Horticulture in the 21st century – the need for an educated workforce

JE Pratley,
Charles Sturt University, Wagga Wagga, Australia 2678
jpratley@csu.edu.au

ABSTRACT

The challenge of feeding the world is well known. The challenge increases significantly if population projections of 9.3 billion by 2050 are realised. Horticulture therefore must play its part and there are great opportunities for the industry. Taking advantage of such opportunities however will require significant increases in productivity, uptake of technology and environmental management at levels much higher than hitherto has been needed.
A highly educated and skilled workforce therefore becomes an imperative in order to achieve the necessary productivity gains. The task for horticulture is to re-fashion its image, create career paths for newcomers and work smarter not harder. An appropriate workforce will only occur if prospective employees find attraction to the careers on offer in the industry. That includes the industry valuing education and training and the associated qualifications. In Australia, these issues have been the focus of attention more generally and the industry has the challenge ahead to entice the next generation of horticulturists into its fold.

INTRODUCTION

Horticulture can be roughly categorised into three sectors, production horticulture, environmental/amenity horticulture and the agribusiness services being the pre and post farm gate businesses sector. This paper focuses on production horticulture, particularly the professional component as it relates to higher education. Elsewhere in these Proceedings the issues of careers as they relate to the vocational education and training (VET) component are canvassed (Aldous and Pratley, 2014).

At the professional level, being the agribusinesses and the management level of farm businesses, there seems to be a strong need for horticulturists, and those with whom they deal, to be better educated than their forebears and for the industry to be educated at least to the level of the rest of the community in order for horticulture to be seen as an attractive career choice for new players. This paper considers the education imperative and the extent to which production horticulture has met these challenges.

OPPORTUNITIES FOR PRODUCTION HORTICULTURE

Much has been written about world food security. Despite the efforts of the Green Revolution of the 1960s and1970s there are some 850 million people currently hungry (ie 1 in 8 people) and more than 2 billion people (ie more than 1 in 4) suffer micronutrient deficiencies which in children lead to stunting and adult impairment (Shenggen Fan, 2014). Just increasing the food supply will not overcome this problem as many are unable to afford to purchase sufficient food. This then is not a particular focus of the paper. However some developing countries, notably China and India, have increasing affluence among their populations and this represents a growing market for food, notably for horticultural products. By 2050, India will require a doubling in the supply of fruit and vegetables while China will need to quadruple the supply of fruit (Penm, 2014). Neither country will be able to supply all its needs thereby opening up opportunities for international horticulture suppliers, including Australia, to provide the shortfall.

Such opportunities however have strings attached. Markets around the world are becoming more sophisticated and demanding in requirements. Emphasis on quality parameters, on methods of production (including sustainability) and reliability infers the need for higher levels of management which in turn are delivered by higher levels of education and training. As well there are many local compliance demands such as work health and safety, chemical certification and the like. The business also needs to do its own marketing and make a profit, utilising modern technologies and chasing productivity gains.

Whereas in past times knowhow was achieved through the 'university of hard knocks', modern business including horticulture has to rely on its education system to deliver employment-ready personnel who can deliver on modern day production. The education parameters have several intentions, being:

- productivity and sustainability of the production system;
- international competitiveness; and
- meeting community standards for the industry in order to provide an attractive workplace.

The national community education standards, or aspirational targets, in Australia have been articulated, with bipartisan support, as 40% of 25-34 year olds having a degree by 2025.

The question therefore is to what extent are the production horticulture industries well positioned educationally to take advantage of the opportunities that are projected by authorities. An analysis as far as data will allow follows.

EDUCATION IN HORTICULTURE

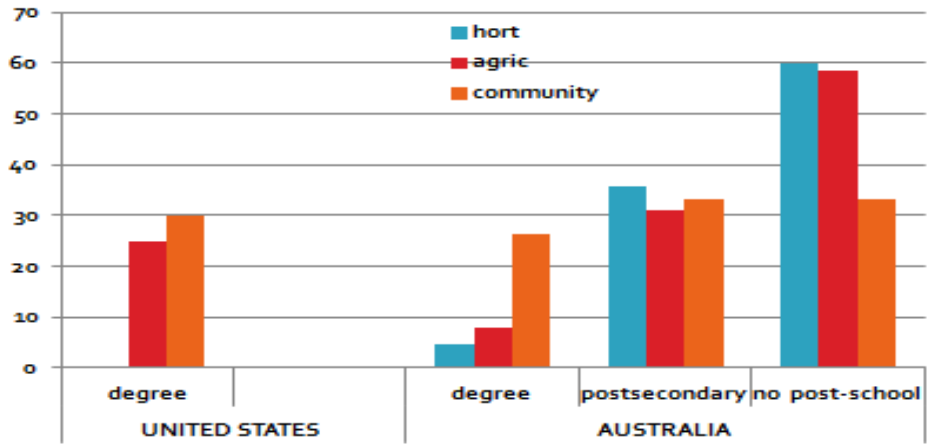


Figure 1 Qualification levels in 2007 for horticulture, agriculture and the Australian community in comparison with those for agriculture and the community in the United States of America

