)
A1–104	Developing remote monitoring methods for early detection of respiratory disease in pigs	The University of Melbourne
A1–105	Early stress experiences and stress resilience and emotionality in pigs	The University of Melbourne
A1–106	A lab on a chip for real time pain and animal welfare biomarker measurement	The University of Adelaide



PROJECT COMMITMENTS
APRIL ROUND 1 PROGRAM 2

APRIL ROUND 1 PROGRAM 2 PROJECT COMMITMENTS PROGRAM 2 – COST

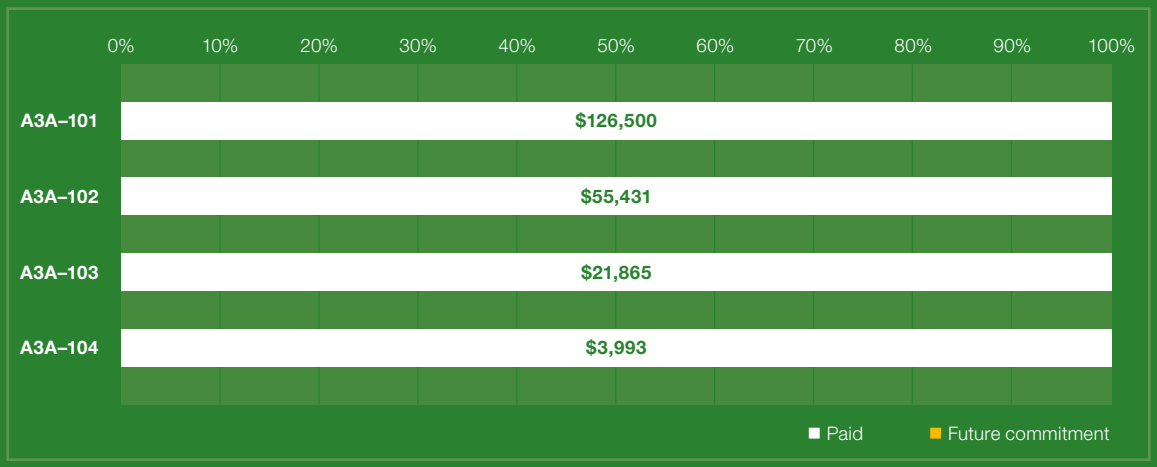
NO.	PROJECT NAME	LEAD PARTY
A2–101	Protected vitamin and mineral premixes maintain performance of commercial pigs at reduced inclusion rates	CHM Alliance Pty Ltd (SunPork)



PROJECT COMMITMENTS
APRIL ROUND 1 PROGRAM 3A

APRIL ROUND 1 PROGRAM 3A PROJECT COMMITMENTS
PROGRAM 3A – REPRODUCTION

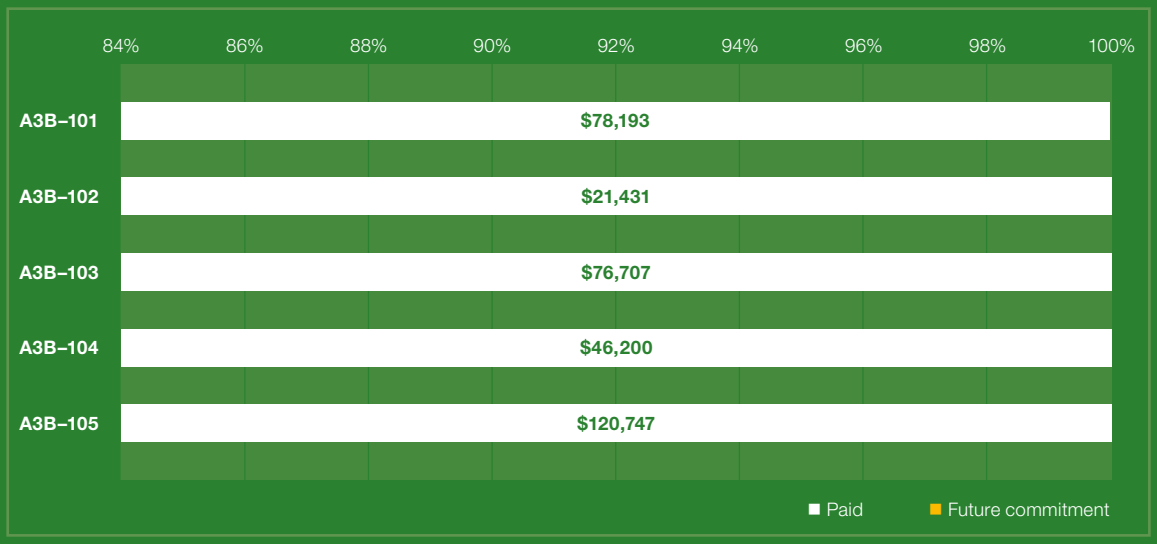
NO.	PROJECT NAME	LEAD PARTY
A3A–101	Improved feed efficiency, control of P2 back fat and maintenance of pork quality in finishing pigs fed bitter extracts	The University of Queensland
A3A–102	Review relationship between energy intake and protein deposition in 60–110 kg pigs with modern genetics using DXA scanner	Rivalea (Australia) Pty Ltd
A3A–103	Feeding a single diet to pigs in the grower/finisher stage to reduce feed costs and improve feed efficiency	Pork Innovation WA
A3A–104	Base-Funded Experiment: Feeding a single diet versus phase feeding to pigs in the growing-finishing stage	CHM Alliance Pty Ltd (SunPork)
A3A–105	Base-Funded Experiment: Feeding a single diet versus phase feeding to pigs in the growing-finishing stage [no cash payment]	Rivalea (Australia) Pty Ltd



PROJECT COMMITMENTS
APRIL ROUND 1 PROGRAM 3B

APRIL ROUND 1 PROGRAM 3B PROJECT COMMITMENTS
PROGRAM 3B – PROGENY

NO.	PROJECT NAME	LEAD PARTY
A3B–101	Using GnRH analogues for fixed-time AI and pregnancy support to address seasonal infertility in sows	The University of Adelaide
A3B–102	Nutritional supplementation to increase the number of pigs weaned and fertility of sows which farrow and are mated during summer / early autumn	The University of Adelaide
A3B–103	Identifying reciprocal chromosomal transloactions to reduce early embryo mortality	CHM Alliance Pty Ltd (SunPork)
A3B–104	Seasonal fertility: a novel approach to alleviating seasonal infertility in sows	CHM Alliance Pty Ltd (SunPork)
A3B–105	Effects of negative DCAD and vitamin D in transition diets to increase piglet weaning numbers, improve piglet weaning weight, and minimise sow condition loss during lactation	J.A.Braun Investments Pty Ltd

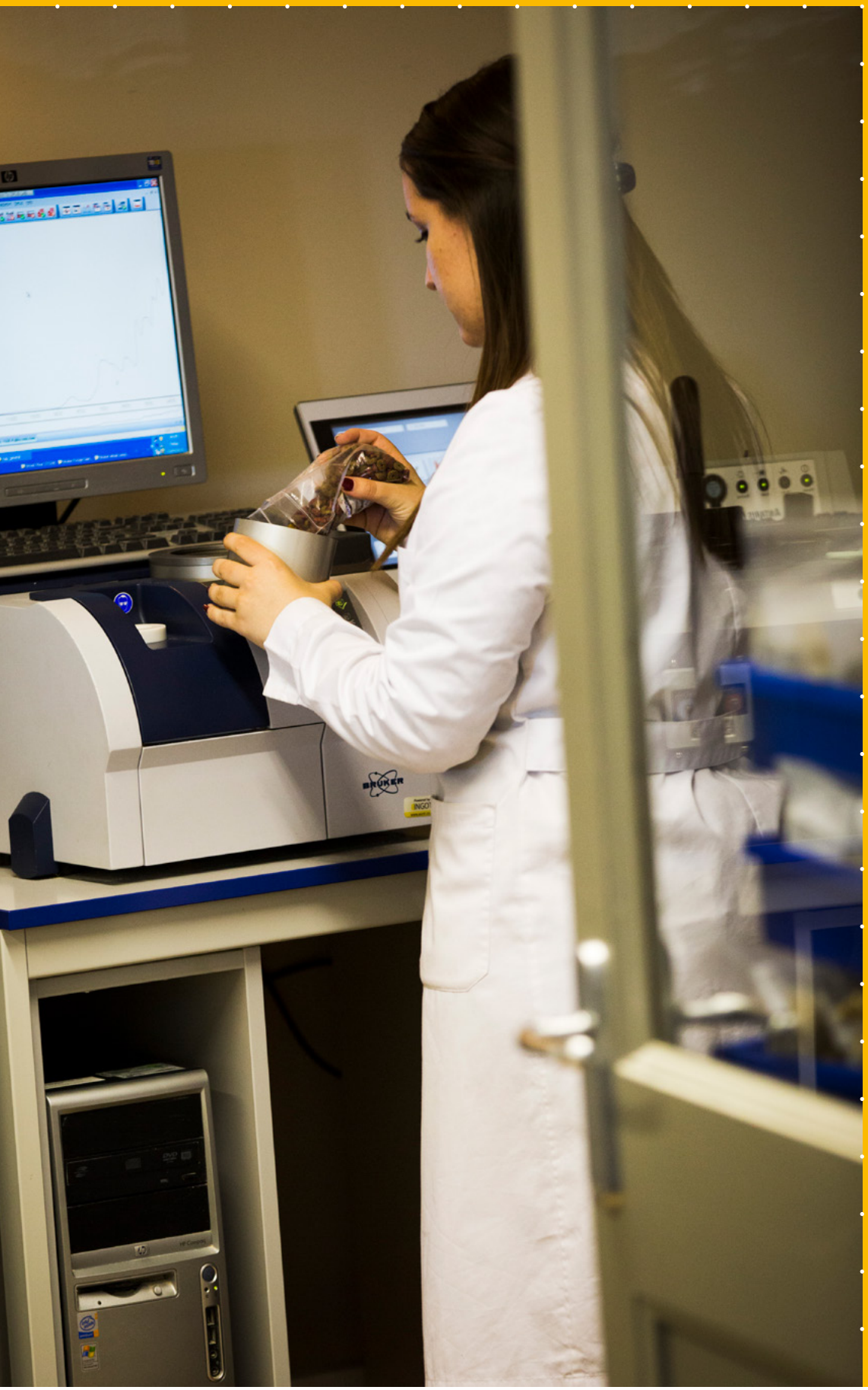


RESEARCH REPORT

INDUSTRY PRIORITY PROJECTS

WHAT IS AN INDUSTRY PRIORITY PROJECT?

APRIL has prioritised several industry challenges that if solved will assist in improving Australasian pork production. Industry Priority Projects are shorter-term, more focussed projects directed at solving these challenges through investments in collaborative research projects.


