This email is a more complete response to questions raised during the Committee's hearing and our informal discussions afterwards, on 14 April at the University of Sydney.

1. **Animal health innovation and climate change**

My response outlined the need for a multidisciplinary, multi-organizational response to new and emerging industry problems arising from climate change.

The specific example was the Pacific Oyster Mortality Syndrome (POMS) impact on our oyster industry. This disease has been spreading around Australia's pacific oyster growing regions over the past 6-8 years, and has been able to wreak the greatest damage (oyster die off) during peak periods of ocean warming in the summer months. We think of the oyster as the canary of the health of our estuarine waterways.

Now POMS virus has reached the hatcheries in Tasmania, the source of 90% of the spat for the Australian industry. Oysters take several years to grow up, so loss of spat will have a multi year impact on our industry (worth over $50m in Tasmania alone).

Tapping into the research expertise available around Australia enabled early identification of the problem, surveillance, and then development of management techniques to reduce the damage done during peak warming periods. Veterinary researchers have led this work, particularly Professor Richard Whittington. A seawater filtration technology developed and patented through an industry funded project has enabled at least one of those hatcheries to remain disease free during the 2016 epidemic in Tasmania and better diagnostics have been developed to rapidly test water to monitor risk.
http://www.abc.net.au/news/2016-02-04/tasmanian-pacific-oyster-mortality-syndrome/7140266

This is a multi-university, industry, government, farmer partnership that has swung into action around an emerging problem, where the balance between the oyster and the disease has been tipped in favour of the disease due to ocean warming. It has been possible because we have outstanding veterinary research expertise in Australia, more than 50% of the expertise is in Universities, and most of those are leading, research intensive metropolitan Universities, contrary to the suggestions made earlier during the day's hearings. We can expect to face many similar new and emerging disease problems in our livestock and aquaculture industries with further climate change, and need outstanding, multi-disciplinary expertise, including veterinary services, to help tackle these problems. Contrary to the suggestions made to the inquiry, this is one of many animal health projects led by G08 Universities in partnership with regional Universities and industry bodies, serving our production animal industries (livestock and aquatic).

The competitive position of Australian agricultural products depends on research-readiness in animal disease. Our global high standing in veterinary science provides a competitive advantage for rapidly identifying, investigating and addressing the new and emerging disease threats. New threats are inevitable, arising from pressure of climate change, intensified agriculture and greater pressure on wildlife populations (the source of most new animal disease).

2. **Women in agricultural innovation**

In response to the question of why there are no women with the robots- there are!
Associate Professor Kendra Kerrisk, is one of the leaders of the Future Dairy Project, which is a decade long, international agricultural business (Delaval)/ Government/ DAiry Australia/ dairy producers/ Dairy farmer collaboration. Kendra is a dairy scientist and was nominated in "25 Women in Robotics You Need to Know About"

http://robohub.org/25-women-in-robotics-you-need-to-know-about-2014/ She was part of the team which made the Eureka prize finals in 2015.

3. How Universities are rewarded for undertaking agricultural research

Upon reflection; Australia's agriculture and veterinary science schools and researchers face particular challenges that can restrict their capacity to contribute to research of benefit to Australia's agricultural industries. Some of these relate to how quality research has been evaluated (through the ERA), rewarded (through SRE) and how it drives individual academics in their decisions on where to put their research effort (with a view to career advancement and promotion). Those were discussed during the session, and are likely to change, with the shift in the drivers for Government funding (RBG) for research performance. Agriculture and Veterinary science have enjoyed greater success with the RDCs, ACIAR and ARC linkage, CRC funding which are very focused on addressing industry problems and driving uptake of research into industry. However the measures of industry impact and uptake from these sorts of research have not been regarded well by NHMRC or ARC discovery panels.

The example I used was a long running ACIAR funded research project in Africa, now also in Timor, on vaccination of village poultry for Newcastle disease, led by Associate Prof Robyn Alders, and reported on ABC national today
http://www.abc.net.au/radionational/programs/breakfast/australian-assisted-animal-vaccination-project-helps/7344808

This project, aimed to help the 50% of children suffering stunting in Timor Leste, and Robyn's work in Africa over 20 years, have had remarkable outcomes. By assisting rural women to deliver animal health programs (vaccination), there has been a substantial, low cost, sustainable improvement in the nutrition, health and wellbeing of children, and the financial independence of women.

Although this work is globally significant, and highly impactful for Australia's reputation abroad, these outcomes are not recognized as equivalent to high impact research publications. Robyn was nominated for the first Mitchell Global Humanitarian Award/ These awards will recognise Australians who *" have made an outstanding contribution to the cause of international development".* The Centre for International Economics estimates her project's $8m of ACIAR funding has generated $480m economic benefits (96.4% return), primarily for women and consumers in Africa. http://devpolicy.org/aidprofiles/2016/02/24/robyn-alders/

4. Challenges specific to agriculture and veterinary science

Further issues to consider that impact agriculture and veterinary science at Australian Universities:

a) Research in universities is underfunded and receives a cross subsidy from teaching
b) Agriculture and veterinary science have been recognized as two of the most underfunded disciplines in higher education (Base funding review)
c) Declining student enrolments in agriculture over the past 15 years have constrained the growth of agriculture schools and faculties (which have not seen the increase in Government funds to universities and in contrast to all other disciplines). Without growth the capacity to adapt and to invest in research has been very limited
d) Underinvestment and diminished standing of these disciplines within our universities is a threat to their continued capacity to contribute, particularly where University partners are required to co-invest in major projects

e) The most underfunded disciplines experience pressure to make savings and to reduce activities. This has not been resolved by the growth in Government funding to higher education following uncapping of undergraduate places. Strategic support for the role for Universities offering Agriculture and Veterinary Science in research to underpin the agro-innovation strategy is necessary. These disciplines are essential contributors to achieving the Government's vision for an innovative, research-driven, industry-linked climate for agribusiness and food business development over the next decade

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