Examination of the data from 2007 suggests that, in degree attainment, horticulture (<5%) lags behind agriculture (<10%) which itself lags behind the community at large (~25%) (Figure 1). The performance of horticulture in post-secondary education is respectable but likely reflects the attainment of vocational (VET) qualifications by the amenity/environmental horticulture sector. This is confirmed in Aldous and Pratley (2014, this Proceedings). What is also evident is that Australian agriculture lags behind its

counterpart in the US where agriculture qualifications are around the same level as the Australian community statistics. An examination of the trends over 3 decades (Figure 2) shows that degree attainment has had steady growth for both the community at large (~28% in 2012) and for agriculture (~12%). The concern is that the slope of the trend for the community is steeper than for agriculture suggesting that the gap is widening.

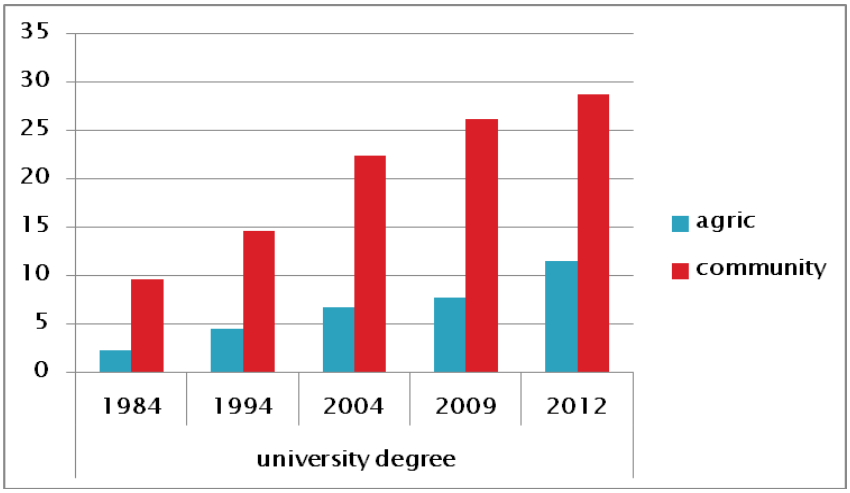


Figure 2 Trends in higher degree attainment from 1984 to 2012 for the Australian community and for agriculture

Analysis of the number of graduates in horticulture from the Australian universities presents a sad picture. From a base of around 150 in 2001 only around 40 graduates became available in 2012 a decline of over 70% (Figure 3). The numbers of graduates from the Associate Degree in Horticulture at the University of Melbourne are included for comparison showing that in recent years most of the graduates emanate from that program, which is in amenity horticulture.

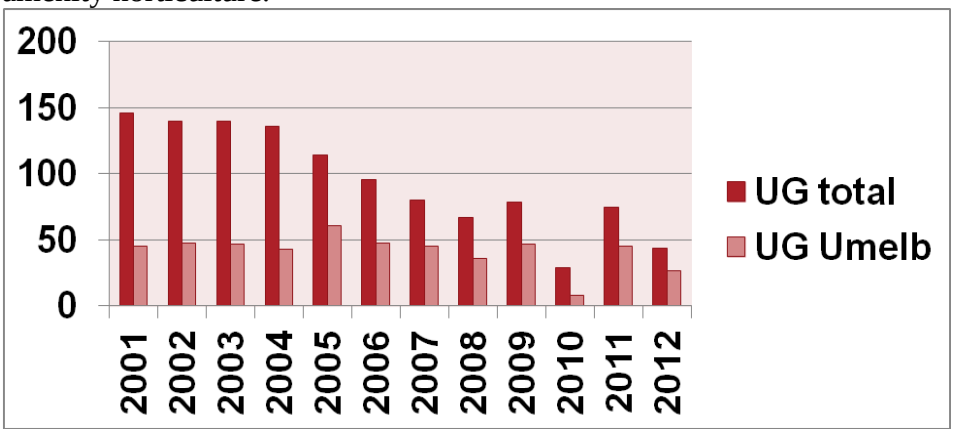


Figure 3 Trends in graduate supply in horticuclture from Australian universities and from the University of Melbourne 2001-2012

Perhaps even more alarming is the decline in student **enrolments** in horticulture at Australian universities (Figure 4). This is important because universities receive government funds based on student load and as load falls so does income. Universities respond to this by reducing staff and subject offerings until the provision of such a course is no longer sustainable. Universities are run more like a business and they respond to income contraction by culling uneconomic offerings and supporting those which are in strong demand. Sentiment and loyalty play little part in University business. In horticulture the decline in enrolments

Australia-wide has been more than 75% over the period 2001 to 2012, with every university experiencing the effect.