BRUKER

THE PRIORITY CHALLENGES THAT APRIL IDENTIFIED IN THE STRATEGIC PLAN 2019–2022 ARE:

- **Effective monitoring of foreign disease incursions in Australasia.**
- **Novel approaches to allow increased use of food wastes in pig diets.**
- **Making pigs more tolerant to heat.**
- **Improved water quality for use/re-use on-farm and in processing facilities.**
- **Alternate methods to control/eradicate endemic diseases.**
- **Development of real time monitoring and surveillance technologies under commercial conditions.**
- **Detecting sow reproductive state more efficiently and effectively.**
- **Establish pork as an integral part of a healthy lifestyle.**
- **Reducing variation in lifetime performance.**
- **Biodegradable packaging solutions for pork products.**
- **Heavier carcasses.**

PROJECTS

APRIL has invested in the following projects addressing the "Making pigs more tolerant to heat", "Reducing variation in lifetime performance", "Development of real time monitoring and surveillance technologies under commercial conditions," "Detecting sow reproductive state more efficiently and effectively" and "Novel approaches to allow increased food wastes in pig diets" priorities:

6A–101 HEAT TOLERANCE (HT) IN LACTATING SOWS: DIETARY STRATEGIES, METABOLIC BIOMARKERS AND MICROBIOME SIGNATURE

PROJECT LEADER: PROFESSOR EUGENI ROURA, THE UNIVERSITY OF QUEENSLAND

- Test selected dietary supplements to increase the heat tolerance of the lactating sow.
- Identify individual variations in metabolism between heat tolerant and less heat tolerant sows during lactation (metabolic and microbiome markers in resilient compared to the most vulnerable individuals).

6A–102 HOT AND BOTHERED! LONG TERM IMPACTS OF LATE PREGNANCY HEAT STRESS ON SOWS AND PROGENY

PROJECT LEADER: DR KATE PLUSH, SUNPORK FARMS

- Demonstrate that heat stress results in a longer duration of farrowing.
- Identify the impacts longer farrowing duration has on (a) the sow and (b) the piglet, and how this impacts long term performance.
- Test dietary/water additives for reducing farrowing duration during times of heat stress and determine the production advantages at a commercial level.
- Conduct a cost:benefit analysis and assessment of farrowing room cooling in the hotter months.

6A–103 EASING THE WEANING TRANSITION: LARGE PIGLETS FROM LARGE PELLETS

PROJECT LEADER: MR ROBERT HEWITT, SUNPORK FARMS

- Reduce weight variability around weaning through combining two complimentary technologies, large pellets and semi-moist extruded feed, to improve feed intake in the period immediately post-weaning, sustaining weight gain.

6A–104 USE OF THERMOGRAPHIC TECHNOLOGY TO DETECT REPRODUCTIVE STATE IN SOWS AND IMPROVE PIGLET PERFORMANCE IN A COMMERCIAL FARROWING HOUSE

PROJECT LEADER: DR JESSICA CRAIG, RIVALEA (AUSTRALIA) PTY LTD

- Identify the optimum position on the sow for surface temperature measurements in order to predict success in lactation of sows, their health status, as well as the viability of their piglets at birth.
- Early detection of at-risk piglets, farrowing difficulties, and/or MMA to provide producers with the tools for early intervention for sows and piglets at risk.

6A–105 FOOD WASTE TO PIG FEED – SAFE AND BIO-SECURE

PROJECT LEADER: DR VALERIA TOROK, SARDI
JOINT PROJECT WITH THE FIGHT FOOD WASTE CRC

- Address novel approaches to allow increased use of food wastes in pig feed.
- Identify food safety/biosecurity risks and strategies to mitigate perceived risks of utilising food waste streams into pig feed.
- Identify waste streams with the least variability in quality and quantity.
- Determine the economic feasibility of utilising food waste for pig feed in key regional production areas.

6A–106A PRECISION MONITORING OF REPRODUCTIVE STATE VIA DEVELOPMENT OF PEN SIDE MUCUS TESTING AND CONTINUOUS REMOTE MONITORING

PROJECT LEADER: PROFESSOR PAUL VERMA, SARDI

6A–106B PRECISION MONITORING OF REPRODUCTIVE STATE VIA DEVELOPMENT OF PEN SIDE MUCUS TESTING AND CONTINUOUS REMOTE MONITORING

PROJECT LEADER: ASSOCIATE PROFESSOR ROS BATHGATE, THE UNIVERSITY OF SYDNEY

These studies will be conducted in parallel and both projects will contribute to two priority areas: detection of sow reproductive state and development of real-time monitoring technologies.

There are three aims to the projects, namely:

1. In sows and gilts, to determine whether oestrus and ovulation are accurately identifiable by:
   i. changes in the concentration of ions in cervical mucus using Near InfraRed Spectroscopy (NIRS)
   ii. the use of accelerometers
   iii. alterations in the glycomic profile of cervical mucus using liquid chromatography-mass spectrometry.

2. To devise and implement an innovative oestrous detection protocol using NIRS cervical mucus analysis to compare conception and farrowing rates with conventional oestrus detection following either double or single dose artificial insemination.
3. In sows, to determine whether the glycomic profile of cervical mucus accurately detects:
   i. seasonal infertility
   ii. pregnancy status prior to 28 days post-insemination
   iii. the onset of parturition.

6A–107 DEVELOPING HIGH-THROUGHPUT MOLECULAR SCREENING TECHNIQUES TO DETECT RECIPROCAL TRANSLOCATION IN BOARS

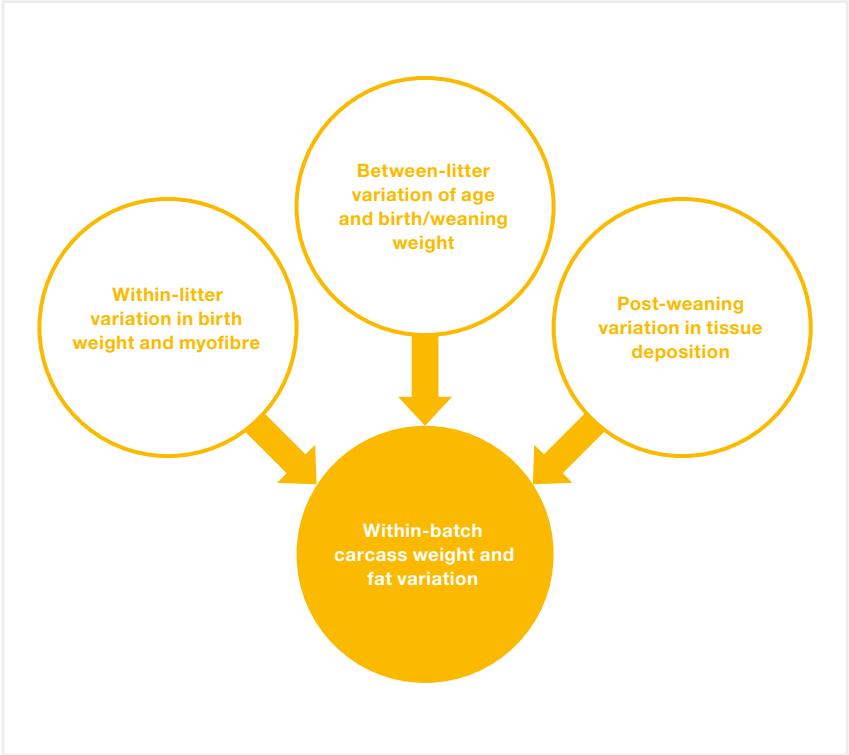
PROJECT LEADER: PROFESSOR TARIQ EZAZ, THE UNIVERSITY OF CANBERRA

This project aims to identify diagnostic DNA markers associated with Reciprocal Chromosomal Translocations (RCTs) in boars. It will use new methodologies to identify single nucleotide polymorphisms and Presence-Absence markers linked with chromosome rearrangements and therefore associated with boar infertility.

The primary objective is to enable detection of RCTs cheaply in a high-throughput manner, enabling the widespread adoption of this technology, and reducing the incidence of low litter size. A secondary objective will see an expansion of the original screening conducted in APRIL project A3B–103 to additional genetic suppliers to detect the incidence of RCTs in the wider boar population.

FIGURE 7

Sources of within-batch variation in pig carcasses



6A–108 HOW LOW CAN YOU GO? OPTIMISING THE USE OF CALCIUM NITRATE (CAN) IN GESTATING SOW DIETS TO REDUCE PIGLET BIRTHWEIGHT VARIATION AND IMPROVE THEIR LIFETIME PERFORMANCE

PROJECT LEADER: DR JESSICA CRAIG, RIVALEA (AUSTRALIA) PTY LTD

This project will investigate the use of calcium nitrate (CAN) in sow diets to improve piglet birth weights and reduce variation in birth weight and lifetime performance.

Following on from a previous APRIL project (5A–104), the current project will aim to optimise strategies for the practical use of CAN and investigate three different timings of CAN supplementation in gestation (i.e., throughout gestation, late gestation from day 90 until farrowing, and the pre-farrowing transition period from entry to the farrowing house until farrowing), to discover the most cost-effective strategy for producers.

The use of a low-dose, low-cost feed additive in the form of CAN, over a relatively short period of time, is anticipated to increase birth weights and reduce birth weight variability. In turn, this is expected to reduce variation in carcass weights and result in heavier carcasses overall, reducing cost of production and improving profitability.

