final report

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Primary Industry Centre for Science Education (PICSE)

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Abstract

In a submission to the Parliament of Australia-Senate Committee on 'Higher education and skills training to support agriculture and agribusiness in Australia' (June 2012), it was noted that many sectors of the industry are facing severe skills shortages.

"In the agricultural sector there is an ongoing labour market shortage in the field of agricultural science. In 2010, only 40% of advertised positions were filled and there were 1.1 applicants for each job. This is down from 65% filled vacancies and 1.4 applicants per job in 2009".

The Primary Industry Centre for Science Education (PICSE) is seeking to address this problem through an integrated program that engages students and teachers at key school intervention points in order to focus them on university science courses that will lead to professional, primary industry focussed careers. The objective of the PICSE program, supported by funding from MLA, is to encourage increased numbers of high quality students to study and work in science-based careers in the agri-food and fibre industries, which will result in flow-on to the meat and livestock industries. This outcome is achieved through teacher professional development programs/courses/materials, student engagement activities (particularly camps and industry placements) and Science and Engineering Investigation Award programs which link students, teachers, university personnel and primary industry employers.

The annual independent evaluation process has demonstrated the continued level of success that PICSE has in attracting rural and regional students into tertiary science, thereby leading to an increased number of graduates becoming skilled professionals in science-based primary industries. The on-line Science for Growth Awards program piloted in 2012 supports wider student attraction in urban and regional/remote settings.

The objectives of the MLA/PICSE agreement are, through a variety of mediums/activities in the wider PICSE program and through engagement with the UNE and CSU Activity Centres in particular, to demonstrate the value and interest of specific careers within the meat and livestock industries. It was also to expand the influence and impact these mediums/activities have on students and their future career pathway choices.

The completion of the primary objectives of the MLA/PICSE collaboration are demonstrated through the specific engagement with teachers and students through the inclusion of specific red meat activities in the Teacher Professional Development programs and during the camps and industry placements for students.

Examples are: a presentation from Dr. Ken Geenty who outlined and displayed the Grow Safe feedlot management technology, of which MLA is a contributor at UNE Feedlot 'Tullimba', the exposure of red meat activities and presentations during school visits, camps and industry placements offered to PICSE scholarship students, for example 13 CSU IPS Camp students visited the JBS Australia feedlot near Yanco NSW and two students completed their five-day industry placements with DPI, one being placed with the Animal Nutrition Unit of the DPI / CSU in Wagga Wagga, whilst the other student was placed at the Cowra Ag Research and Advisory Station. Two UNE IPS Students, completed their five-day industry placements with the Animal Genetics and Breeding Unit and visited both sheep and cattle properties at Guyra collecting a variety of raw measurements from rams and bulls to explore genetic variation between animals, while 18 camp students enjoyed an informative session

on parasites of sheep presented by Assoc Prof Lewis Kahn and Ms Sara Bowers from Animals Science.

This program is supported by additional activities. These include the distribution of no-cost Teacher Resources, which include meat and livestock related activities (most recently the inclusion of the 'Mighty Meat' activity which highlights the development and importance of the MLA's Meat Standards Australia (MSA) program and supports teachers in including investigations that incorporate meat taste testing into their classroom teaching). These resources are also available via the PICSE web site.

The September 2012 the launch of the industry careers magazine "Science Taking You Places – Pathways for a Dynamic Career in Australia's Primary Industries" provides several profiles of PICSE program graduates, Horizon and Nuffield Scholars, ABARES and DAFF graduates, an AgriFood Skills Australia Ambassador and other university graduates. It illustrates the dynamic opportunities at all levels of the primary industries supply chain, from laboratory to the farm, engineering, information technology, economics, marketing and biological and environmental sciences. Red meat industry examples were included.

The PICSE Network publication was produced on a monthly basis, in both hard and electronic copy, with over 1300 of every edition distributed nationally. This also included red meat industry examples.

An independent 2012/2013 Impact Evaluation Report has been prepared and following are extracts from the report.