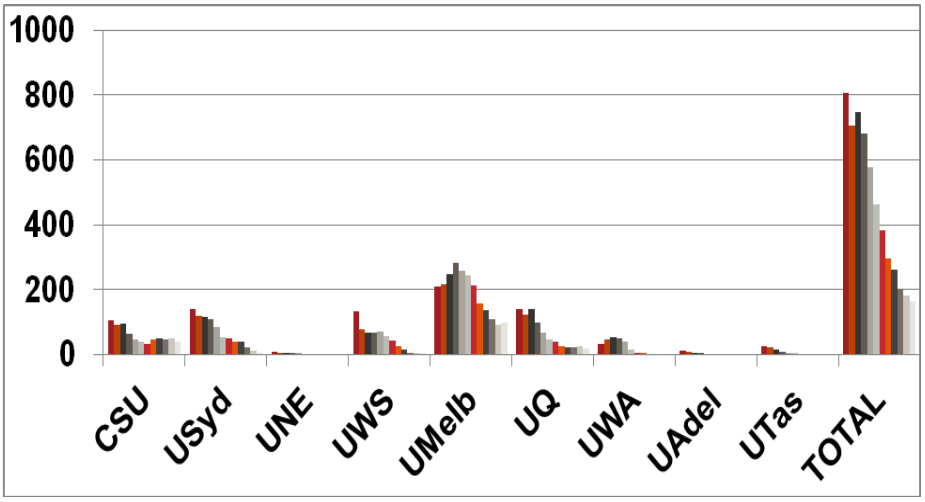


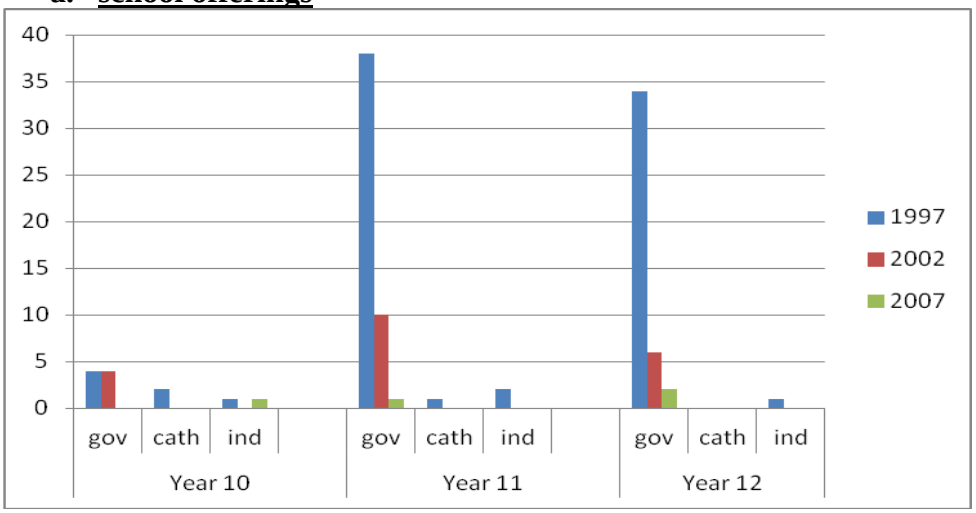
Figure 4 The trend of declining enrolments in horticulture in Australian universities from 2001 to 2012

It is no surprise therefore that horticulture degrees have largely disappeared from higher education, having been withdrawn from the University of Queensland, the University of Sydeny, the University of Western Sydney, the University of Tasmania, the University of Adelaide and the University of Western Australia. Only Charles Sturt University and the University of Melbourne (associate degree only) continue to offer programs. There remain strands and elective units in some universities.

In the debate on the decline in the supply of agricultural graduates in Australia, much has been written about the need for engagement of students in the school system, both in primary and secondary schools. In the Review into Agricultural Education and Training in NSW (Pratley, 2013) the availability of horticultural education in schools was canvassed. A measure of the health or otherwise of school horticulture education was the offering and participation in the senior years of secondary schools (Figure 5). The data suggest that horticulture has disappeared from the Catholic and the Independent Schools and declined to very low levels in the public schools. Data show that whereas in 1997 there were around 34 schools offering horticulture in 1997, only 2 schools still offered it in 2007 and there were no students enrolled in 2012.