6A–109 REVIEW: IDENTIFYING KNOWLEDGE GAPS AND STRATEGIES TO IMPROVE PROGENY UNIFORMITY OF PIGS

PROJECT LEADER: DR FAN LIU, RIVALEA (AUSTRALIA) PTY LTD

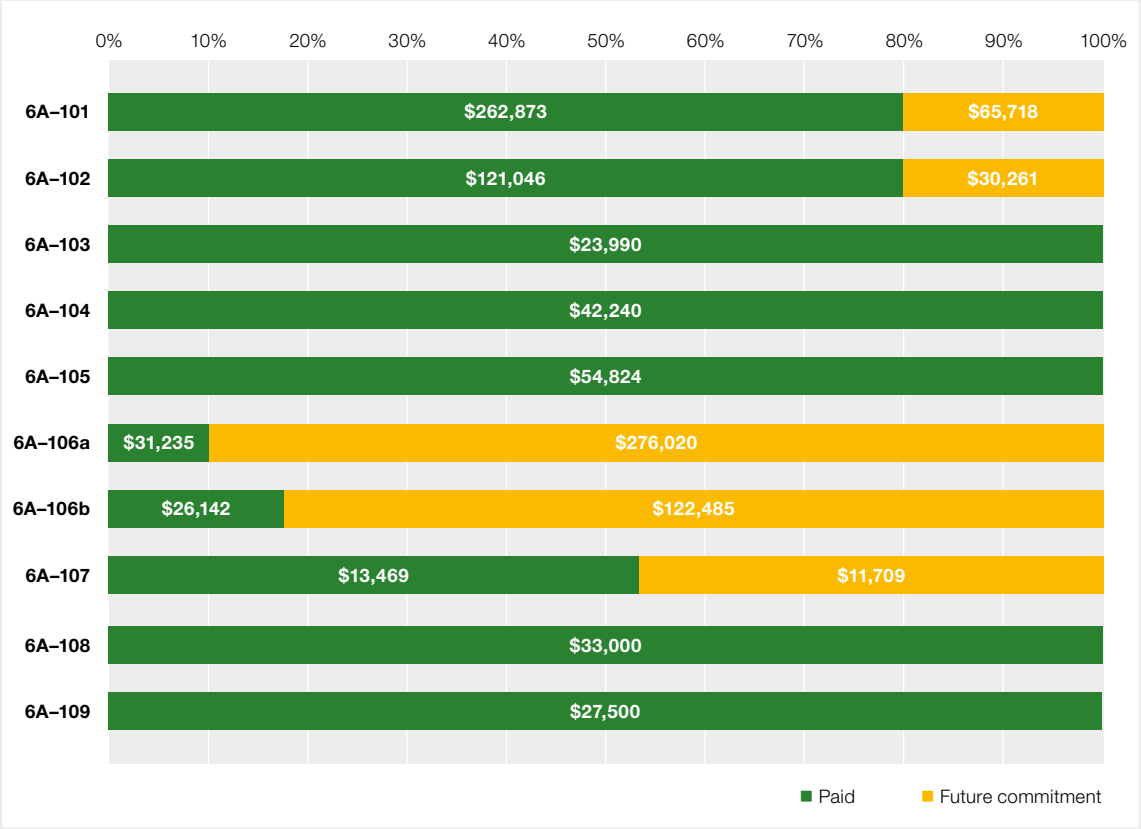
Carcass weight and fatness are the two most important factors that determine the carcass value in the Australasian pig industry. Improving the uniformity of carcass weight at a given slaughter age and the uniformity of backfat at a given carcass weight can reduce sorting required for marketing, shorten the selling duration of a progeny batch and improve carcass compliance, thereby improving profitability.

The variation of carcass weight and backfat in a progeny batch are a reflection of different lifetime tissue deposition rates among individual pigs. The individual variation in tissue deposition rate of progeny pigs originates from multiple factors in the foetal, preweaning, weaner, and grower/finisher phases (Figure 7).

A Literature Review will be conducted to explore the key physiological and nutritional factors during the prenatal, neonatal, or postnatal phase that are associated with the individual variation of tissue growth. The outcome of the review will facilitate the potential development of a research program to reduce the within-batch variation of progeny pigs.

NO.	PROJECT NAME	LEAD PARTY
6A–101	Heat Tolerance (HT) in lactating sows: dietary strategies, metabolic biomarkers and microbiome signature	The University of Queensland
6A–102	Hot and Bothered! Long term impacts of late pregnancy heat stress on sows and progeny	CHM Alliance Pty Ltd (SunPork)
6A–103	Easing the transition: large piglets from large pellets	CHM Alliance Pty Ltd (SunPork)
6A–104	The use of thermographic technology to detect reproductive state in sows and improve piglet performance in a commercial farrowing house	Rivalea (Australia) Pty Ltd
6A–105	Food waste to pig feed – Safe and Bio-secure	Fight Food Waste CRC
6A–106a	Precision monitoring of reproductive state via development of pen side mucus testing and continuous remote monitoring	SARDI
6A–106b	Precision monitoring of reproductive state via development of pen side mucus testing and continuous remote monitoring	The University of Sydney
6A–107	Developing high throughput molecular screening techniques to detect reciprocal translocation in boars [cancelled due to technical difficulties]	The University of Canberra
6A–108	How low CAN you go?: Optimising the use of calcium nitrate (CAN) in gestating sow diets to reduce piglet birthweight variation and improve their lifetime performance	Rivalea (Australia) Pty Ltd
6A–109	Review: Identifying knowledge gaps and strategies to improve progeny uniformity of pigs	Rivalea (Australia) Pty Ltd

APRIL INDUSTRY PRIORITY PROJECT COMMITMENTS



FEATURE PROJECT: 6A–104

USE OF THERMOGRAPHIC TECHNOLOGY TO DETECT REPRODUCTIVE STATE IN SOWS AND IMPROVE PIGLET PERFORMANCE IN A COMMERCIAL FARROWING HOUSE

PROJECT LEADER:
Dr Jessica Craig, Rivalea (Australia) Pty Ltd

PROJECT PARTICIPANTS:
Dr Rebecca Morrison, Rivalea (Australia) Pty Ltd; Dr Ellen Jongman, The University of Melbourne; Maria Fernanda Jorquera Chavez (PhD student), The University of Melbourne; Bryony Tucker (PhD student), The University of Adelaide; Associate Professor Roy Kirkwood, The University of Adelaide; Dr Kate Plush CHM Alliance Pty Ltd (SunPork); Professor Eugeni Roura, The University of Queensland; Dr Marta Navarro, The University of Queensland

PROJECT STATUS:
completed

AIMS AND OBJECTIVES

APRIL project 6A–104 (*Use of thermographic technology to detect reproductive state in sows and improve piglet performance in a commercial farrowing house*), led by Dr Jessica Craig and conducted at Rivalea (Australia Pty Ltd), JBS Australia Pork Division, aimed to assess first, the use of infrared thermography (IRT) in a commercial farrowing house to predict sow performance in lactation, and second, to identify sows at risk of common health concerns in lactation such as mastitis, shoulder sore formation, and other illnesses.

KEY FINDINGS

1. The FLIR E8 Ex series was the easiest hand-held IRT camera technology to use in a commercial farrowing house compared to the FLIR ONE Pro iPhone attachment or the FLIR Duo Pro.

2. Skin temperatures measured at the shoulder, ear base or posterior teats using the E8 camera were the most useful measurements that showed the most promise in terms of practicality and relationships with sow performance and health status in the farrowing house period.

3. Some skin temperatures measured by IRT may be related to litter size and piglet activity, which deserves to be further investigated. Unfortunately, skin temperature measured with the pointer function on the E8 camera was largely not predictive of sow performance in a way that could be useful to producers.

4. A number of environmental factors pose difficulties for the use of these technologies in a commercial setting, such as interference from piglets, bars of farrowing crates, water from cooling systems, contamination of skin from urine, faeces, dirt and feed dust, lighting, humidity, ambient temperature and air flow. All of these factors must be considered when using IRT within a commercial setting.

APPLICATIONS TO INDUSTRY

1. Thermal cameras such as the FLIR E8 can be used as an alternative to (or used to complement) measurement of rectal temperature of sows in lactation as a non-invasive way to measure body temperature.

2. That skin temperatures be measured at the point of the shoulder, ear base and posterior teats when IRT technologies are used in a commercial farrowing house.

3. That IRT may be used to measure shoulder, udder and/or ear base temperature when assessing sows for impacts of JEV around farrowing.

4. Production of a SOP for determination of eye and ear temperatures using the FLIR E8 camera was accomplished.

This project also involved two other APRIL-supported projects where knowledge and resources were shared. A thank you is extended to Professor Eugeni Roura, Dr Max Muller, Dr Marta Navarro-Gomez and Astrid Coba Cedeno from The University of Queensland (6A–101; *Heat tolerance in lactating sows: dietary strategies, metabolic biomarkers and microbiome signature*), and Dr Kate Plush and Dr Lauren Staveley (SunPork) and Associate Professor Jeremy Cottrell (The University of Melbourne) (6A–102; *Hot and bothered! Long term impacts of late pregnancy heat stress on sows and progeny*).

Final Reports for these 'sister projects' will be shared once they become available.

FURTHER INFORMATION

A copy of the Project Summary, Final Report, and the SOP relating to the use of this camera, for this project, can be found at: https://apri.com.au/research/project-reports/.

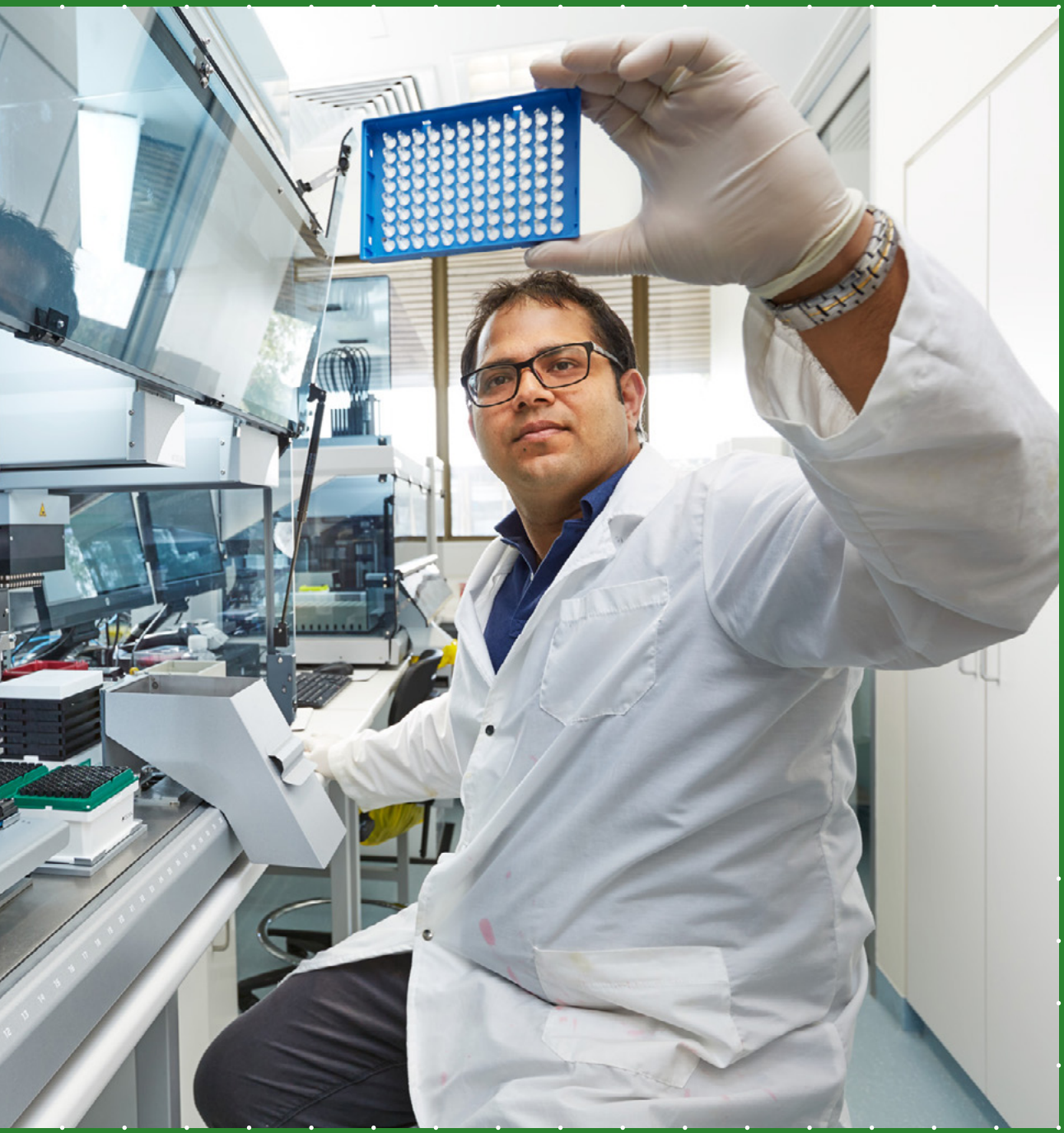
USE OF THERMOGRAPHIC TECHNOLOGY TO DETECT REPRODUCTIVE STATE IN SOWS AND IMPROVE PIGLET PERFORMANCE IN A COMMERCIAL FARROWING HOUSE

FIGURE 8

An example of the visible and infrared images showing three regions of interest as part of this project: (a) Ear base, (b) Shoulder, and (c) Posterior teats (further information can be found in the Final Report and SOP for the use of the FLIR E8 camera).