- Participation in 2012/13 PICSE activities has increased overall, with students and teachers expressing ongoing high levels of enjoyment and feelings of achievement. Those involved have said they have a greater appreciation and understanding of science and science related careers, the importance of science to primary industries, teachers have improved their teaching capacity and thinking, as well as motivation and confidence in being able to encourage and advise students on future study options and career choices(in primary industries).
- Teachers continued to state that their involvement helped support them to encourage students to continue studying science (85%) as well as provide better advice about career opportunities (81%).
- The benefits of PD in providing teachers with opportunities to develop relationships with industry sources continued to be highly valued (average 8.7/10).
- Most students who attended the IPS Camp (76% or 113) and participated in the IPS RBS (91% or 117) indicated that their view on the importance of science in Primary Industry had changed as a result of their involvement. They attributed the main influences as being the benefit of hearing directly from industry professionals and academics about their careers, stories of personal journeys in science and agriculture, how speakers had ended up where they were, and the wide scope of study and employment options available.

Executive summary

The Primary Industry Centre for Science Education (PICSE) program is collaboration between agencies, universities, their regional communities and local primary industries. Through the direct engagement of the PICSE program with students during school years and university, these students are specifically encouraged to become the next generation of researchers and industry scientists working in the primary industries and their supporting businesses.

The University of Tasmania and Meat & Livestock Australia have collaborated to deliver a project, through the PICSE program, that delivers science class activities, teachers' professional development, teaching resources, student camps and student industry placement programs. The activities focus on building strong and sustainable relationships between students and teachers, plus local scientists and employers in primary industries. The focus is on attracting students into tertiary science and increasing the number of skilled professionals in science-based primary industries through an "experiential / seeing is believing focus".

The project objectives were:

1. Engage with the University of New England Activity Centre and Charles Sturt University Activity Centre (2012) to foster inclusion of red meat industry materials, demonstrating interesting careers in the livestock industry, within the PICSE resources and activities program

2. Show positive impact that this project is delivering results, by demonstrated increased interest from teachers and students in the red meat industry

3. Create defined secondary school lesson materials, regarding the sciences of the meat and livestock industry that also demonstrates to teachers a suite of meat and livestock industry career opportunities for students. These materials to be used during teacher professional development programs at the CSU and UNE Activity Centres.

Overall Completion of the Project

The project work is now completed. There were a suite of direct activities focussed on Activity Centres based at CSU and UNE as outlined in the objectives. However there was spill-over to the national PICSE program at other locations. There are opportunities to continue to build on these objectives within the framework of MLA's capacity building activities.

MLA funding for this project has enabled PICSE to undertake activities that will benefit the red meat industry into the future. Along with funding from other key stakeholders including government, agri-business, peak industry bodies, and Rural Development Corporations, this has allowed PICSE to create a fully integrated program of activities that will support all of the primary industries. Particular red meat industry outcomes were achieved within the context of the wider primary industry benefits.

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1. Background

The Primary Industry Centre for Science Education (PICSE) program is based on collaboration between industry organisations, the agribusiness sector, universities, their regional communities and local primary industries. Through the direct engagement of the PICSE program with students during school years and university, these students are encouraged to become the next generation of researchers and industry scientists working in the primary industries and their supporting businesses and organisations.

MLA and UTAS have agreed to collaborate through the PICSE program on the terms set out in the contribution agreement (Project Number B.STU.0262) between Meat & Livestock Australia Limited and The University of Tasmania (Primary Industry Centre for Science Education). This collaboration was signed and witnessed by both parties as at 24th January 2013 (See scanned copy of signed Agreement attached as **Appendix 1**).

This project was established to fund specific and general activities within the PICSE program which focused on year 10-12 secondary school teachers and students. It commenced operation during calendar 2012 in anticipation of signature during mid-late 2012.

2. Project objectives

The broad objective of this project was to educate students on agricultural science and science based career possibilities, encourage them to select agricultural science, or related science fields, on entering tertiary education and progress to a career within primary industry. While the PICSE program has a more general focus on the wider primary industry, there was a specific and defined focus on the red meat industry within the scope of this agreement.

