FILLING THE RESEARCH GAP PROGRAM

REQUESTED ADDENDUM TO RESEARCH FINAL REPORT - Report No. 6

PERIOD 15/11/2015 to 30/06/2016

PROJECT INFORMATION	
Project title:	Anaerobic treatment for emissions reduction from solid manure residues
Term:	July 2013 to 30 June 2016 (contract with Commonwealth executed on 01/08/2013)

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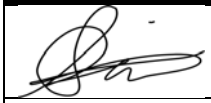
PROGRESS REPORT AUTHORISATION			
	Dr. Stephan Tait	Research Fellow	14/09/2016
Signature of authorised representative	**Name**	**Position**	**Date**

SECTION E – PLAIN ENGLISH SUMMARY

Project title:	Anaerobic treatment for emissions reduction from solid manure residues
Lead organisation:	The University of Queensland
Partner organisations:	Australian Pork Limited, CRC for High Integrity Australian Pork, Quantum Power Limited, Australian Egg Corporation Limited
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Project narrative	This project researched anaerobic treatment of solid manure residues as an alternative to usual manure handling practices, with the aim to reduce emissions and value-add on-farm by recovering energy and nutrients.
Key findings of the project.	Key findings of the research were: *Manure characteristics:* 1) The manures analysed contained significant amounts of phosphorus, nitrogen and potassium, highlighting their value as a fertilizer. 2) The manures contained a complex consortia of micro-organisms, highlighting the impact of carbon and potential future benefits from manures applied to crop land. *Stockpile emissions simulation model:* 3) A mechanistic simulation model tool was developed to aid the future design and operation of manure stockpiles for reduced emissions and decreased nutrient losses. *Anaerobic treatment technology:* 4) Energy (as methane) and nutrients in solid manure residues are recoverable by anaerobic treatment. Specifically, in pilot testing of the project, 50% of the maximum methane potential was recovered. Further, it was possible to up-concentrate phosphorus by 10 times using practical means, which would considerably reduce the costs to transport nutrients to crop-land where they are most needed. 5) For pigs, high capital cost presently limits the economics of anaerobic treatment at small to medium production sizes, and future development should target cost-feasible variants. 6) For eggs, high ammonia is a major limiting factor for anaerobic treatment, requiring future work to develop feasible solutions.
Significance of these findings for policy makers in Australian agriculture.	The project tested and developed anaerobic treatment technology. This provided an illustrated example of manure handling practices that may become widespread in the future. The incentive is in improving farming profitability, reducing energy costs by using renewable energy in biogas recovered by the technology, and improving the beneficial reuse of nutrients.

	A policy framework can greatly facilitate future adoption. Target areas could be (1) incentivising reduced energy intensity on-farm by using biogas energy instead of fossil fuel-derived energy and (2) incentivising the responsible use of nutrients and carbon in manure. Anaerobic treatment, as shown in the project, could help in these regards by recovering the biogas energy from solid manures and by extracting and up-concentrating nutrients to reduce the costs of transport to crop-land where the nutrients are most needed.
How this research contributed to the aim and expected outcome of the project.	The project aimed to provide concrete supporting evidence for anaerobic treatment as applied to Australian solid manures. This aim was achieved, and in addition the project testing provided valuable insight into potential technical challenges that may be faced at full-scale and how to address these.
How the outputs of this research will benefit Australian agriculture.	Manures should be promoted as a valuable soil conditioner and nutrient source for broadacre crop growth. The project analyses provide further support for their nutrient content. Test data from the project provides supporting evidence for anaerobic treatment of solid manures. Anaerobic treatment has already been adopted (during the project term but independent of the project) by a large egg producer in Australia, providing evidence of on-farm benefits. For pigs, anaerobic treatment is already feasible for liquid manure and could be feasible for solid manures at the larger end of production. Major benefits are in the nutrient value of processed manures and in the energy recovered as biogas methane.