SKIN TEMPERATURES MEASURED AT THE SHOULDER, EAR BASE OR POSTERIOR TEATS USING THE E8 CAMERA WERE THE MOST USEFUL MEASUREMENTS THAT SHOWED THE MOST PROMISE IN TERMS OF PRACTICALITY AND RELATIONSHIPS WITH SOW PERFORMANCE AND HEALTH STATUS IN THE FARROWING HOUSE PERIOD

EDUCATION AND TRAINING REPORT



APRIL EDUCATION AND TRAINING PROGRAM

APRIL is committed to helping build skilled human resources for the benefit of industry, whether it be through supporting tomorrow's researchers through undergraduate projects (e.g. Honours) and postgraduate support such as PhD scholarships and Doctor of Veterinary Medicine projects, or training highly skilled staff in pork production through the Industry Placement Program.

During the reporting period, APRIL supported two researchers under the Post-Doctoral Fellowship Scheme which provides support to Universities to employ an early career research scientist focused on pork industry research.

APRIL has a dedicated Education Advisory Committee that ensures APRIL's education and training programs are relevant and operating efficiently to meet these goals.

TOMORROW'S RESEARCHERS

As at 30 June 2024, APRIL has supported scholarships for the following undergraduate and postgraduate students:

...THE PHD STUDENTS INVOLVED IN THESE PROJECTS ARE WORKING ON REAL-WORLD ISSUES ON COMMERCIAL PRODUCTION UNITS...

STUDENT	UNIVERSITY	QUALIFICATION	STATUS
Brittany Silva	Murdoch University	DVM	Completed
Ryan Kristen	The University of Sydney	DVM	Completed
Bianca Hatze	The University of Sydney	DVM	Completed
Eva Vidacs	The University of Melbourne	Honours	Completed
Suzanna Jones	Murdoch University	Honours	Completed
Stephanie Shields	The University of Sydney	Honours	Completed
Kaitlin Beltakis	The University of Adelaide	Honours	Completed
Amelia Sofra	The University of Melbourne	Honours	Ongoing
Tanishka Munjal	The University of Melbourne	Honours	Ongoing
Emma Goode	University of New England	MSc	Completed
Isabel Stanley	The University of Melbourne	MSc	Ongoing
Tanya Laird	Murdoch University	PhD	Completed
Elisabet Puig-Garcia	The University of Queensland	PhD	Ongoing
Abedin Abdallah	The University of Queensland	PhD	Ongoing
Katelyn Tomas	The University of Queensland	PhD	Ongoing
Rutu Galea	The University of Melbourne	PhD	Ongoing
Md Shariful Islam	University of New England	PhD	Ongoing
Soraya Leedham (nee Haynes)	Murdoch University	PhD	Completed
Viet Hai Tran	The University of Queensland	PhD	Ongoing
Xianyi Liu	The University of Queensland	PhD	Ongoing
Paul Bogere	The University of Queensland	PhD	Ongoing
Astrid del Rocio Coba Cedeno	The University of Queensland	PhD	Ongoing
Cintia Amaral	Murdoch University	PhD	Ongoing

In addition, a number of projects involving APRIL funding also provide student support. Examples include the Australian Research Council-Linkage projects involving APRIL as a Partner Organisation, titled *Early stress experiences and stress resilience and emotionality in pigs* and *How to make antimicrobials in pig feed redundant, naturally*. The nature of these projects, directly involving industry, means that the PhD students involved in these projects are working on real-world issues on commercial production units, meaning not only do they gain a PhD but also are well equipped to enter the workforce having a greater understanding and appreciation of production.

INDUSTRY PLACEMENT PROGRAM

APRIL supports an Industry Placement Program (IPP), similar to that successfully initiated in the Cooperative Research Centre for High Integrity Australian Pork. The Pork CRC's IPP placed more than a dozen highly credentialed young people in industry positions where they leveraged their academic skills and qualifications to add value to their workplaces, and APRIL seeks to continue this valuable legacy.

As part of an IPP Award, APRIL will provide the successful business applicant with $75,000 over the first two years to help cover salary and other costs associated with training the awardee for three years.

As at 30 June 2024, APRIL has supported the following IPP students:

AWARDEE	EMPLOYER	STATUS
Sofie Pridgeon	CHM Alliance Pty Ltd (SunPork)	Completed
Dr Jessica Craig	Rivalea (Australia) Pty Ltd	Completed
Dr Lauren Staveley	CHM Alliance Pty Ltd (SunPork)	Completed
Dr Maria Jorquera-Chavez	Rivalea (Australia) Pty Ltd	Completed
Dr Nandi van Wyk	Apiam Animal Health Ltd/ Portec	Ongoing
Dr Maximiliano Muller	The University of Queensland	Ongoing
Samantha Sterndale	Westpork Pty Ltd	Ongoing
Patrick Hurley	CHM Alliance Pty Ltd (SunPork)	Ongoing

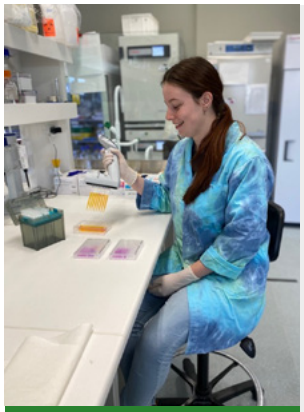
POST DOCTORAL FELLOWSHIP SCHEME

During the year, APRIL established a new Post Doctoral Fellowship Scheme. The Scheme supports early career researchers (less than 3 years' experience since PhD conferral), and its main objectives are to:

- Attract and retain high calibre early career researchers for the benefit of the pork industry;
- Provide a Post-Doctoral Fellow with the time and support to develop their demonstrated research potential and track record;
- Assist in establishing a Post-Doctoral Fellow with a successful career trajectory.

The first two awardees are set out in the table below:

AWARDEE	EMPLOYER	STATUS
Dr Bryony Tucker	South Australian Research and Development Institute	Ongoing
Dr Gemma Zerna	LaTrobe Univeristy	Ongoing



STUDENT PROFILE: DR SORAYA LEEDHAM (NEE HAYNES)

Congratulations to Dr Soraya Leedham (nee Haynes) whose Doctor of Philosophy thesis was recently conferred at Murdoch University. Dr Leedham was the recipient of an APRIL top-up scholarship award during her PhD program.

Dr Leedham's thesis, An exploration of the anti-infective potential of plant-sourced natural products, studied the roles that plant-sourced natural products can play in the fields of antiviral and disinfectant development. The main aims of the thesis were as follows:

1. Develop a simple, cost effective,high-throughput screening method which could be applied to the screening of natural product libraries for anti-coronavirus activity.
2. Demonstrate via proof-of-concept by applying this screening method to a library of Western Australian plant extracts, utilising it in a bioassay-guided fractionation process for the identification of lead antiviral compounds.
3. Highlight the broad-spectrum, anti-infective potential of plant-sourced natural products.

Overall, Dr Leedham's thesis outlined the development of a rapid, cost-effective compound screening system which can be modified to target any number of viral pathogens within a short timeframe, making it ideal for screening large libraries in the face of emerging outbreaks.

In addition, the thesis illustrated the potential of plant-sourced natural products from native Australian plants. Dr Leedham is currently employed as a Research Officer in the Sepsis Diagnostics Research Group at Murdoch University, Perth, and as a Research Assistant for Biotome Pty Ltd., a Western Australian-based start-up company.

CORPORATE GOVERNANCE

STRUCTURE

The Australasian Pork Research Institute Ltd (APRIL) is a tax exempt Australian public not-for-profit company limited by guarantee.

At 30 June 2024, APRIL has 11 Ordinary (voting) Members, one (non-voting) Associate Members, and one (non-voting) Supporting Member.

DSM-fermenich ceased their membership with APRIL during this year under review.

GOVERNANCE

Board membership consists of:

- An independent Chairperson and one other independent Director nominated by the Board and appointed by vote of Ordinary Members at a general meeting.
- Two Directors appointed by Australian Pork Limited (APL).
- Four Directors appointed by vote of Ordinary Members at a general meeting from nominations provided by Ordinary Members.

All nominees must add skills to the Board in one or more of the following areas:

a. As a member of the Australian Institute of Company Directors or other appropriate qualifications or accreditations to be a Director.
b. Pork production and processing.
c. Business management.
d. Finance and accounting and/or auditing.
e. Corporate governance.
f. Marketing.
g. Administration and commercialisation of research and development.
h. Environment.
i. Animal science and welfare.
j. Education.
k. Any other skills determined by the Directors from time to time.

The Board has approved the Governance Manual and Code of Conduct which set out the expectations and responsibilities of Directors under APRIL's governance framework.

Individual Directors have a right to obtain information necessary for them to discharge their duties from executives employed by APRIL.

Directors may seek independent professional advice, at the expense of the company if any Director wishes to do so, subject to prior agreement of the Chairperson.

THE BOARD IS RESPONSIBLE FOR DECISIONS RELATING TO THE INVESTMENT OF APRIL FUNDS, THE RESEARCH PROGRAM, PROTECTION AND COMMERCIALISATION OF INTELLECTUAL PROPERTY, AS WELL AS MANAGEMENT OF APRIL

BOARD MEMBERS

APRIL's Board members are:

INDEPENDENT DIRECTORS

DR TONY PEACOCK (CHAIRPERSON)

SU MCCLUSKEY

APL APPOINTED DIRECTORS

MARGO ANDRAE [appointed 19 February 2024]

GAIL OWEN

MEMBER NOMINATED DIRECTORS

PROFESSOR ROBER VAN BARNEVELD

PROFESSOR FRANK DUNSHEA

NEIL FERGUSON

DR REBECCA MORRISON [appointed 13 November 2023]

Details of each Director's skills and experience can be found in the Directors' report on page 80

BOARD COMMITTEES

APRIL has constituted the following Board Advisory Committees:

- Research and Development Advisory Committee
- Education Advisory Committee
- Audit and Risk Committee

Further detail on the functions of these committees is provided below.

RESEARCH AND DEVELOPMENT ADVISORY COMMITTEE

Clause 38.6 of APRIL's constitution requires the Directors to establish a Research and Development Advisory Committee, and also permit each Ordinary Member to appoint a member of the committee by notice to the Company Secretary.