The agreed objectives were for PICSE to achieve the following to MLA's reasonable satisfaction:

1. Engage with the University of New England Activity Centre and Charles Sturt University Activity Centre (2012) to foster inclusion of red meat industry materials demonstrating interesting careers in the livestock industry within the PICSE resources and activities program

2. Show positive impact that this project is delivering results by demonstrated increased interest from teachers and students in the red meat industry

3. Create defined secondary school lesson materials regarding the sciences of the meat and livestock industry that also demonstrate to teachers a suite of meat and livestock industry career opportunities for students. These materials to be used during teacher professional development programs at the CSU and UNE Activity Centres.

PICSE has met these objectives through the following suite of engagement activities:

Objective 1:

The PICSE program is delivered by experienced Science Education Officers, based at partner universities, through a series of activities that include professional development for science teachers, student workshops, annual science camps and industry placement scholarship for year 11 and 12 students, development of teaching resources and a science and engineering investigation awards program.

Although this Agreement was officially signed in Jan 2013, PICSE commenced inclusion of red meat industry focussed information into general PICSE Activities and created a specific program focus at UNE and CSU from September 2012. This included, but was not restricted to:

Communication and Promotion

- September 2012 resulted in the launch of a new magazine "Science Taking You Places – Pathways for a Dynamic Career in Australia's Primary Industries" designed to engage young people in direct career options. The magazine profiles several PICSE program graduates, Horizon and Nuffield Scholars, ABARES and DAFF graduates, an AgriFood Skills Australia Ambassador and other university graduates. It illustrates the dynamic opportunities at all levels of the primary industries supply chain, from laboratory to the farm, engineering, information technology, economics, marketing and biological and environmental sciences. A red meat industry focussed career option was included.
    - An insight into a possible career in the red meat industry is shown on page 9 where an article on Sarah Gatenby is featured profiling her journey since first participating in the PICSE Program back in 2002. Extracts are:
        - "In 2008, Sarah became only the second woman ever to win the Tasmanian Young Farmer of the Year competition, a contest of practical skills and theoretical knowledge. 'The competition varies from year to year, but it often includes things such as livestock and agronomy knowledge, cropping and so forth,' Sarah says. She also comments that these are all crucial skills she is now putting to use on the farm she has established with her partner in Tasmania's Derwent Valley, overseeing a few hundred sheep and cattle, "starting small and working [their] way up".
          "After participating in a PICSE camp and work placement at the end of Year 12 in 2002, Sarah tackled a Bachelor of Agricultural Science degree with honours at the University of Tasmania. She followed this with a master's degree researching the productivity and profitability drivers of the state's beef industry…"
    - The magazine was also distributed electronically as an E-Magazine containing YouTube videos of some of the graduates as well as hyperlinks to websites. The E-Magazine is attached as **Appendix 2.**
    - The career journeys of these young people, coupled with a conceptual careers pathways diagram and the many links to partner and industry websites, make this publication an enduring resource for students and teachers. Copies of the printed magazine are available on request.
- The MLA education resources link to the three Study Guides that focus on sustainability in the cattle and sheep industry

(http://www.target100.com.au/Tips-resources/Sustainability-study-guides) has been circulated across all PICSE Activity Centres for utilisation within Teacher PDs and student camp activities. This demonstrates wider distribution of red meat information materials to the nine PICSE SEOs for inclusion in their engagement with teachers and students. This supports their focus on 'telling real stories of science in action'. This becomes a longer term resource available to key PICSE personnel.

- The PICSE Network publication was produced on a monthly basis, in both hard and electronic copy, with over 1300 of every edition distributed nationally. Articles of significance and interest to the meat and livestock industry can be found at **Appendix 4.** They include references to animal welfare and animal husbandry which were included to demonstrate the breadth of issues relevant to students, teachers, employers and industry.