In both higher education and in school education therefore horticultural education has been decimated in the last two decades and there must be questions as to whether there can be recovery. What is clear is that the horticultural need to address the image of its industries and re-engage with the education system as a whole.

a. school offerings



b. student enrolments

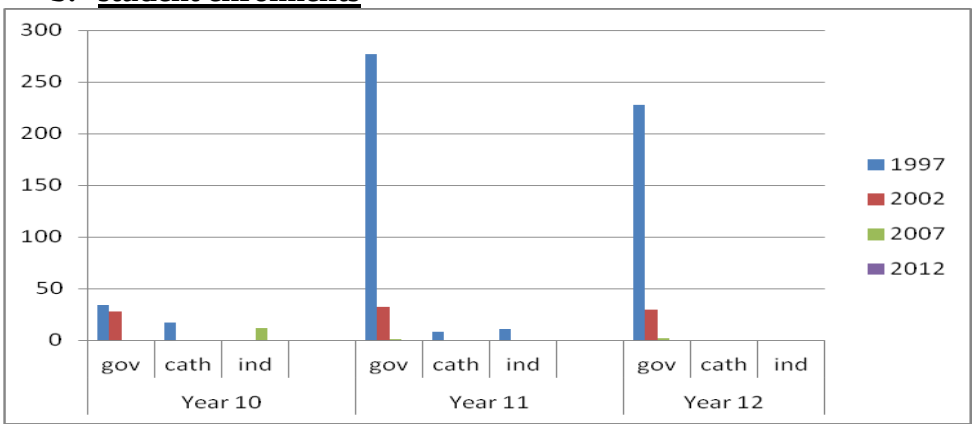


Figure 5 Horticulture in the NSW secondary schools Years 10 to 12: a. Subject offerings 1997-2007; b. Student enrolments 1997-2012

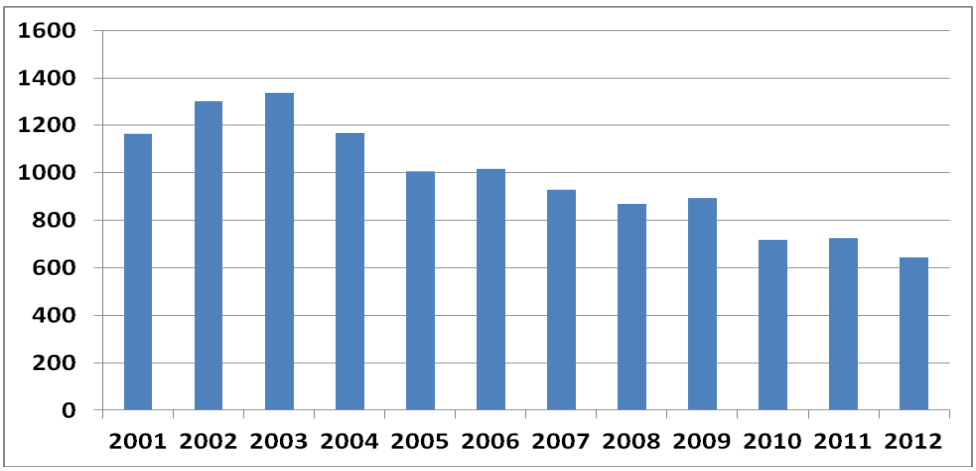


Figure 6 Graduates from Australian universities in agriculture and related courses, 2001-2012

How then might the horticulure industries move forward? In respect of production horticulture, the response would be to depend on agriculture graduates as occurred in past decades. In many agribusiness situations, graduates service both agriculture and horticulture needs and would be expected to pick up knowledge of specialist horticultural management

needs in the line of business. For this to work though it presumes that there is an adequate supply of agriculture graduates. This has been reviewed over the past seven years by the Australian Council of Deans of Agriculture (Pratley, 2012). It is clear from these studies that there has been a decline in graduate numbers for two decades to the extent that there is a chronic shortage of graduates for the buoyant job market. Data show that including graduates in agriculture, agricultural science and related courses the graduate classes have shrunk from around 1200 per year at the start of the century to around 600 in 2012. While the numbers are much larger than for horticulture similar decline trends are evident. The availability of jobs is key to whether there are enough to satisfy the needs of horticulture.

The job market has been monitored since 2007 by recording all relevant job advertisements in state and national newspapers and on the internet. This has been done jointly by Rimfire Resources Ltd and the Australian Council of Deans of Agriculture. Job categories are identified in Pratley (2012) and would include horticulture opportunities. The numbers have been discounted to allow for duplications and churn. There has been softening of demand, particularly on farm, but the key statistic is that for every quarter of every year monitored there have been in excess of 1000 jobs per quarter, or 4000 jobs per year, advertised. The mathematics are clear – 4000 agribusiness jobs per year for around 600 graduates or over 6 jobs per graduate. Market forces have come into play and salaries have been rising significantly and the horticulture industry will need to provide similar rewards to attract the right people.

