



**Mick Keogh**

Executive Director

Australian Farm Institute

Agriculture was the standout sector of the Australian economy in the 1980s and 1990s when it came to productivity growth, with annual rates exceeding 2% per annum for much of this period. Since the end of the 1990s, however, the sector has experienced a significant slowdown and has only achieved very low or negative rates of productivity growth. While the millennium drought and the high Australian dollar undoubtedly sapped agricultural profitability and investment in new technology during much of this period, there is still no real evidence of a recovery, which many put down to a lack of innovation in the sector.

A critical challenge for policy-makers and industry leaders is finding ways to reinvigorate innovation and productivity growth, in order for the sector to remain internationally competitive. The Autumn 2016 edition of the Australian Farm Institute's *Farm Policy Journal* contains a series of papers discussing solutions that aim to address this challenge.

The first, a collective paper from Michael Robertson, Brian Keating, Daniel Walker, Graham Bonnett and Andrew Hall of the CSIRO, is entitled: 'Five ways to improve the agricultural innovation systems in Australia'. It begins by pointing out that Australia needs to profit from innovation that incites productivity growth. Productivity growth is needed to meet the unprecedented demands of the Asian markets, which are predicted to nearly triple in size by 2050.

The paper notes that although aggregate agricultural productivity has stalled, there are notable exceptions in the case of larger farms in the cotton, dairy and grain industries. The decline of research and development (R&D) spending,

and the lack of private sector investment are given as productivity impediments. Other factors identified include the changing climate, reduced irrigation water availability and declining soil fertility in some regions.

The paper argues that while Australian agricultural research outputs are healthy, this is sadly not correlating with high practical uptake or impact within Australian farming systems. The authors argue that a healthy agricultural innovation system requires entrepreneurial activity and public policy invention. The current innovation system is focused on infrastructure, funding and expenditure. The authors suggest five issues that need addressing: firstly, to increase the emphasis on innovation and not research; secondly, the development of market road maps for higher value capture from Australia's major commodity sectors; thirdly, the development of a set of national targets and a learning platform for agrifood sector growth and innovation; fourthly, to recognise and embrace the evolving role for government; and finally to recognise and embrace changing modalities for agricultural extension for the 21st century.

The second paper is a collaborative effort from Snow Barlow (University of Melbourne), Jim Pratley (Charles Sturt University), Ross Kingwell (Australian Export Grains Innovation Centre and the University of Western Australia) and Brian Keating (CSIRO). It describes how integral the universities have been as a training ground for agricultural researchers and practitioners. In this role, the universities have been responsible for the production of many of the published agricultural research papers. The report describes how the university environment has altered over the past 25 years. It led to the loss of the strategic agricultural colleges, and faculties being swallowed into university mergers, along with cuts to funding priorities. This correlates with a decline in student numbers along with the difficulty of attracting talented students, which has led to a loss of teaching and research staff in agriculture. Finally, the major universities at present have a large focus on attracting international students, of which agriculture attracts few at undergraduate levels.

The authors argue that university research priorities are now being driven by the rankings system administered by the Australian Research Council, called Excellence in Research for Australia (ERA). These rankings are based on publications, not by industry adoption. Australian agriculture does well in the ERA rankings, but this bears little relationship to the adoption of innovations arising from the research. There has also been a lot of reorganisation and structural change in the public research environment over this period, and CSIRO's capacity and funding has shrunk. On the other hand university research has grown due to leverage of the Research and Development Corporations (RDCs).

CSIRO is Australia's national science body and innovation catalyst. CSIRO's challenge in the future is to facilitate all parties working together to foster innovation ecosystems. This will require a significant cultural change internally and in the wider environment. It is also now recognised that to support public funding, partnerships with private investment or the philanthropic sector are paramount.

The authors recommend that national agricultural innovation needs coordinated and integrated oversight. The key recommendations are the creation of an Agrifood Innovation Council and that the ERA criteria be weighted towards industry impacts. The final recommendation is to foster and incentivise private/public partnerships and stronger networks in research, innovation and postgraduate training.

The third paper is a contribution by Les Copeland from the University of Sydney. He argues that food production has a long history of innovation in Australia. However, on a global scale Australia provides only 1% of the total world agriculture production, with Australia's greatest challenge to lift production.

Technology allows a fresh innovative approach to addressing the productivity slowdown. Biotechnology crossed with digital technology provides many opportunities. Many practices like gene sequencing, 'omics' technology, genome editing using CRISPR-Cas9, and epigenetics can aid advances. All these techniques can help

develop the productivity of plant and animal systems at a faster rate. The digital revolution can provide efficiencies to existing research and yield advances. Utilisation of a multidisciplinary and collaborative research approach opens up endless opportunities.

In the concluding paper, the authors examine the challenges to effective interaction in the New Zealand agricultural research and extension system. The joint paper is written by James Turner, Kelly Rijswijk, Tracy Williams, Tim Barnard and Laurens Klerkx. This paper reiterates the importance of translating science to on-farm production. It uses an innovation system framework, to understand the influences from the research phase right through to uptake on the farm. The key message from the paper is that to streamline adoption, strong linkages are needed between research and industry, including incentivising individuals that act as a science translator to the farmer. This should also include greater collaboration among all levels of innovation from government, industry, and research to the farmer.

The papers contained in the Autumn 2016 *Farm Policy Journal* have set out to address the reinvigoration of innovation and productivity within the agriculture sector. Most papers focus on the challenges of translating research into productivity gains on farms, something which cannot be done while researchers work in isolation from industry. Unfortunately, institutional change has driven researchers and research organisations away from industry, and significant reforms will be needed to institutions, funding and incentive systems in order to bring about the required changes. It is clear that Australian agriculture needs to develop networks of multidisciplinary private and public partnerships. Investment in research needs to be driven by industry impact. This needs to be supported by a very integrated approach, and such an approach to innovation needs to be entrenched by universities, industry and farmers.