Teacher Professional Development

- The purpose of the Annual Professional Development (PD) two-day course run at each Activity Centre is inform teachers about 'science in action'. Furthermore it is to influence teachers so that they can influence students in favour of the exciting careers available in primary industries. By including meat and livestock exemplars, this experience "makes real to teachers" the sciences relevant to the meat and livestock sector.
  The PDs took place across the Nation during November and December 2012. The 2012 national focus agreed at the February 2012 SEO Forum was ***"Co-developing solutions to create a new way of supplying quality food by 2050".*** A copy of the PICSE UNE (Armidale NSW) and PICSE CSU (Wagga Wagga NSW) Teacher PD Programs which included the meat and livestock focus in this context are attached in **Appendix 6**.
- 132 Year 11/12 science teachers participated nationwide in the Teachers' Professional Development two-day forums.
- Teacher engagement during their PDs at UNE and CSU with regard to the red meat industries (beef and sheep meats) included:
  - PICSE UNE's Teacher PD included a presentation from Dr. Ken Geenty outlining and displaying the Grow Safe feedlot management technology, to which MLA is a contributor, and is set up at UNE Feedlot 'Tullimba'. This technology accurately measures and records the amount of feed and water consumed by each animal and records individual animal weight gain.
  - PICSE CSU's Teacher PD included a visit to Teys Australia Wagga Complex as well as a presentation by Dr Rebecca Doyle, Lecturer in Animal Welfare, CSU.
  - All teachers were provided with the draft version of the latest national PICSE resource for teachers which included the "Mighty Meat" activity developed by PICSE for science teachers to use in their classroom teaching. This resource activity highlights the development of, and importance of, the MLA's Meat Standards Australia (MSA) program and supports teachers in including investigations that incorporate meat taste testing into their classroom teaching. Each teacher who attended the event reviewed the resource and was presented with a hard and electronic copy of the complete resource to incorporate into their classroom teaching. Many experienced taste testing.
  - In addition a range of presentations on wider industry issues such as sustainable farming systems; environmental management, food security challenges, etc were used to demonstrate the wider industry contexts to ensure teachers understanding the science of these

competing industry and community issues. Open forums were used to tease out these issues to expand teachers thinking.

Student Industry Scholarship Camps and Placements

- The Industry Placement Scholarship (IPS) focuses on Year 11/12 science students as the means to encourage them to choose to continue their studies of science at tertiary level in order to create a primary industry career pathway. The activities engaged in during the scholarship program relate to the sciences that support primary industries. The aim of this scholarship is to illustrate the range of rewarding career paths available for science graduates in primary industries and to put them in personal contact with enthusiastic current employees so students experience these exciting careers personally and 'see it is for them'. The independent evaluation acknowledges this as one of the PICSE key success factors.
- During November and December 2012, eight industry/science five-day residential camps were run for 148 Year 11/12 students as a prerequisite for the individualised five-day Industry Placements with scientists during January 2013. A copy of the PICSE UNE (Armidale NSW) and PICSE CSU (Wagga NSW) IPS Camp Programs are attached in **Appendix 7.**
- Student engagement during Camp and/or Industry Placements at UNE and CSU focussed on the red meat industries included:
    - 13 CSU IPS Camp students visited JBS Australia feedlot near Yanco NSW.
    - Two CSU IPS Students completed their five-day industry placements with DPI. One student, Sophie, was placed with the Animal Nutrition Unit at the DPI part of CSU in Wagga Wagga and this confirmed her interest in animal science, whilst the other student, Karney, was placed at the Cowra Ag Research and Advisory Station. Sophie and Karney have written a report on their camp and placement experience and these are attached as **Appendix 8**.
    - 18 UNE IPS Camp students experienced a lunch time session where a local meat science expert (Geert Geesink) spoke to the students regarding the MSA program. The students were informed about the taste testing process used by MSA and a hot and cold roast beef taste testing activity was set up with students as taste testers. The following day, Geert presented the results of the student responses. Students commented that they appreciated being involved in this session and discovered the importance of science in the evaluation and quality control of high quality meat.
    - Students were also presented with a session on parasites of sheep by Assoc Prof Lewis Kahn and Ms Sara Bowers from Animals Science at UNE. Later that same day students travelled to UNE's Kirby Farm where Deborah Maxwell from Sheep CRC provided students with the latest research and developments in the sheep industry.
    - Two UNE IPS Students, Hannah and Madeline, completed their five-day industry placements with the Animal Genetics and Breeding Unit at UNE. They visited both sheep and cattle properties at Guyra collecting a variety of raw measurements from rams and bulls to explore genetic variation between animals. They completed exciting projects with the scientists where genotypic information will be available through DNA extractions and measurements made on the same animals of key performance traits to allow the students to compare the genotypic information to the actual phenotypic performance of these animals. Hannah and Madeline have written