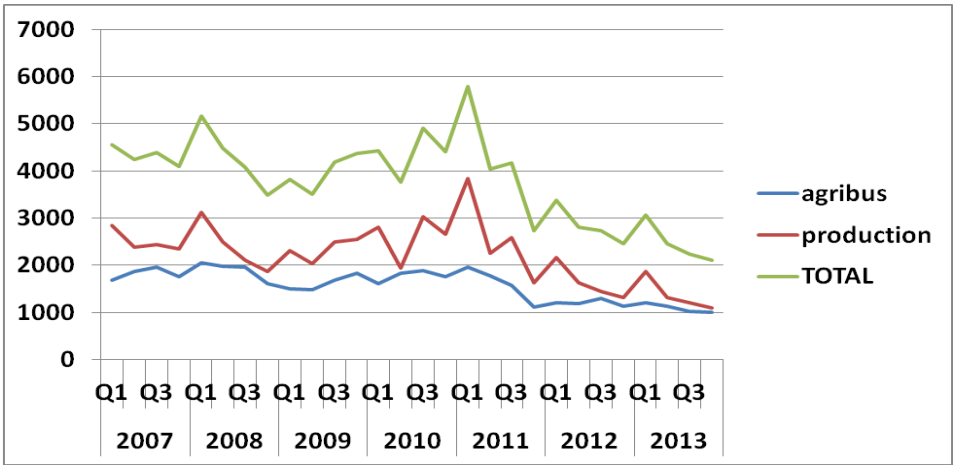


Figure 7 Job advertisements in newspapers and on the internet for employees in agribusiness and farm business in each quarter from 2007 to 2013.

There have been consequences resulting from this shortfall of graduates. This has resulted in less capacity for R&D, fewer qualified advisers and a greater chance of poor advice. Further, there has been a plethora of products for which there is no evidence of efficacy and there are many promoters ('snake-oil' salesmen) of such products.

In summary, the data show that horticulture, particularly production horticulture, has a lower level of education than agriculture which in turn has lower levels of education relative to the community at large and the gap is widening. There has been a dramatic decline in horticultural education at the university and school levels and the industry needs to engage closely with education institutions in order to redress this. Professionals have become more expensive as demand outstrips supply of graduates.

The story is simple to this point. But is there other information that helps the understanding of why it is that education levels are low and prospective entrants to the industry are going elsewhere.

THE DEMOGRAPHIC INFLUENCE

Some light was shed on this phenomenon by Barr (2014) in his publication "New entrants to Australian agricultural industries: *Where are the young farmers?*". The following figures are taken from that publication. Figure 7 shows the relative decline in farmer number in Australia from a base in 1976. It shows that most sectors have declined significantly with horticulture numbers about 60% of those in 1976, having the second lowest decline of the industries represented.

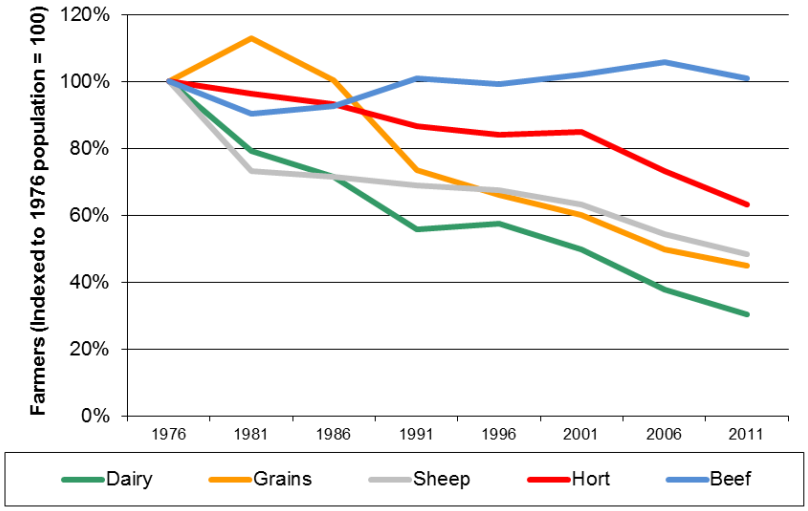


Figure 7 Relative decline in farmer numbers for several agricultural industries from a base of 100 in 1976 (Barr, 2014)

The more startling statistics are those for the farmers under 35 years (Figure 8). All industries represented show large declines from the 1976 base with horticulture showing a 60% decline. For horticulture the numbers have reduced from around 9000 to around 4000 in that period.

