



Australian Government

**AUSTRALIA'S CHIEF SCIENTIST**

**PROFESSOR IAN CHUBB**

**MILTHORPE LECTURE**

**20-MINUTE SPEECH (PLUS 20-MINUTE Q&A)**

**MACQUARIE UNIVERSITY, SYDNEY**

**MAY 23, 2013**

**\*\*\*\*\* CHECK AGAINST DELIVERY \*\*\*\*\***

Good morning

It is an honour to be invited to present the 2013 Milthorpe Lecture.

And it is good to see so many young, (well, young-er!) people here.

I heard one of my staff talking about The Black Eyed Peas the other day and I thought it was strange when they said they were awesome because I thought they were talking about food.

I then realized they were talking about a band and they were talking about a report that a member of the Black Eyed Peas – will.i.am - recently donated five hundred thousand pounds to The Prince's Trust charity in the UK, directing them to use the money on science lessons for children.

He said: - *“I wanted to donate this money so if there is a kid somewhere in the ghetto or undeserving community in London, people just like me, instead of telling he or she to play sports, let's encourage them to do science or mathematics... I have no doubt that a kid from Brixton or East London can create something that changes the world with the Prince's Trust.”*

How refreshing to hear a pop star with such a deep understanding of how important science is to the world.

It is an understanding that we all share.

I know that a good number of you here today are studying first-year biology.

It is a discipline with broad application and in the Australian context, biology (along with chemistry) has a long-standing and fruitful relationship with agriculture.

It's that relationship I want to talk about today.

Australia's agricultural sector matters. We need it to be strong and sustainable in order to feed ourselves.

We talk about food security, but don't be misled by any narrow definition.

The importance of food security extends well beyond food (something I'll come back to in a moment)

But first let me turn to the loss of capacity in our agricultural sector.

That's true for both the farmers that produce food and fibre, and the scientists working to help them do this better.

Australia's farmers are getting older.

From 1976 to 2001, the number of farmers in their 20s declined by more than 60%<sup>1</sup>

These days the average age of Australian farmers is 53, 14 years above the national average for other occupations<sup>2</sup>.

Some 18,000 people left the sector the year before last<sup>3</sup>

Which begs the question, in 10, 20, 50 years, who is going to grow crops or raise livestock or do research that will help them do it better?

Unfortunately for Australia – though perhaps fortunately for you - 0.5% of university students take agricultural science. In 2010 we had only 743 graduates in agricultural science. That same year, approximately 4500 agricultural science jobs were advertised<sup>4</sup>.

Farmers need scientists to keep providing the new knowledge they need to do better. And it is clear we are not producing enough of them.

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<sup>1</sup> Barr N, Department of Primary Industries, Victorian Government, for Australian Bureau of Statistics (2004). *The micro-dynamics of change in Australian agriculture, 1976-2011*, ABS 2055.0.

<sup>2</sup> Australian Bureau of Statistics, 2012. Labour Force and Other Characteristics of Farmers – *The Personal Characteristics of Farmers*. Available: <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/1301.0Main+Features3032012>

<sup>3</sup> National Farmers Federation, 2012. *Farm Facts 2012: Farmers are Batting Above the Average*. Available: <http://www.nff.org.au/read/2527/farm-facts-2012-farmers-are-batting.html>

<sup>4</sup> Office of the Chief Scientist, 2012. *Senate Enquiry into Agriculture*. Available: <http://www.chiefscientist.gov.au/2012/02/senate-enquiry-submission-agriculture/>

That's where (hopefully) some of you might come in.

The fact is we need some of you to be thinking about studying agricultural science.

Australians should be adding to agricultural science's global bank of knowledge.

We need that knowledge to draw upon, so that we can produce more and more food, with less and less inputs.

That's been the story thus far. Science has already had a major impact on agriculture. The results have been, shall we say, awesome.

Since the introduction of the Green Revolution crops, Global crop production increased from 1.84 billion tonnes in 1960 to 4.38 billion tonnes in 2007.