reports on their camp and placement experiences and these are attached as **Appendix 9.** One of the students commented ... *"The Industry Placement at AGBU was a great way for me to be able to consolidate all I had learnt through a practical experience, gaining an in-depth understanding of animal genetics - something interesting that I hadn't previously learnt much about. After learning about the great facilities and wide range of opportunities I am definitely considering pursuing my studies at UNE."*

Student Travelling Scholarships

- One or two students from each Activity Centre nationally are awarded "Travelling Scholarships" to a Science Camp in another State; the scholarships are funded by national industry partners such as the MLA. The following students were awarded the MLA Funded Travelling Scholarships for 2012.

Name	Original Activity Centre	Destination Activity Centre
Nicholas Hardie	Curtin University, Perth WA	University of New England (Armidale NSW)
Tahlia McSwain	Curtin University, Perth WA	University of Tasmania

- A copy of Nicholas and Tahlia's IPS reports and letters of thanks to MLA are attached as **Appendix 10.** An extract from Nicholas' report ***..."****I am very grateful for the opportunity MLA gave to me as I would have never had the opportunities otherwise. The scholarship has opened my eyes to other forms of agriculture and I am so grateful to be given this opportunity ...I hope to in the future pursue a bachelor of Agribusiness at Curtin University."*

Objective 2:

PICSE conducts an annual independent external Impact Evaluation. The report for 2012/13 has reinforced the value of PICSE programs in increasing enrolments in tertiary agriculture, marine science and aquaculture and general science courses.

The report broadly summarises the impact of the PICSE activities as *"the continued level of success that PICSE has in attracting rural and regional students into tertiary science, thereby leading to an increased number of graduates becoming skilled professionals in science-based primary industries".* The impact reporting process is based on structured feedback received from participants involved in the various PICSE activities. The following are extracts from the report. The full report can be found at **Appendix 11**.

- Participation in 2012/13 PICSE activities has increased overall, with students and teachers expressing ongoing high levels of enjoyment and feelings of achievement. Those involved have said they have a greater appreciation and understanding of science and science related careers, the importance of science to primary industries, teachers have improved their teaching capacity and thinking, as well as motivation and confidence in being able to encourage and advise students on future study options and career choices.
- Teachers continued to state that their involvement helped support them to encourage students to continue studying science (85%) as well as provide better advice about career opportunities (81%).

- The benefits of PD in providing teachers with opportunities to develop relationships with industry sources continued to be highly valued (average 8.7/10).
- Most students who attended the IPS Camp (76% or 113) and participated in the IPS RBS (91% or 117) indicated that their view on the importance of science in Primary Industry had changed as a result of their involvement. They attributed the main influences as being the benefit of hearing directly from industry professionals and academics about their careers, stories of personal journeys in science and agriculture, how speakers had ended up where they were, and the wide scope of study and employment options available.

The impact evaluation focuses on the extent to which PICSE meets its broader objectives, and generally retains a higher level focus than individual industries. As a result there are few direct high level comments on industry impacts. However the data outlined in response to Objective 1 demonstrates that students had the opportunity to experience aspects of the red meat industry in action through the IPS component of the PICSE program (13 at CSU and 18 at UNE) and that there were specific impacts on teachers and students noted above.