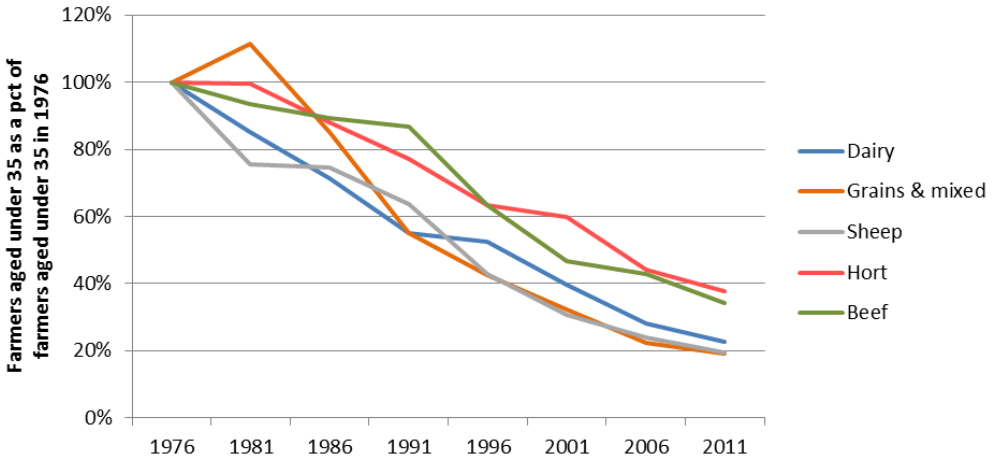


Figure 8 Relative decline in the number of farmers under 35 years from a base of 100 in 1976 (Barr, 2014)

These changes not only change the numbers but also change the proportions in various age categories. Figure 9 shows that in all sectors the proportion of under 35 years farmers

declines in all the industries represented, with horticulture declining from around 27% to 16% over the 35 year period studied.

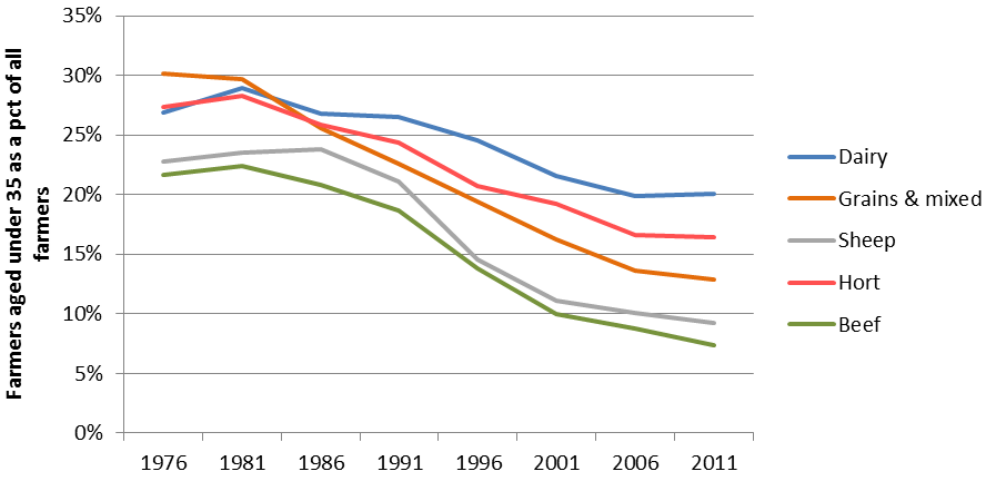


Figure 9 Farmers under 35 years of age as a percentage of all farmers, 1976 to 2011 (Barr, 2014)

This has a substantial impact on the age distribution of farmers over time. The relative proportions of different age groups is shown in Figure 10 with the lower age categories in serious decline and the top age group climbing.

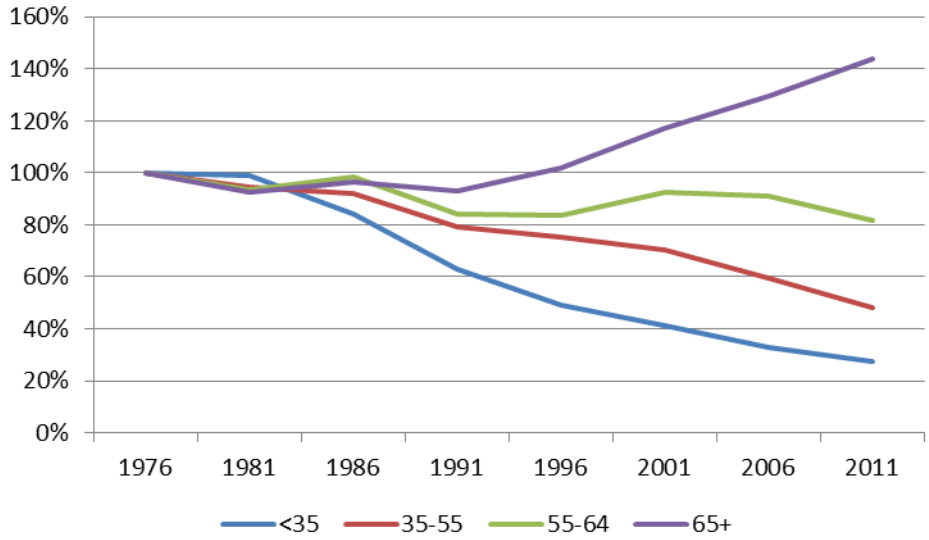


Figure 10 Relative proportions of age categories of farmers from a base of 100 in 1976 (Barr, 2014)