This is a more than doubling of yield, stemming from only an 11% increase on the amount of agricultural land used<sup>5</sup>.

For those of you who don't know his story, look up Norman Borlaug, who is credited with starting the ``Green Revolution''.

He developed a high-yield, disease-resistant wheat.

When it was introduced to many developing countries, it is said to have saved more than a billion people from starvation.

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<sup>5</sup> PMSEIC, 2010. *Australia and Food Security in A Changing World*. Canberra, Australia: p 21

In accepting the 1970 Nobel Peace Prize, Norman Borlaug said: -

*'... we are dealing with two opposing forces, the scientific power of food production and the biologic power of human reproduction. Man has made amazing progress recently in his potential mastery of these two contending powers. Science, invention and technology have given him materials and methods for increasing his food supplies substantially'*<sup>6</sup>.

These words, spoken 43 years ago, still resonate today. At least I hope they do.

We cannot take our ability to produce food of sufficient quantity or quality for granted.

Food security is a global issue and Australia is already playing its part, through primary production.

We are a major food trading nation. We export around 70 per cent of the food we produce.<sup>7</sup>

Asia is our biggest export market, with China the most significant importing country.

By 2050, global demand for food is projected to increase by 70 per cent from what it was five years ago.<sup>8</sup>

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<sup>6</sup> (Borlaug, 1970)

<sup>7</sup> Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (2011). *Agricultural commodity statistics 2011*, December.

Where's the greatest growth expected? Not surprisingly it is on our doorstep, in Asia, particularly China.

What will they want more of? Fruit and vegetables, followed by meat and cereals, according to the projections.

Currently Australia produces enough food to directly contribute to the sustenance of 60 million people<sup>9</sup> - that is 1 per cent of the world population and 2 per cent of the population of Asia.

That's a pretty good effort. But when you consider our knowledge and research expertise, we are well-placed to make an even greater contribution.

The outcomes of Australian agricultural research is said to contribute to the diets of 400 million people worldwide.<sup>10</sup>

An important part of that contribution comes via our aid program.

Two years ago, the Australian Centre for International Agricultural Research (ACIAR) asked me to chair a panel looking at aid funding for research by Australian institutions, particularly in agriculture and medicine.

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<sup>8</sup> Linehan V et al. (2012). *Food demand to 2050: Opportunities for Australian agriculture*, ABARES conference Canberra, March

<sup>9</sup> D'Occhio M (2011). *A food secure world—challenging choices for our north*, Highlights newsletter, August. Crawford Fund, Canberra.

<sup>10</sup> D'Occhio M (2011). *A food secure world—challenging choices for our north*, Highlights newsletter, August. Crawford Fund, Canberra.

The panel framed a strategy that said we should respond to the priorities of the developing countries we work with, and try to make sure the research reduces poverty and contributes to long-term food security.

Part of that is sharing our expertise so developing countries are ultimately able to develop their own.

To state the obvious, there is no substitute for food and estimates are that poorer people spend more than 50% of their income on food.<sup>11</sup>

Improving agricultural productivity (which is getting more out for less in) is an effective way to increase food production and reduce poverty, and increased productivity builds local economies.

In Australia we've shown some leadership by sharing our agricultural expertise, which we have built up over a long time.

We have established strong links and capabilities in delivering technology to developing countries in our region.

One example is East Timor and the *Seeds of Life* program (a joint project by that country's Ministry for Agriculture and Fisheries, and the Australian Government through ACIAR).

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The program started in 2000 and has tested 210 varieties of staple crops on experimental stations, before moving them to on-farm trials engaging Timorese farmers.

The gain from higher yielding varieties is sufficient to feed 1000 farming families a year, every year.

Of those farmers, more than half sold a third of their surplus, helping their families by buying more protein rich food and paying for their children's education.<sup>12</sup>

What a simple but effective example of how research around food security brings benefits beyond food.