Overall the impact data most relevant to students attending the program at CSU and UNE is extracted from the current impact report (pg 47):

Impact on interest in studying/seeking a career in science that supports primary industry

	Changed: now interested in a career in PI	Decreased interest in PI	No change: already committed to a career in PI	No change: not interested
Adelaide	11%	6%	0%	11%
CSU	46%	0%	31%	15%
Curtin	43%	0%	57%	0%
GrowSmart	31%	0%	56%	0%
UNE	68%	5%	16%	16%
USC	71%	0%	24%	5%
UTAS	75%	4%	25%	0%
UWA	38%	4%	21%	4%
Total	50%	3%	27%	6%

Impact on enrolments in science related studies

	yes	no	maybe	n/a	Total
Adelaide	4	2	10	2	18
CSU	9	2	2		13
Curtin	6		8		14
GrowSmart	5		7	4	16
UNE	14		5		19
USC	13		8		21
UTAS	8	1	13	2	24
UWA	16		5	3	24
Total	**75**	**5**	**58**	**11**	**149**

The most relevant data regarding the influence on <u>teachers</u> to support the comments outlined under Objective 1 from the impact report including comments regarding CSU and UNE are (pg 67):

Impact of PD on confidence, thinking and motivation in teaching science subjects

	Help to encourage students to continue to study science	Will be better able to advise students about career opportunities in science based industries	Will be better able to encourage students to continue on to university study in sciences relating to Primary Industries	Other
CSU	100%	78%	100%	0%
Curtin	85%	70%	65%	5%
GrowSmart	95%	95%	100%	43%
UNE	81%	81%	85%	0%
USC	90%	80%	80%	5%
UTAS	82%	77%	73%	5%
UWA	67%	87%	80%	7%
Total	85%	81%	82%	10%
2011/12 Difference	5%	-4%	2%	7%

Objective 3:

Science Teaching Resources

- The 2012 PICSE Teaching Resource, of which 2,500 were produced, "Science Taking You Places 4 – Making Science Contemporary and Relevant" has been distributed throughout the PICSE network to high school teachers nationally who engage / have engaged with the program. PICSE develops a new teaching and learning resource each year. These resources, produced in partnership with funders such as MLA, contain teacher and student materials, demonstrate links with local industries and have a focus on scientific investigations. This Resource covered 15 investigations over 8 primary industries. The research investigations in this publication are predominantly aligned with the Year 9 and 10 Australian Curriculum: Science. Section 4 covers investigations that have a meat industry focus, including an introductory page on MLA. This section covers – a Meat Tenderness Investigation and a DNA Extraction Investigation; pgs 79-84.
- These form the basis of direct teacher support for those teachers engaged in the PICSE program as well as being made available more widely. It is noteworthy that in the 2011/12 external impact evaluation report, a teacher-student multiplier was calculated to be 375 students directly influenced by each teacher influenced by the PICSE program.
- An extensive website has been established to allow students and teachers access to this and other PICSE resources: http://www.picse.net/Hub/resourcesTeachers.htm.

3. Methodology

The PICSE program is delivered by experienced Science Education Officers (SEOs) through a series of activities that include professional development for teachers of science, student workshops, a science camp and industry placement scholarships for year 11 and 12 students, development of teaching resources and a student award program. These activities are explained below.

Teacher Professional Development – Teachers attend a two day workshop and interact with academic science and teaching staff, industry leaders and professionals, as well as business owners in the agricultural industries. This provides contemporary, professional insights of their 'science subjects in action' to inform their teaching.

In-School Workshops for Students in Years 11 and 12 – SEOs identify links with the teaching curriculum and industry and university degree subjects to enable students to make the connection from school curriculum to interesting and fulfilling careers in contemporary industry.

5-Day Camp and Industry Placement Scholarship – The camp and Industry Placement Scholarship (IPS) focuses on encouraging Year 11/12 students to study science at tertiary level by exposing them personally to real careers in action so they experience the potential end-point of their studies. The activities engaged in during the scholarship program relate to the sciences that support primary industries. The aim of these scholarships is to illustrate the range of rewarding career paths available for science graduates in primary industries. The aim of this activity is that senior students experience primary industry research and activities first hand and gain a clearer understanding of options for science graduates in the primary industries sector overall. Through this aspect of the program they experience real potential careers for themselves in an action setting.

Student Travelling Scholarships – This scholarship program allows students to travel to Activity Centres outside of their home state to attend the five day camp described above.