Such age group changes have changed median age of farmers in Australia from 45 year in 1976 to 53 years in 2011 (Figure 11). While the age of farmers exiting farms has not changed much the age at which new entrants come into farming has increased from around 36 years to around 42 years. This suggests that farming is not the first career and entry is only after education, capital raising or a key succession time.

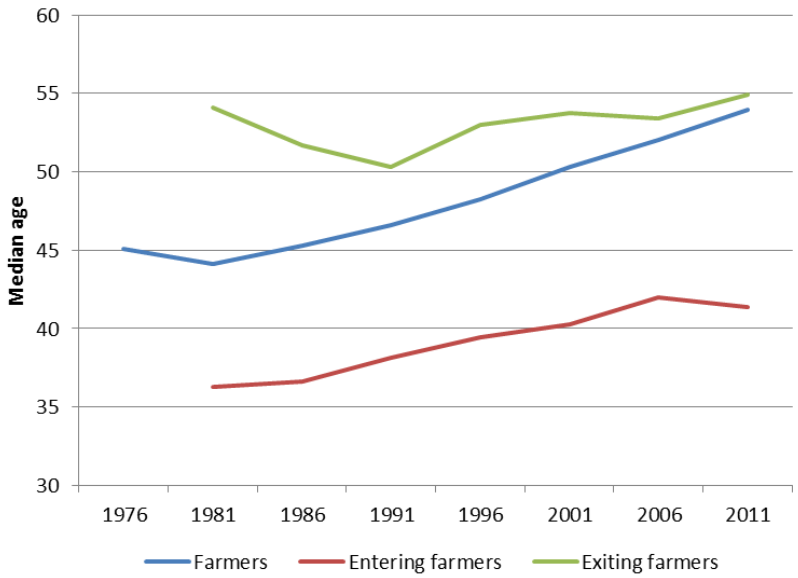


Figure 11 Median age of farmers together with age at entry and age at exit, 1976-2011 (Barr, 2014)

There is a degree of comfort in knowing that similar trends are occurring around the world. The average age of farmers in Canada is 54, in the UK 55, in the US 57 and in Japan 67 (Barr, 2014) and so Australia is not particularly different in age demographic. That of course is not a reason to discourage younger people into the industry. It is also useful to know that lack of youth in the industry is not solely an Australian problem. Australia is better placed than most, as shown for under 35s in Figure 12.

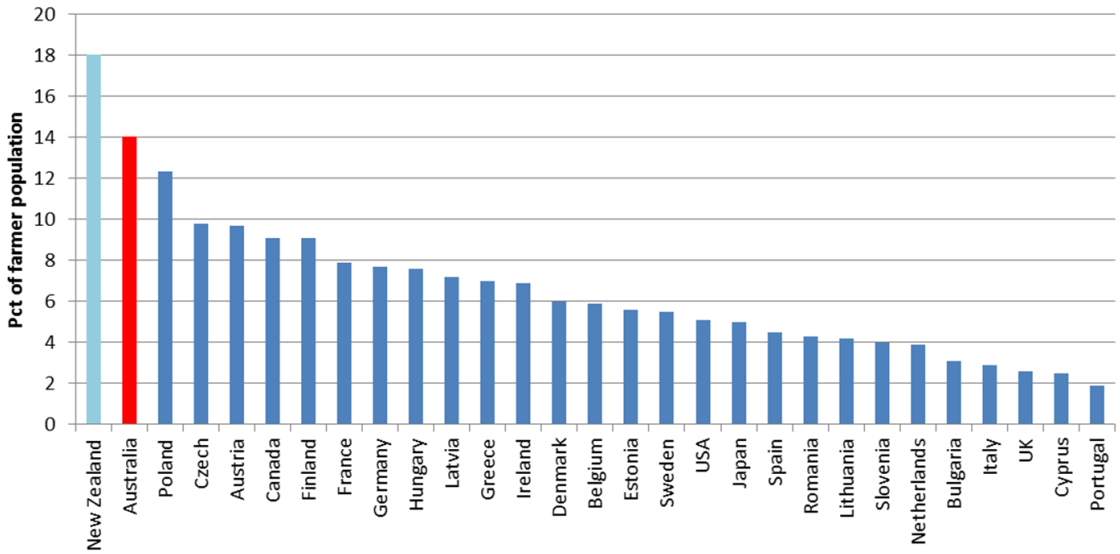


Figure 12 The percentage of under 35 year old farmers relative to all farmers, across a range of countries (Barr, 2014)

Further, it is encouraging to note the strong educational levels of farm operators, in this case under 40 years of age. Averaging approximately 30% with degrees, the level is around that of the community at large. This suggests that the problem is not necessarily the education and training of the modern generation but rather the chronic shortage of young people entering the industry.