The Committee advises and assists the Board of APRIL to oversee and advise on all matters relating to the establishment of Projects undertaken by or on behalf of the company.

The members of the committee as at 30 June 2024 are:

- Dr Tony Peacock (Chair)
- Professor Sam Abraham, Murdoch University
- Dr David Cadogan, Feedworks P/L
- Samantha Sterndale, Westpork P/L
- Dr Jeremy Cottrell, The University of Melbourne
- Dr Darryl D'Souza, CHM Alliance Pty Ltd (SunPork)
- Dr Hugo Dunlop, Apiam Animal Health Ltd
- Dr Rebecca Morrison, Rivalea (Australia) P/L
- Mr Robert Parkes, Ridley Agriproducts P/L
- Dr John Pluske, APRIL (CEO/Chief Scientist)
- Professor Eugeni Roura, The University of Queensland
- Dr Rebecca Athorn, Australian Pork Limited
- Professor Paul Verma, SARDI

The committee held one meeting during 2023–24 on 27 October 2023.

EDUCATION ADVISORY COMMITTEE

The Education Advisory Committee is established under clause 38.1(b) of the APRIL constitution as an Advisory Committee to advise and assist the APRIL Board in discharging its activities in relation to Education and Training within APRIL.

The members of the committee as at 30 June 2024 are:

- Professor Frank Dunshea, The University of Melbourne (Chair)
- Dr Rebecca Athorn, Australian Pork Limited
- Dr Tony Peacock, APRIL
- Dr John Pluske, APRIL (CEO/Chief Scientist)
- Professor Eugeni Roura, The University of Queensland
- Dr Stuart Wilkinson, Feedworks P/L

The committee held two meetings during 2023–24 on 6 September 2023 and 12 February 2024.

AUDIT AND RISK COMMITTEE

The Audit and Risk Committee (formerly the Audit Committee) is established under clause 38.1(b) of the APRIL constitution as an Advisory Committee to advise and assist the APRIL Board in discharging its responsibility for the general oversight of APRIL affairs in the areas of financial accounting and reporting, Government reporting, governance, risk management, and the underlying internal control environment.

The members of the committee as at 30 June 2024 are:

- Su McCluskey (Chair)
- Neil Ferguson
- Sandra Di Blasio
- Gail Owen

The CEO and Company Secretary also attend all Audit Committee meetings.

The committee held four meetings during 2023–24 on 6 October 2023, 23 January 2024, 9 April 2024 and 11 June 2024.

MANAGEMENT

CEO/CHIEF SCIENTIST

DR JOHN PLUSKE
BSc (Agric) (Hons), PhD (UWA),
RAnNutr., R. Anim. Sci.

Dr John Pluske is the Chief Scientist and CEO of The Australasian Pork Research Institute Limited (APRIL), and an Honorary Professorial Fellow at The University of Melbourne. His research career, including many years as a Pork CRC Subprogram Leader and Board member, has focused on nutrition-gut disease interactions in pigs, growth and development, feed and ingredient evaluation, and alternatives to dietary antimicrobial compounds.

M 0410 436 871
E j.pluske@april.org.au

MANAGER, COMMERCIALISATION AND RESEARCH IMPACT

DR CHARLES RIKARD-BELL
BSc.Agr, MSc, PhD

As Manager, Commercialisation and Research Impact for APRIL, Dr Rikard-Bell is responsible for the commercialisation of intellectual property (IP) generated by the company. Charles worked in UK, Belgium and USA as a pig geneticist before returning to Australia to work with a multinational animal health company for 11 years, holding technical, sales and marketing roles in Australia and Asia Pacific. Charles gained his PhD in nutrition and biology through the CRC for an Internationally Competitive Pork Industry.

T +61 8 8313 7973
M 0439 513 723
E c.rikardbell@april.org.au

COMPANY SECRETARY

MS SALLY VARDY
GAICD, FGIA, FCA

Sally is a highly experienced and versatile finance and governance professional with significant Board and Committee experience. She has over 15 years' experience as a professional Company Secretary and CFO for a range of CRC and other organisations. She is an excellent communicator of finance and governance matters to interdisciplinary teams, especially those in science and technical professions. Sally has significant experience setting the financial strategy and monitoring performance in a variety of NFP organisations (ACNC registered charities, lobby groups and membership bodies) and medical, hospitality, construction and technology start-up SME businesses. Sally has held several Board roles in community and NFP organisations, and has operated her own external CFO consulting firm, Beyond Your Numbers PL, for 25 years.

MEMBERS

FOUNDATION MEMBERS

- Apiam Animal Health Ltd
- Australian Pork Limited
- Feedworks Pty Ltd
- Murdoch University
- Ridley Agriproducts Pty Ltd
- Rivalea (Australia) Pty Ltd
- South Australian Research and Development Institute
- CHM Alliance Pty Ltd (SunPork)
- The University of Melbourne
- The University of Queensland
- Westpork Pty Ltd

ASSOCIATE MEMBERS

- Jefo Australia Pty Ltd

SUPPORTING MEMBER

- RSPCA Australia

STRATEGIC PLAN DELIVERABLES

APRIL's achievements against Pillar 1: Further Developing the APRIL Business of the new strategic plan are set out below:

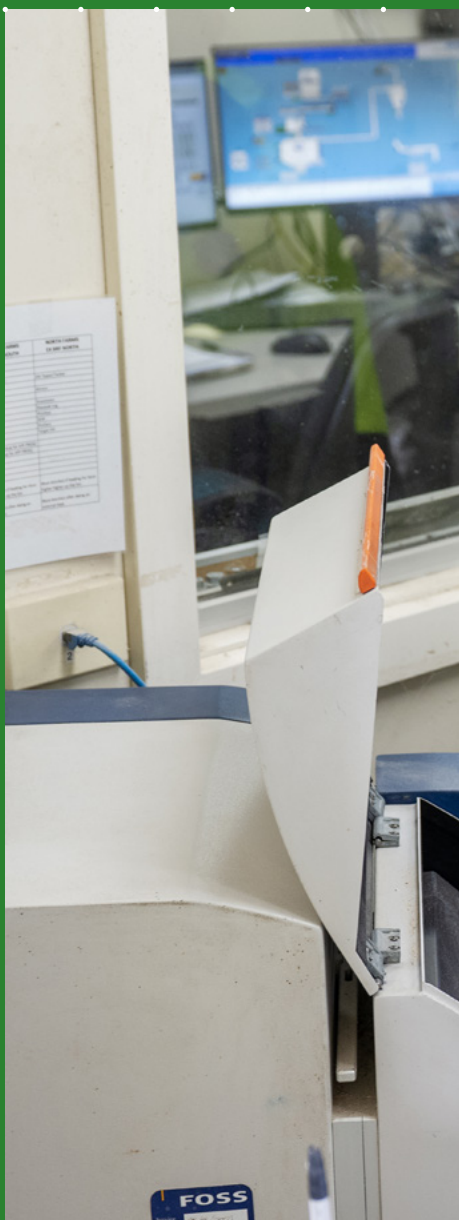
PILLAR 1: FURTHER DEVELOPING THE APRIL BUSINESS

ACTIVITIES	KEY OUTCOMES/DELIVERABLES	2024 STATUS
1.1 Seek additional investment to deliver APRIL's activities	Leverage APRIL investment in research and commercialisation by stakeholder co-investment in applicable projects.	✔ Achieved for the year – ongoing
	Identify external opportunities for co-investment in APRIL activities and where feasible, and where appropriate, drive the bid process.	✔ Achieved for the year – ongoing
	Monitor major external funding programs and strategically apply for funds as an applicant or as a co-applicant with e.g., a member or members: – Development/submission of at least two major Transformational Projects application (> 5:1 project leverage on APRIL funds) to an external funding body, per annum.	● Started – on hold
	Exploit APRIL's 'freedom to operate' and strong collaborative culture among members to seek investment in its project portfolio from non-traditional funding sources.	● In progress
	Increase Member and non-Member revenue of APRIL: • At least two new Ordinary Members by February 2024 (over December 2021 membership). • Additional revenue (up to $100,000 per annum) from non-membership activities, including from external strategic investment of cash reserves.	● Partly achieved this year – ongoing
1.2 Nurture and grow collaborative alliances	Review member benefits and expectations to ensure APRIL can deliver appropriately and sustain support.	✔ Achieved
	Grow relationships/partnerships with relevant investors to advance progress in mutually beneficial activities.	● In progress
1.3 Review operational capability to ensure management efficiency	Operational resources and staffing are adequate to ensure all activities can be implemented according to this Strategic Plan.	✔ Achieved for the year – ongoing
	Employees and consultants have effective and sustainable employment arrangements.	✔ Achieved for the year – ongoing
	Suppliers that deliver services to, or on behalf of APRIL, enhance APRIL's ability to operate effectively and without conflict.	✔ Achieved for the year – ongoing

FINANCIAL STATEMENTS

AUSTRALASIAN PORK RESEARCH INSTITUTE LIMITED

ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 2024



DIRECTORS' REPORT

30 JUNE 2024

YOUR DIRECTORS PRESENT THEIR REPORT, TOGETHER WITH THE FINANCIAL STATEMENTS FOR AUSTRALASIAN PORK RESEARCH INSTITUTE LIMITED, FOR THE FINANCIAL YEAR ENDED 30 JUNE 2024 AND THE AUDITOR'S REPORT THEREON.

The following persons were Directors of the Company during the financial year and are at the date of this report, except as otherwise stated:

APL APPOINTED DIRECTORS

MS GAIL OWEN
OAM, BA LLB (Hons), LLM, FAICD

Ms Owen is an experienced chairperson and Board member, a Fellow of the Australian Institute of Company Directors, and an Order of Australia medal recipient. Gail is a lawyer specialising in commercial and energy law. Ms Owen is Independent Chair of the Victorian Institute of Teaching's Audit, Risk Management and Finance Committee. In her role on the APL Board, Ms Owen is Chair of the Audit, Risk and Corporate Governance and a member of the Industry Integrity Committee.

PROFESSOR BRONWYN HARCH
[resigned 9 February 2024]
BSci (Env)(Hons), PhD (Biometrics), FTSE, FQA, FAICD

Professor Bronwyn Harch has significant research and higher education leadership experience and is passionate about innovation that makes our communities more secure, resilient, and sustainable.

In the role of Interim Queensland Chief Scientist (Oct 2022 to May 2023), Bronwyn worked across government departments in progressing science and research strategy and policies, championing science for study and careers, and working with teams focused on developing large-scale science and research initiatives of relevance to the government's priorities and objectives.

Bronwyn, as the University of Queensland Deputy Vice-Chancellor & Vice-President (Research & Innovation 2018 to 2022), was responsible for enhancing the University's performance and reputation in research, commercialisation and innovation, research training, and research and innovation collaboration with external stakeholders, nationally and internationally. She led the bid for the recently successful Federal Government's Trailblazers Commercialisation Program for the Food and Beverage Accelerator (FaBA).