National Science Teaching Resource – Teachers work with scientists and university researchers to develop a resource for all schools to use and which complements the Australian Curriculum and classroom delivery.

Annual Science and Engineering Investigation Awards – SEOs work with teachers to prepare students for a Science and Engineering Investigation Award judged by members of the community and industry. The students personally undertake the investigation to gain in-depth understanding of the practical relevance of that activity to them and the community on a daily basis.

The University of New England (UNE) Activity Centre and the Charles Sturt University (CSU) Activity Centre, which were set up in 2007 and 2011 respectively, were selected to deliver the activities to support the red meat industry. The UNE Activity Centre, based at Armidale, worked with teachers and students from schools across New South Wales, as well as local businesses and industry representatives. The CSU Activity Centre, based at Wagga Wagga, worked closely with primary and secondary schools from the Riverina region, representatives of local businesses, as well as scientists from the EH Graham Centre and the NSW Department of Primary Industries.

4. Results

As described in the previous milestone report, PICSE commenced the inclusion of red meat industry information into their activities from September 2012. The activities that were undertaken included communication and promotional activities; development, distribution and delivery of teacher resources; teacher professional development programs; student activities and Awards programs. A full description of the activities is below.

Communication and Promotion

- PICSE's national careers magazine "Science Taking You Places – Pathways for a Dynamic Career in Australia's Primary Industries" was released in September 2012.
- PICSE continues to receive promotion through local newspapers and other forms of communication. PICSE programs funded specifically through the contribution of MLA have appeared in newspapers such as The Northern Daily Leader where industry scholarship and placement students were featured in an article about young people being attracted to careers in agriculture. There was specific mention of the seven students who undertook placements at the Animal Genetics and Breeding Unit and the NSW Department of Primary Industries Meat Science Centre. This article is reproduced at **Appendix 3.**
- In February 2013 all PICSE SEOs attended a week-long PICSE National Planning Forum held at the University of Tasmania, Hobart. Guest speakers were invited to present to the SEOs, with a view to providing information, material and knowledge to be used within classroom presentations. Dr Aduli Malau-Aduli spoke regarding his research 'Genetics-nutrition interactions in

manipulating the omega-3 fatty acid content of meat from Australian Prime Lambs'. Dr Aduli's PowerPoint has been made available to all SEOs and a printed copy is available on request.

- Throughout 2012 the PICSE Network Magazine was published monthly, with over 1,300 hard copies distributed each month, along with electronic mailings and website availability. References to the meat industry were featured within this distribution, examples of which are attached at **Appendix 4.**
- The MLA education resources link to the three Study Guides that focus on sustainability in the cattle and sheep industry (http://www.target100.com.au/Tips-resources/Sustainability-study-guides) has been circulated across all PICSE Activity Centres for utilisation within Teacher PDs and student camp activities. Some of these may be adapted and included with a practical activity to enhance student engagement.

Science Teaching Resources

- PICSE's 2012 Teaching Resource "Science Taking You Places 4 – Making Science Contemporary and Relevant" has been printed and distributed to High School teacher's nationally. The resource is also available online at http://www.picse.net/HUB/resources.htm. PICSE generally develops a new teaching and learning resource each year and this is the fourth in the series.
- Other PICSE resources, including material developed in previous years, are available on our website. The order form, listing the resources, is attached at **Appendix 5**. These resources are available, at no cost, to both students and teachers: http://www.picse.net/Hub/resourcesTeachers.htm.

Teacher Professional Development

- The Annual Professional Development (PD) two-day course took place across the Nation during November and December 2012. The focus for 2012 was "Co-developing solutions to create a new way of supplying quality food by 2050"
- 132 Year 11/12 science teachers participated nationwide in the Teachers' Professional Development two-day forums. 27 school teachers participated at the UNE forum, while 12 participated at the CSU forum.
- A copy of the PICSE UNE and PICSE CSU Teacher PD Programs are attached in **Appendix 6.**