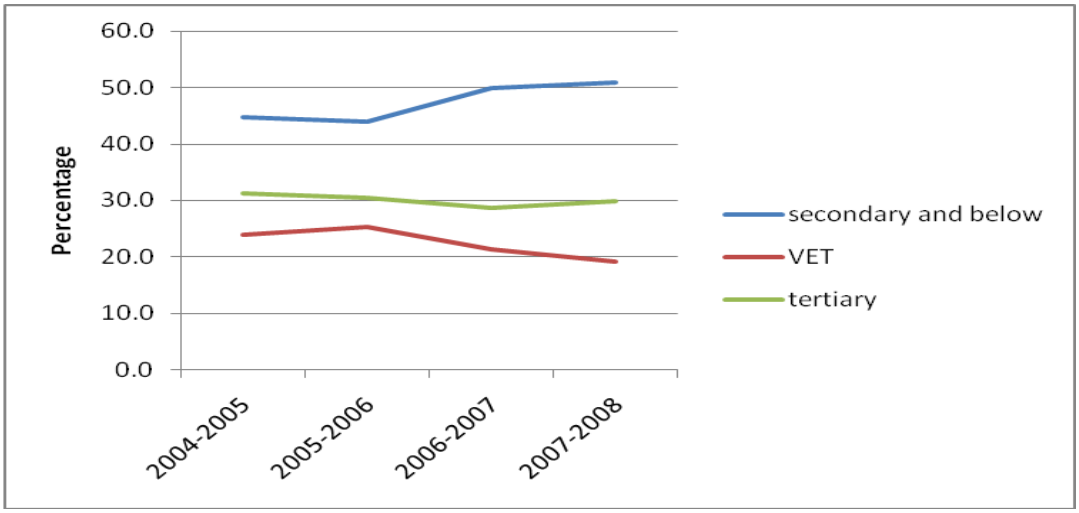


Figure 13 Highest qualifications of farmers under 40 years of age in Australia, 2004 to 2008

In summary regarding the demographics, it is the case that there are fewer farms and therefore farmers. The older farmers are staying with only 5% exiting annually. Entrants to the industry are older in modern times. The greatest challenge is the decline in proportion of younger farmers. Clearly there are not enough young people entering horticulture to change the character of the industry, although the small numbers do seem to be well educated.

Why then is it desirable to attract more young people? They are likely to raise the education levels which in turn should raise productivity as new technologies are embraced. Entry of new young people will also act as a catalyst to further entrants as they see the opportunities and a new perspective on an old industry. Changing the image of horticulture from old world to new is an imperative.

The industry needs to facilitate the entry of the emerging generation. It needs to engage with the educational institutions (from primary school to university), work to create career paths and use existing youth to create a positive, welcoming image for the sector. Employers also need to consider the career options they provide including, where appropriate, the opportunities for employees to build equity.

The outcomes will be determined by the actions taken. Doing nothing will deliver the *status quo.* Doing something however will make a difference but it needs to start now. The opportunities for production horticulture are projected to be excellent – the capture of the opportunities depends on increasing the capabilities and that in turn requires a concerted effort to attract the emerging generation into the fold.

REFERENCES

Aldous, D.E. and Pratley, J.E. 2014. Career development in horticulture - an Australian perspective. International Horticultural Congress (this Proceedings)

Barr, Neil 2014. New entrants to Australian agricultural industries: Where are the young farmers? RIRDC Publication No. 14/003 Rural Industries Research and Development Corporation ISBN 978-1-74254-620-9; ISSN 1440-6845

Penm, Jammie 2014. Opportunities in Asia. ABARES Outlook Conference, Canberra http://www.daff.gov.au/ABARES/outlook-2014/Documents/presentation-slides/jamie-penm-presentation.pdf

Pratley, J. 2012. Professional agriculture – A case of supply and demand. Australian Farm Institute Occasional Paper No 12.01, 1-8 (AFI: Surry Hills Australia

Pratley, Jim 2013. Review into Agricultural Education and Training in New South Wales. NSW Government ISBN 978-0-646-59653-2/978-0-646-59654-9
Shenggen Fan 2014. Economics of food insecurity and malnutrition. Crawford Conference, "Ethics, Efficiency and Food Security: Feeding the 9 billion", Canberra, Australia http://www.crawfordfund.org/wp-content/uploads/2014/05/Fan.pdf