As the U.S. Secretary of Agriculture said recently: -

*“... there is tremendous opportunity ... to provide solutions through shared capacity building tools. Greater access to these tools will allow farmers and ranchers around the world to produce more, increase access to food, and ultimately provide ladders of opportunity with improved incomes for people in rural places around the world.”*<sup>13</sup>

So the East Timor example is not just about us being a good neighbour.

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<sup>12</sup> Australia and Food Security in a Changing World: Can we feed ourselves and help feed the world in the future? Report of the PMSEIC Expert Working Group October 2010

<sup>13</sup> Apr 29, 2013 [Remarks by Secretary Tom Vilsack G-8-International-Conference-on-Open-Data-for-Agricultures](#)

It shows that Australian agricultural science expertise is joining a broader international movement of nations that do well in this discipline and share their expertise.

Yet despite our research success, there are challenges ahead. One of the biggest is sustainability.

This has been recognised at the most prominent, national level and was contained in a report to the Prime Minister's Science, Engineering and Innovation Council, or PMSEIC<sup>14</sup>.

The report outlined four new challenges that need to be addressed in order for Australia to move towards sustainable practices:

- Maintaining the quality of our land, water and biological resources.
- Ensuring threats to biosecurity are addressed.
- Adapting to climate change, and
- Dealing with increases in input costs.

All of those will require science to provide the answers. All of those need at least some of you to play your part.

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<sup>14</sup> PMSEIC, 2010. *Australia and Food Security in A Changing World*. Canberra, Australia.

Australian researchers are already investigating new ways to improve our resource management practices.

Last year, I was asked to speak at a Soil Security symposium, a relatively new area of research focused specifically on managing soil to support agricultural ecosystems.

Similarly, crop protection and biotechnology solutions are finding ways to increase yield while reducing water consumption and increasing a crop's nutrient uptake.

Another challenge, the relentless threat of invasive species (e.g. pests and weeds) and disease, is already being countered by science. Herbicides, insecticides and fungicides are currently relied upon to increase global food production by between 30 and 50 per cent<sup>15</sup>.

Finally, facing the changes to our environment and to weather patterns, even if we do not know the extent of them, is already

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<sup>15</sup> Croplife, 2012. *Submission in Response to National Food Plan Green Paper*. Introduction, paragraph 5. Available: <http://www.croplifeaustralia.org.au/files/newsinfo/submissions/2012/CropLife%20Submission-National%20Food%20Plan.pdf>

a huge part of scientific research.

We are faced with the reality that many current farming processes and crops will be at risk in that changing environment.

Those risks include things like longer droughts and more of them, increasing salinity in arable land, soil degradation, water scarcity, declining availability of fertilisers, emergence of pests and diseases in places they were not previously found.

The solutions science offers us could include better land management, better water management, better irrigation systems, precision farming (use of remote sensors and GPS) sensitively-conducted research into genetically-modified crops and recycling of soil nutrients in food production.

Development of biofertilisers and biopesticides might help reduce dependence on their 'chemical cousins', and nanotechnology might be applied to control the timing and amount of any fertilisers used.

Science offers agriculture possibilities as exciting as they are broad - and necessary.

It is estimated that close to a billion people in the world are malnourished right now.

With the world population projected to grow to from 7 to 9 billion by 2050, it is important for all nations to be investing in agricultural R&D, especially when you consider the lag before any benefits are seen.

How long is this lag? Estimates suggest that some benefits may not be seen until 35 years after the initial investment.<sup>16</sup>

R&D investment on its own will not be enough. We need people who are going to do the research.

So as you sit here this morning, wondering how to plot your pathway to further study and a career, it is worth considering agricultural science.

It is a discipline that needs good people and it offers the opportunity to do some good, not just here in Australia, but overseas.

Regardless of whether you pursue agricultural science, or another discipline, you should all know that you are an important part of the Australian scientific enterprise.

The country is better off for your participation and your effort. I thank you for it and I urge you to keep going.

Thank you.

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<sup>16</sup> Sheng Y, Mullen D and Zhao S (2011). *A turning point in agricultural productivity: consideration of the causes*, ABARES Research Report 11.4 for the Grains Research & Development Corporation.