Student Industry Scholarship Camps and Placements

- During November and December 2012, eight industry and science focused five-day residential camps were run for 148 Year 11/12 students as a prerequisite for the individualised five-day Industry Placements with scientists during January 2013. 20 students attended UNE and 13 students attended CSU. Copies of the PICSE UNE and PICSE CSU IPS Camp Programs are attached in **Appendix 7.**

Student IPS Reunions

- Eleven students who completed the 2011-12 scholarship and 9 students who applied for the 2012-13 scholarship attended the annual UNE PICSE Reunion. This activity maintains contact with the students linked to the program, thereby enabling continued advice for students regarding further science based careers supporting primary industries. It reinforces the level of

engagement and continues their connection with potential mentors and refocusses their interest on the career options available.
Students took part in activities that included learning about the research and development work taking place in the agricultural science industry, as well as tours of award winning local agricultural science industries.

- In 2012 CSU IPS students were invited to a reunion. Six students attended this event. Those who attended participated in a careers fair hosted by the Inter Collegiate Meat Judging Association and also attended presentations by CSU PhD students.

5. Discussion/conclusion

MLA funding for this project has enabled PICSE to undertake activities that will benefit the red meat industry into the future. Along with funding from other key stakeholders including government, agri-business, peak industry bodies, Rural Development Corporations and agencies, this has allowed PICSE to create a fully integrated program of activities that will support all of the primary industries. In addition it provides a focus on individual industries including the meat and livestock industries.

This **longer term benefit** will be achieved by providing school students with an appropriate science education and providing them with relevant industry experience by linking them personally with industry professionals. These students will then go on to create an increased pool of highly skilled technicians, industry professionals and research scientists that have the skills and capability to support the innovation required to expand the primary industry sector, industry and businesses into coming decades. These outcomes are demonstrated through the external impact evaluation report.

The **collaborative elements of the program** will continue to ensure strong and sustainable relationships with local scientists and employers in primary industries and influence the decision making of senior students considering their future professions. It will also influence the thinking of science teachers who are known to be the major influencers of student career decision making.

The PICSE **annual independent monitoring and evaluation** program has reinforced the value of PICSE programs in increasing enrolments in tertiary agriculture, marine science and aquaculture and general science courses as a result of PICSE activities. Furthermore it has reported on the demonstrated and continued level of success that PICSE has in attracting rural and regional students into tertiary science, thereby leading to an increased number of graduates becoming skilled professionals in science-based primary industries. The impact report has previously commented on the expected multiplier effect from the structured engagement of each teacher – on approximately 375 students over 3-years.
A copy of the independent evaluation report is available on request or at **Appendix 11**.

Since the inception of the 10 Activity Centres in five states, PICSE personnel have provided class visits to over 50,000 students, hosted 1,094 Year 11 and 12 students on Industry Placement Scholarships (including camps, work placements and Reporting Back Sessions); provided Teacher Professional Development for 1,307 teachers; produced 13 teacher resources and, since 2009 have had 8,273 students participate in Science Investigation Awards.

The following are **specific examples of feedback** received from teachers and students who attended the 2012 Teacher PD and Student Camps at UNE and CSU:

Teachers:

"I've learnt so much in 2 days to share with teachers and students"

"As has been the case with previous Teacher PDs from PICSE I am better equipped to make links between science in theory and in practice. My school has not taken advantage of other PICSE opportunities offered"

"Certainly opened my eyes to the current projects and how these link to our teaching and motivation of students"

"Rare to find a PD with useful practical application for teaching – very good"

"As a teacher in agricultural science, this PD is always extremely useful"

Students

"More direction and motivation to work harder in year 12"

"A greater understanding about the research part of a degree"

"A new view of science that I otherwise would not have had"

"Becoming comfortable with the idea that anything is possible in the future"

"A broader understanding of what primary industry actually is and how various areas of science can apply to primary industry"

"Science allows people from around the world to join and share their knowledge with each other"

Looking to the future, and as a result of the above data, PICSE is moving to a more focused model for delivery of the integrated activity program. The PICSE programs will also expand into both Victoria and the Northern Territory which may benefit MLA, as this expansion will support future projects being delivered across additional activity centres providing greater value for money.