Whilst Executive Director of the QUT Institute for Future Environment (2014 to 2018), Bronwyn led digital transformation projects in the agrifood sector as bid co-lead and Research Director for the Food Agility CRC. She developed engagement and commercialisation strategies with governments and industry.

Bronwyn also worked as a researcher and research leader at CSIRO (1995 to 2014). Her own research has focused on the statistical design of landscape-scale sampling protocols and monitoring programs, as well as the statistical modelling of complex systems, particularly agricultural and environmental systems.

Bronwyn's more recent board experience has included membership of Queensland's Innovation Advisory Council, the Cooperative Research Centres Advisory Committee, AgResearch NZ's Science Advisory Panel, Australian Pork Limited and CSIRO.

Bronwyn joined Griffith University as Vice President (Industry and External Engagement) in 2023.

MS MARGO ANDRAE
[appointed 19 February 2024]
PGCertMgt, MAICD

Margo joined APL as CEO on 1 August 2019. Prior to commencing with APL, Margo held positions with Cattle Council of Australia, CSIRO, University of NSW, Rural Industries Research and Development Corporation and QLD Local Government. She has extensive experience and networks across primary industries, regional Australia and research environments through these roles.

Margo has extensive experience in stakeholder engagement, marketing, communications, business development, operations and resource management and has a graduate certificate in management from Australian Graduate School of Management, UNSW.

Margo was a former Director of Agricultural Innovation Australia (AIA).

INDEPENDENT DIRECTORS

DR TONY PEACOCK
BSci (Agric)(Hons), PhD, FTSE, FAICD
Independent Chair

Dr Tony Peacock is a passionate advocate for applied research. A reproductive scientist by training, Tony has worked at the Universities of Sydney, Melbourne and Saskatchewan. He has a high media profile with regular spots on ABC Radio speaking on innovation. Tony holds a Diploma of the Australian Institute of Company Directors; Bachelor of Science Hons Agriculture and PhD Veterinary Science, University of Sydney. He is a Fellow of the Australian Institute of Company Directors, a Fellow of the Academy of Technology and Engineering, and is an Adjunct Professor at the University of Canberra.

Tony is considered an expert in collaboration between the public and private sectors on innovation. Tony has served on the Board of a number of start-up biotechnology companies and environmental groups, his current research interests are in science communication, research leadership and effective innovation systems. He is a Director of Peacock Consulting Pty Ltd, the Woodlands and Wetlands Trust, ACT, the Marine Bioproducts CRC and the CRC for Solving Antimicrobial Resistance in Agribusiness, Food and Environments. He is the Chairman of Wintermute Biomedical Inc., Wintermute Biomedical Australia Pty Ltd., Ten Carbon Chemistry Pty Ltd. He has an outstanding track record as a manager of the Pig Research and Development Corporation (1996–2000), the Pest Animal Control Cooperative Research Centre (2001–2005), the Invasive Animals CRC (2005–2010) and most recently the Cooperative Research Centres Association (2010–2020).

He was a 2014 Monash University Churchill Fellow, investigating the relationship between business and research in the USA, the UK, Germany and Singapore. He has consulted to the Governments of Taiwan and Vietnam on innovation models and has represented Australian innovation in Japan, New Caledonia, Sweden, Denmark, the Netherlands, Germany, France and the UK. In 2013 he received the University of Sydney Alumni Award for Community Service and in 2010 the Australian Government Eureka Prize for Improving the Public Understanding of Science.

MS SU MCCLUSKEY
FCPA, FTSE, BCom, MAICD

Su is a Director of Australian Unity, AWN Rural Pty Ltd, LiveCorp Ltd and a Commissioner for International Agricultural Research, and is the Special Representative for Australian Agriculture for the Australian Government. Su was a Commissioner on the National Covid-19 Commission Advisory Board, a member of the Charities Review, the NSW Review of the Regulatory Framework and the Small Business Digital Taskforce. She was also a member of the Independent Review Panel for CPA Australia, the Harper Review of Competition Policy and the Regional Telecommunications Independent Review. Su was previously a director of Energy Renaissance, the Foundation for Young Australians and the NSW Rice Marketing Board.

Su was the CEO of the Regional Australia Institute and the Council of Rural Research and Development Corporations and the Executive Director of the Office of Best Practice Regulation. Su has held senior positions with the Business Council of Australia, the National Farmers' Federation and the Australian Taxation Office. She was named the Westpac/Australian Financial Review Regional Women of Influence in 2013 and received the Women in Agribusiness award in 2014 for outstanding contribution to policy development. Su is also a beef cattle farmer at Yass, NSW.

MEMBER NOMINATED DIRECTORS

PROFESSOR ROBERT VAN BARNEVELD
BAgrSci (Hons), PhD, RAnNutr, FAICD

Professor van Barneveld has been Group CEO and Managing Director of the SunPork Group of Companies since 2016 which includes SunPork Farms, SunPork Fresh Foods, Swickers Kingaroy Bacon Factory and SunPork Solutions. In addition, Professor van Barneveld is Chair of Autism CRC Ltd. He is a former Director of Australian Pork Ltd, Roseworthy Piggery Pty Ltd, Social Skills Training Pty Ltd, Porkscan Pty Ltd and the ASX-listed Ridley Corporation. Professor van Barneveld has a PhD in pig nutrition and formerly worked as a consultant scientist and nutritionist in Australia and overseas for more than 27 years.

PROFESSOR FRANK DUNSHEA
BAgrSci (Hons), PhD, FNSA, FAPSA, FAAAS, FIUNS, RegAnimSci

Frank Dunshea is a Redmond Barry Distinguished Professor and Chair of Agriculture at The University of Melbourne and Professor of Animal Growth and Development at the University of Leeds. He has had a research career spanning almost 40 years in farm animal and biomedical research. His area of expertise is in growth physiology and nutrition and understanding the interactions between the animal and the animal's environment. His research has had a high scientific impact and the results of much of his research have been rapidly adopted by industry. He has maintained a balanced approach to research, combining fundamental with applied research, providing commercial and public good outcomes. Frank is committed to ensuring that all animal industries operate in a responsible and sustainable manner and much of his work has focused on improving efficiency through reducing inputs and outputs while maintaining product quality and consumer health.

MR NEIL FERGUSON
BBus (Agric)

Mr Ferguson is currently the Chief Executive Officer for Westpork Pty Ltd. and has had more than 25 years' experience in the pork industry. Mr Ferguson is an Australian Pork Limited Delegate, Chair of Agricultural Produce Commission of Western Australia – Pork Producers' Committee, and a member of Pork Industry Training WA.

MR DAVID HENMAN
[retired 13 November 2023]
BSci (Agric), MSci (Vet), RAnNutr

Completing his Agriculture Science degree at The University of Sydney, David began his career in the pig industry with PIC in 1987 as part of their management training program involved in the development of Auspig with the PIC genotype, and then moved to Colborn Dawes in Wagga Wagga as a nutritionist and support for the Format feed formulation system in Australia.

David has been nutritionist at Rivalea (Australia) Pty Ltd/ QAF/Bunge Meat industries since 1991 and since 1995 involved in developing research objectives for internal research, as well as being principal investigator for research work conducted on behalf of other commercial companies and pig industry research bodies. David obtained a Master of Science in Veterinary Science from The University of Sydney in 2004. As the Manager of Research and Innovation for the feed milling business, he is responsible for the formulation of 240,000 t/year for its internal pig business and 100,000 t/year for external clients across all species.

With roles in the company across all Rivalea's pig production systems over 27 years, David is very aware of the problems facing pig enterprises. David has also developed a worldwide network of commercial and academic contacts to collaborate with on projects to benefit the Australian pig industry.

DR REBECCA MORRISON
[appointed 13 November 2023]
BAgrSci (Hons), PhD, Dip Mgt

Dr Rebecca Morrison is the Research, Innovation and Animal Welfare Manager for the JBS Pork Division, Australia and has 25 years of experience in the Australian and USA pig industry and universities, leading research teams, delivering impactful research and new products (encompassing pig production and food innovation), and education. Previously, Rebecca was the Sustainable Swine Production Systems Scientist at the University of Minnesota, USA.

Rebecca is actively involved in the Australian industry and is an APL Delegate, a member of the APL Animal Welfare Reference Group, and past representative on the APRIL R&D Advisory Committee. Rebecca holds technical expertise in animal welfare and behaviour, reproduction, nutrition, health, genetics, meat science and new product development. Rebecca provides the Australian pig industry with opportunities for future enhancement in animal welfare, by utilising her internationally recognised animal welfare expertise.

Rebecca has exceptional relationship management skills, positively influences people at all levels, and is committed to ensuring sustainability and profitability of Australasian pork production-with an unwavering passion for the pigs and the people that care for them.

DIRECTORS MEETINGS

The number of Directors' meetings (including meetings of Board Committees) and number of meetings attended by each of the Directors of the Company during the financial year are:

DIRECTOR		BOARD OF DIRECTORS	AUDIT AND RISK COMMITTEE	R&D ADVISORY COMMITTEE	EDUCATION ADVISORY COMMITTEE
Ms Gail Owen	Eligible	4	2	–	–
	Attended	4	2	–	–
Professor Bronwyn Harch	Eligible	2	–	–	–
	Attended	2	–	–	–
Ms Margo Andrae	Eligible	2	–	–	–
	Attended	2	–	–	–
Dr Tony Peacock	Eligible	4	–	1	2
	Attended	4	–	1	2
Ms Su McCluskey	Eligible	4	4	–	–
	Attended	4	4	–	–
Professor Robert van Barneveld	Eligible	4	–	–	–
	Attended	4	–	–	–
Professor Frank Dunshea	Eligible	4	–	–	2
	Attended	4	–	–	2
Mr Neil Ferguson	Eligible	4	4	–	–
	Attended	4	3	–	–
Mr David Henman	Eligible	1	–	–	–
	Attended	1	–	–	–
Dr Rebecca Morrison	Eligible	3	–	–	–
	Attended	3	–	–	–

PRINCIPAL ACTIVITIES AND OBJECTIVES OF THE COMPANY

The Company's objectives are focussed on enhancing the Australasian Pork Industry by investing in research, development, education and training, and commercialisation activities focused on priorities and deliverables that ensure the sustainability of Australasian pork production.

PERFORMANCE MEASUREMENT

The Company evaluates its performance against objectives, milestones and targets as set out in the strategic plan (available at APRIL Strategic Plan 2022–2025), and against the uptake of research outcomes, where appropriate, by Industry. Progress against activities is reported to Members annually.

MEMBERSHIP

The Company is limited by guarantee. As at 30 June 2024, 11 organisations continue as Ordinary Members, one organisation continues as an Associate Member, and one organisation continues as a Supporting Member of the Company.

In the event of a winding up where there are insufficient assets to pay all liabilities, each of the members are required to contribute $10 each which would result in total additional funds of $130.

LEAD AUDITOR'S INDEPENDENCE DECLARATION

The lead auditor's independence declaration is set out on the following page and forms part of the Directors' Report for the financial year ended 30 June 2024.

This report is made in accordance with a resolution of the Directors:

Dr Tony Peacock
Chair

25 September 2024
Canberra

INDEPENDENCE DECLARATION

30 JUNE 2024

RSM Australia Partners

Equinox Building 4, Level 2, 70 Kent Street Deakin ACT 2600
GPO Box 200 Canberra ACT 2601

T +61 (0) 2 6217 0300
F +61 (0) 2 6217 0401

www.rsm.com.au

AUDITOR'S INDEPENDENCE DECLARATION

As lead auditor for the audit of the financial report of Australasian Pork Research Institute Ltd for the year ended 30 June 2024, I declare that, to the best of my knowledge and belief, there have been no contraventions of:

(i) the auditor independence requirements of the *Corporations Act 2001* in relation to the audit; and

(ii) any applicable code of professional conduct in relation to the audit.

RSM AUSTRALIA PARTNERS

Canberra, Australian Capital Territory
Dated: 26/09/2024

GED STENHOUSE
Partner

STATEMENT OF INCOME AND RETAINED SURPLUS

FOR THE YEAR ENDED 30 JUNE 2024

	NOTE	2024	2023
		$	$
Revenue	2	2,467,429	2,415,427
Expenses			
Research program and other costs		(1,807,713)	(1,646,624)
Management expenses	3	(533,776)	(545,978)
Other expenses	4	(364,259)	(303,481)
Surplus from operating activities		**(238,319)**	**(80,656)**
Financial income		250,469	162,449
Net financial income	5	**250,469**	**162,449**
Surplus/(deficit) before income tax		**12,150**	**81,793**
Tax expense		–	–
Surplus/(deficit) for the period		**12,150**	**81,793**
Retained surplus brought forward		**4,238,503**	**4,156,710**
Retained surplus carried forward		**4,250,653**	**4,238,503**

The above statement of income and retained surplus should be read in conjunction with the accompanying notes

STATEMENT OF FINANCIAL POSITION

AS AT 30 JUNE 2024

	NOTE	2024	2023
		$	$
ASSETS			
Current assets			
Cash and cash equivalents	7	5,222,799	5,208,258
Trade and other receivables	8	334,562	404,235
Other assets	9	137,259	240,740
		5,694,620	**5,853,233**
Total assets		**5,694,620**	**5,853,233**
LIABILITIES			
Current liabilities			
Trade and other payables	10	636,972	765,606
Unearned income	11	738,635	773,449
Provisions	12	30,103	37,343
		1,405,710	**1,576,398**
Non-Current liabilities			
Provisions	12	38,257	38,332
		38,257	**38,332**
Total liabilities		**1,443,967**	**1,614,730**
Net assets		**4,250,653**	**4,238,503**
Equity			
Retained surplus		4,250,653	4,238,503
Total equity		**4,250,653**	**4,238,503**

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

STATEMENT OF CASH FLOWS

FOR THE YEAR ENDED 30 JUNE 2024

	NOTE	2024	2023
		$	$
CASH FLOWS FROM OPERATING ACTIVITIES			
Cash receipts from members and customers		2,852,513	2,789,229
Payments to suppliers and employees		(3,088,441)	(2,517,672)
Net cash from operating activities		**(235,928)**	**271,557**
CASH FLOWS FROM INVESTING ACTIVITIES			
Interest received		250,469	162,449
Purchase of Term Deposits		–	751,426
Net cash investing activities		**250,469**	**913,875**
Net (decrease) / increase in cash and cash equivalents		14,541	1,185,432
Cash and cash equivalents at beginning of financial year		5,208,258	4,022,826
Cash and cash equivalents at end of financial year	7	**5,222,799**	**5,208,258**

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

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30 JUNE 2024

NOTE 1. SIGNIFICANT ACCOUNTING POLICIES

Australasian Pork Research Institute Limited is a public company incorporated and domiciled in Australia. The financial statements are presented in Australian dollars, which is Australasian Pork Research Institute Limited's functional and presentation currency.

The Company is a not-for-profit entity.

The financial report was authorised for issue by the Directors on 25 September 2024.

The principal accounting policies adopted in the preparation of the financial statements are set out below. These policies have been consistently applied to all the years presented, unless otherwise stated.

NEW OR AMENDED ACCOUNTING STANDARDS AND INTERPRETATIONS ADOPTED

The company has adopted all of the applicable new or amended Accounting Standards and Interpretations issued by the Australian Accounting Standards Board ('AASB') that are mandatory for the current reporting period.

Any new or amended Accounting Standards or Interpretations that are not yet mandatory have not been early adopted.

BASIS OF PREPARATION

These general purpose financial statements have been prepared in accordance with Australian Accounting Standards – Simplified Disclosures and Interpretations issued by the Australian Accounting Standards Board ('AASB') and the Corporations Act 2001, as appropriate for not-for-profit oriented entities.

Subsection 295 (3A)(a) of the *Corporations Act 2001* does not apply to Australasian Pork Research Institute Limited as the company is not required to prepare consolidated financial statements by Australian Accounting Standards.

Historical cost convention

The financial statements have been prepared under the historical cost convention.

GOODS AND SERVICES TAX ('GST') AND OTHER SIMILAR TAXES

Revenues, expenses and assets are recognised net of the amount of associated GST, unless the GST incurred is not recoverable from the tax authority. In this case it is recognised as part of the cost of the acquisition of the asset or as part of the expense.

Receivables and payables are stated inclusive of the amount of GST receivable or payable. The net amount of GST recoverable from, or payable to, the tax authority is included in other receivables or other payables in the statement of financial position.

Cash flows are presented on a gross basis. The GST components of cash flows arising from investing or financing activities which are recoverable from, or payable to the tax authority, are presented as operating cash flows.

Commitments and contingencies are disclosed net of the amount of GST recoverable from, or payable to, the tax authority.

CURRENT AND NON-CURRENT CLASSIFICATION

Assets and liabilities are presented in the statement of financial position based on current and non-current classification.

An asset is classified as current when: it is either expected to be realised or intended to be sold or consumed in the company's normal operating cycle; it is held primarily for the purpose of trading; it is expected to be realised within 12 months after the reporting period; or the asset is cash or cash equivalent unless restricted from being exchanged or used to settle a liability for at least 12 months after the reporting period. All other assets are classified as non-current.

A liability is classified as current when: it is either expected to be settled in the company's normal operating cycle; it is held primarily for the purpose of trading; it is due to be settled within 12 months after the reporting period; or there is no unconditional right to defer the settlement of the liability for at least 12 months after the reporting period. All other liabilities are classified as non-current.

EMPLOYEE BENEFITS

Short-term employee benefits

Liabilities for wages and salaries, including non-monetary benefits, annual leave and long service leave expected to be settled wholly within 12 months of the reporting date are measured at the amounts expected to be paid when the liabilities are settled.

Other long-term employee benefits

The liability for annual leave and long service leave not expected to be settled within 12 months of the reporting date are measured at the present value of expected future payments to be made in respect of services provided by employees up to the reporting date using the projected unit credit method. Consideration is given to expected future wage and salary levels, experience of employee departures and periods of service. Expected future payments are discounted using market yields at the reporting date on national government bonds with terms to maturity and currency that match, as closely as possible, the estimated future cash outflows.

Wages and salaries

Liabilities for wages, salaries and annual leave that are expected to be wholly settled within 12 months of reporting date, represent present obligations resulting from employee's services provided to reporting date, are measured as the undiscounted amounts based on remuneration wage and salary rates that the Company expects to pay as at reporting date including related on-costs.

Non-accumulating non-monetary benefits are expensed based on the net marginal cost to the Company as the benefits are taken by the employees.

PROVISIONS

A provision is recognised in the Statement of Financial Position when the Company has a present legal or constructive obligation as a result of a past event, and it is probable that an outflow of economic benefits will be required to settle the obligation. Provisions are determined by discounting expected future cash flows at a pre-tax rate that reflects current market assessments of the time value of money of the risks specific to the liability.

NOTE 1. SIGNIFICANT ACCOUNTING POLICIES (continued)

RESEARCH PROJECT COSTS

Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised in the Statement of Income and Retained Surplus as an expense as incurred.

FOREIGN CURRENCY TRANSLATION

Foreign currency transactions and balances

Foreign currency transactions are translated into the functional currency of the Company, using the exchange rates prevailing at the dates of the transactions (spot exchange rate). Foreign exchange gains and losses resulting from the settlement of such transactions and from the re-measurement of monetary items at year end exchange rates are recognised in profit or loss.

FAIR VALUE MEASUREMENT

When an asset or liability, financial or non-financial, is measured at fair value for recognition or disclosure purposes, the fair value is based on the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date; and assumes that the transaction will take place either: in the principal market; or in the absence of a principal market, in the most advantageous market.

Fair value is measured using the assumptions that market participants would use when pricing the asset or liability, assuming they act in their economic best interests. For non-financial assets, the fair value measurement is based on its highest and best use. Valuation techniques that are appropriate in the circumstances and for which sufficient data are available to measure fair value, are used, maximising the use of relevant observable inputs and minimising the use of unobservable inputs.

CRITICAL ACCOUNTING JUDGEMENTS, ESTIMATES AND ASSUMPTIONS

The preparation of the financial statements requires management to make judgements, estimates and assumptions that affect the reported amounts in the financial statements. Management continually evaluates its judgements and estimates in relation to assets, liabilities, contingent liabilities, revenue and expenses. Management bases its judgements, estimates and assumptions on historical experience and on other various factors, including expectations of future events, management believes to be reasonable under the circumstances. The resulting accounting judgements and estimates will seldom equal the related actual results.

NOTE 2. REVENUE

	2024	2023
	$	$
Research and project co-funding	346,112	134,250
Membership fees	1,810,000	1,955,000
Commercialisation income	311,317	300,833
Other contribution and government grant	–	25,344
	2,467,429	**2,415,427**

ACCOUNTING POLICY

Grants

Grant revenue is recognised in profit or loss when the company satisfies the performance obligations stated within the funding agreements.

If conditions are attached to the grant which must be satisfied before the company is eligible to retain the contribution, the grant will be recognised in the statement of financial position as a liability until those conditions are satisfied.

Research and project co-funding and commercialisation revenue

Revenue is recognised at an amount that reflects the consideration to which the company is expected to be entitled in exchange for transferring goods or services to a customer. For each contract with a customer, the company: identifies the contract with a customer; identifies the performance obligations in the contract; determines the transaction price which takes into account estimates of variable consideration and the time value of money; allocates the transaction price to the separate performance obligations on the basis of the relative stand-alone selling price of each distinct good or service to be delivered; and recognises revenue when or as each performance obligation is satisfied in a manner that depicts the transfer to the customer of the goods or services promised.

Membership revenue

Membership fees comprise annual subscription fees, application fees, fees upon cessation of membership and contribution fees.

NOTE 3. MANAGEMENT EXPENSES

	2024	2023
	$	$
Management fees	533,776	545,978
	533,776	**545,978**

Australian Pork Ltd and SciEcons Consulting charges the Company management fees on a reimbursement basis which is calculated based on the time spent or completion milestones by each of the organisation's employees or partners, respectively, on providing corporate services to the Company.

NOTE 4. OTHER EXPENSES

Legal fees	17,136	36,283
Directors' fees	76,028	75,685
Travel	37,459	31,716
Bad debt provision	–	(21,114)
Commercialisation costs	136,090	110,751
Other	97,546	70,160
	364,259	**303,481**

NOTE 5. FINANCIAL INCOME

	2024	2023
	$	$
Interest income from investments and cash and cash equivalents	250,469	162,449
	250,469	**162,449**

ACCOUNTING POLICY

Interest income is recognised in the Statement of Income and Retained Surplus as it accrues, using the effective interest method.

NOTE 6. INCOME TAX EXPENSE

The Company is a non-profit scientific institution and as such the Company's constitution prohibits the distribution of income and assets to members except as bona fide compensation for services or goods provided to, or expenses incurred on behalf of, the Company. Accordingly, the Company is not subject to income tax.

NOTE 7. CASH AND CASH EQUIVALENTS

Cash at bank	499,124	2,161,933
Term deposits – original maturity date of 3 months or less	4,723,675	3,046,325
	5,222,799	**5,208,258**

The Company holds term deposits with interest rates of between 4.90% and 5.10%.

ACCOUNTING POLICY

Cash and cash equivalents comprise cash balances, at call deposits and term deposits with an original maturity of 3 months or less. Bank overdrafts that are repayable on demand and form an integral part of the Company's cash management are included as a component of cash and cash equivalents for the purpose of the Statement of Cash Flows.

NOTE 8. TRADE AND OTHER RECEIVABLES

Trade receivables	92,361	113,314
Other receivables	242,201	290,921
	334,562	**404,235**

ACCOUNTING POLICY

Receivables are stated initially at their fair value and subsequently measured at their amortised cost less for any allowance for expected credit losses.

NOTE 9. OTHER CURRENT ASSETS

	2024	2023
	$	$
Prepayments	137,259	240,740
	137,259	**240,740**

NOTE 10. TRADE AND OTHER PAYABLES

Trade and other payables	636,972	765,606
	636,972	**765,606**

ACCOUNTING POLICY

Trade and other payables are initially measured at fair value and subsequently measured at amortised cost. Trade payables are normally settled on 30 days term.

NOTE 11. UNEARNED INCOME

Current		
Contract liabilities	738,635	773,449
	738,635	**773,449**

ACCOUNTING POLICY

Contract liabilities

Contract liabilities represent the company's obligation to transfer goods or services to a customer and are recognised when a customer pays consideration, or when the company recognises a receivable to reflect its unconditional right to consideration (whichever is earlier) before the company has transferred the goods or services to the customer.

NOTE 12. PROVISIONS

Current	30,103	37,343
Non-current	38,257	38,332
	68,360	**75,675**

NOTE 13. REMUNERATION OF AUDITORS

During the financial year the following fees were paid or were payable for services provided by RSM Australia Pty Ltd, the auditor of the company.

	2024	2023
	$	$
Audit services – RSM Australia Pty Ltd		
Audit of the financial statements	17,440	16,791
	17,440	**16,791**

NOTE 14. KEY MANAGEMENT PERSONNEL DISCLOSURES

The following were key management personnel of the Company for the entire reporting period, unless otherwise stated:

Directors

1. Ms Gail Owen – OAM, BA LLB (Hons), LLM, FAICD
2. Professor Bronwyn Harch – BSci (Env)(Hons), PhD (Biometrics), FTSE, FQA, FAICD
3. Ms Margo Andrae – PGCertMgt, MAICD
4. Dr Tony Peacock – BAgrSci (Hons), PhD, FTSE, FAICD
5. Ms Su McCluskey – FCPA, FTSE, BCom, MAICD
6. Professor Robert van Barneveld – BAgrSci (Hons), PhD, RAnNutr, FAICD
7. Professor Frank Dunshea – BAgrSci (Hons), PhD, FNSA, FAPSA, FAAAS, FIUNS, RegAnimSci
8. Mr Neil Ferguson – BBus (Agr)
9. Mr David Henman – BAgrSci, MSci (Vet), RAnNutr
10. Dr Rebecca Morrison – BAgrSci (Hons), PhD, Dip Mgt

Executives

11. Dr John Pluske – Chief Executive Officer, BSc (Agric) (Hons), PhD (UWA), RAnNutr, RegAnimSci

KEY MANAGEMENT PERSONNEL TRANSACTIONS WITH THE COMPANY

During the year the Company transacted with entities for which key management persons hold positions that result in them having control or significant influence over the financial or operating policies of these entities. The terms and conditions of the transactions with key management personnel and their related parties were no more favourable than those available, or which might reasonably be expected to be available, on similar transactions to non-key management personnel related entities on an arm's length basis.

Compensation

The aggregate compensation made to directors and other members of key management personnel of the company is set out below:

	2024	2023
	$	$
Aggregate compensation	305,028	272,810
	305,028	**272,810**

NOTE 15. RELATED PARTY DISCLOSURES

Transactions with key management personnel related entities. In the following table, superscripts refer to the key management personnel affiliations (from the numbered list of directors in Note 15) with each related party. Net transactions with the Company by director related entities were as follows:

	2024	2023
	$	$
Project and program expenditure		
Australian Pork Limited (1,2,3)	192,112	168,880
SunPork Group (6)	461,685	598,009
The University of Queensland (6)	183,734	207,718
The University of Melbourne (7)	98,459	9,900
Australasian Pig Science Association (7,11)	–	10,000
Rivalea (Australia) Pty Ltd (9,10)	302,104	288,755
SciEcons Consulting (11)	273,250	152,750
The University of New England (6)	16,621	8,771
University of Canberra (4)	–	12,245
Westpork Pty Ltd (8)	57,581	1,639
Current receivables		
Trade receivables from related parties	35,340	38,242
Current payables		
Trade payables to related parties	256,344	208,831

Transactions with key management personnel related entities consist of the receipt of membership fees and commercialisation income, and the payment of research costs, consultancy fees and costs related to the Company's Industry Placement Program.

Terms and conditions

All transactions were made on normal commercial terms and conditions and at market rates.

NOTE 16. COMMITMENTS

The Company has entered into Research and Development contracts which require the Company to make future cash payments to counterparties once certain obligations have been performed by those counterparties.

At 30 June 2024 these commitments (exclusive of GST) total $2,819,622 (2023: $3,632,352) and will be funded by cash balances and future receipts from member and research participant contributions.

In addition, the Company has approved, but not contracted, research project commitments totalling $143,781 (2023: $591,957).

NOTE 17. SUBSEQUENT EVENTS

No matter or circumstance has arisen since 30 June 2024 that has significantly affected, or may significantly affect the Company's operations, the results of those operations, or the Company's state of affairs in future financial years.

NOTE 18. REGISTERED OFFICE

The address of the Company's registered office is LEVEL 2, 2 BRISBANE AVENUE, BARTON, ACT 2600.

DIRECTORS DECLARATION

IN ACCORDANCE WITH THE RESOLUTION OF THE DIRECTORS OF AUSTRALASIAN PORK RESEARCH INSTITUTE LIMITED MADE PURSUANT TO SECTION 295(5)(A) OF THE CORPORATIONS ACT 2001, THE DIRECTORS DECLARE THAT:

- the attached financial statements and notes comply with the Corporations Act 2001, the Australian Accounting Standards – Simplified Disclosures, the Corporations Regulations 2001 and other mandatory professional reporting requirements;
- the attached financial statements and notes give a true and fair view of the company's financial position as at 30 June 2024 and of its performance for the financial year ended on that date; and
- there are reasonable grounds to believe that the company will be able to pay its debts as and when they become due and payable.

On behalf of the Directors

Dr Tony Peacock
Chair

25 September 2024
Canberra

Ms Su McCluskey
Audit Committee Chair

25 September 2024
Canberra

INDEPENDENT AUDITOR'S REPORT

RSM Australia Partners

Equinox Building 4, Level 2, 70 Kent Street Deakin ACT 2600
GPO Box 200 Canberra ACT 2601

T +61 (0) 2 6217 0300
F +61 (0) 2 6217 0401

www.rsm.com.au

INDEPENDENT AUDITOR'S REPORT

TO THE MEMBERS OF

AUSTRALASIAN PORK RESEARCH INSTITUTE LTD

Opinion
We have audited the financial report of Australasian Pork Research Institute Ltd (APRIL), which comprises the statement of financial position as at 30 June 2024, the statement of comprehensive income, the statement of changes in equity and the statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies, and the directors' declaration.

In our opinion, the accompanying financial report of APRIL is in accordance with the Corporations Act 2001, including:

(i) giving a true and fair view of APRIL's financial position as at 30 June 2024 and of its financial performance for the year then ended; and

(ii) complying with Australian Accounting Standards *Simplified Disclosures* under AASB 1060 *General Purpose Financial Statements – Simplified Disclosures for For-Profit and Not-for-Profit Entities*.

Basis for Opinion
We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Report* section of our report. We are independent of APRIL in accordance with the auditor independence requirements of the Corporations Act 2001 and the ethical requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* (the Code) that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

We confirm that the independence declaration required by the Corporations Act 2001, which has been given to the directors of APRIL, would be in the same terms if given to the directors as at the time of this auditor's report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information
The directors are responsible for the other information. The other information comprises the information included in APRIL's annual report for the year ended 30 June, 2024 but does not include the financial report and the auditor's report thereon.

Our opinion on the financial report does not cover the other information and accordingly we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial report, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial report or our knowledge obtained in the audit or otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of the Directors for the Financial Report
The directors of APRIL are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards – *Simplified Disclosures* under AASB 1060 *General Purpose Financial Statements – Simplified Disclosures for For-Profit and Not-for-Profit Entities* and the Corporations Act 2001 and for such internal control as the directors determine is necessary to enable the preparation of the financial report that gives a true and fair view and is free from material misstatement, whether due to fraud or error.

In preparing the financial report, the directors are responsible for assessing the ability of APRIL to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate APRIL or to cease operations, or have no realistic alternative but to do so.

Auditor's Responsibilities for the Audit of the Financial Report
Our objectives are to obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of this financial report.

A further description of our responsibilities for the audit of the financial report is located at the Auditing and Assurance Standards Board website at: http://www.auasb.gov.au/auditors_responsibilities/ar4.pdf. This description forms part of our auditor's report.

RSM

RSM AUSTRALIA PARTNERS

GStenhouse

GED STENHOUSE
Partner

Canberra, Australian Capital Territory
Dated: 26/09/2024

NOTES

NOTES

AUSTRALASIAN PORK RESEARCH INSTITUTE LTD

PO Box 466
Willaston SA 5118

APRI.COM.AU

Australasian
Pork Research
Institute Ltd
APRIL