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# Graduate Completions in Agriculture and Related Degrees from Australian Universities, 2001–2006



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The demand for graduates in agriculture is strong and is likely to remain strong into the future. However the supply of agriculture graduates from Australian universities is well short of the market requirement. There is an estimated demand in excess of 2000 jobs per year for new graduates but a study by the Australian Council of Deans of Agriculture shows graduate completions below 800 and declining. This reflects the continuing decline in enrolments in agriculture courses in universities and graduate completions will continue to fall until at least 2011 even if there is a turnaround immediately in student enrolments. Such vacancies are being filled by less qualified professionals and the industry is less well serviced. Workforce issues have become a priority for the agriculture industry to address.

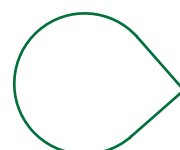
In 2007, the Australian Council of Deans of Agriculture (ACDA) instituted a study on the number of graduates produced by Australian universities from undergraduate agriculture and related courses. This study was in response to government data collections which amalgamate many courses and to some extent distort the perceptions of decision makers such as ministers. Whereas there is a perception that there are sufficient graduates to meet the employment market, the reality is that there is great difficulty experienced by industry in securing graduates for employment and by universities in attracting graduates to higher degree research studies.

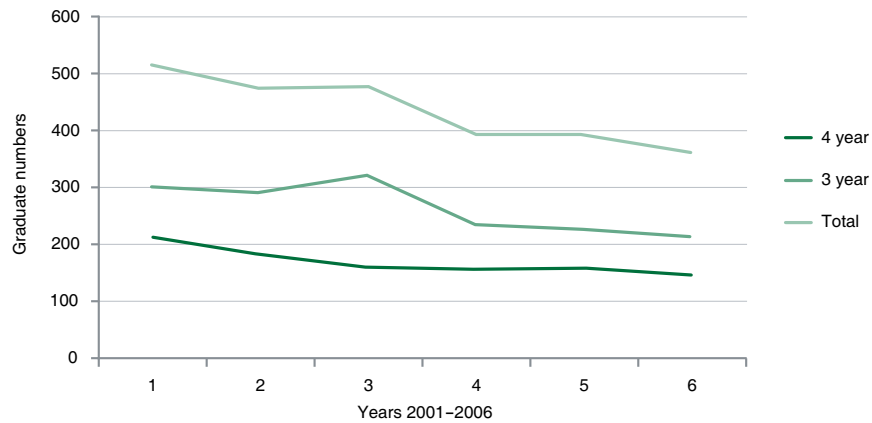
Members of the ACDA thus agreed that each university would provide from its own records data on individual course completions for the period 2001 to 2006 to provide recent trends in completions in such courses. The courses comprised agriculture and related studies but excluded environmental programs outside of agriculture, food science and forestry.

## The Supply of Graduates in Agriculture

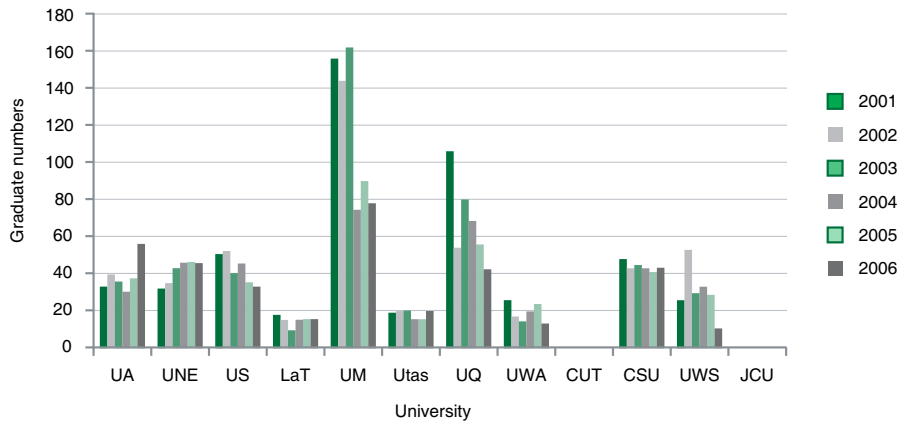
### Degrees in agriculture (science and technology)

Agriculture is provided at Australian universities both as three and four year degree programs. There are also some diploma and associate degrees offered but these have low numbers and a different emphasis and are excluded from this study. Figure 1a shows the total graduate completions across the period of study. Honours graduates from three year degrees have not been included as these are usually counted in the previous year's tally. There are about 370 graduates in 2006 from the agriculture programs and there is a decline of about 30% from 2001 to 2006 (Figure 1a). The decline has been similar in both four (31%) and three (29%) year degrees. The three year programs emanate largely from the previous Colleges of Advanced Education which have been incorporated into previously existing

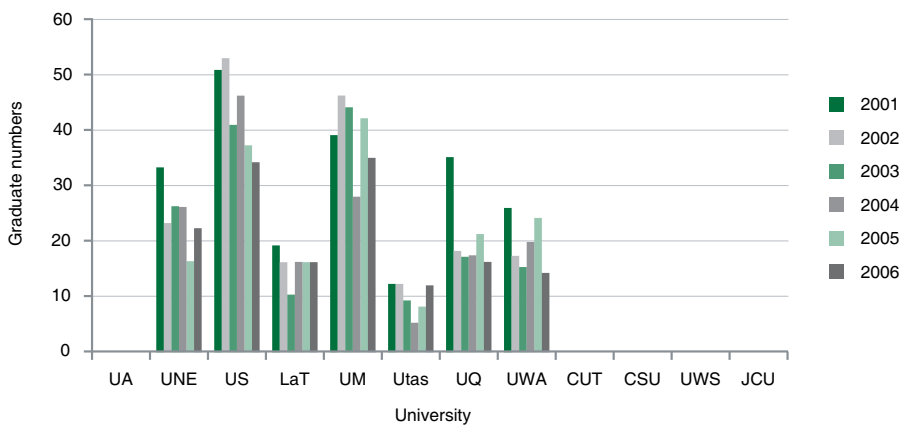




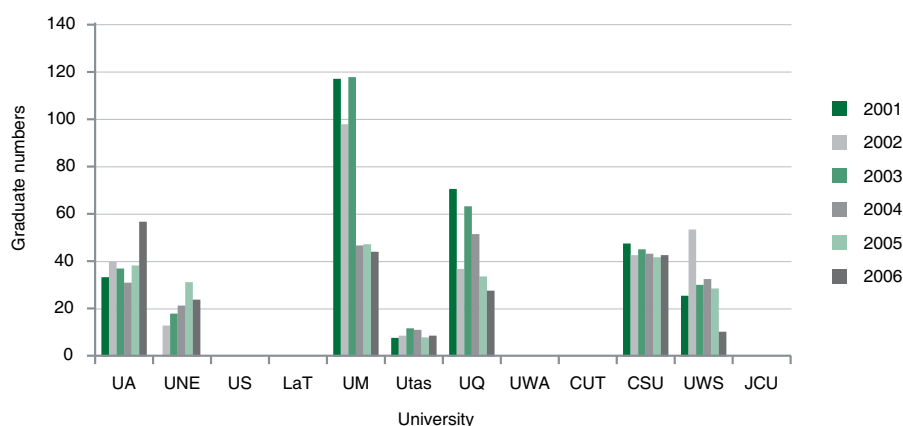
**Figure 1a:** Total graduate completions in agriculture from Australian universities for the period 2001–2006. Figures include three and four year graduates in agriculture but do not include graduates in forestry, food science and environmental science.



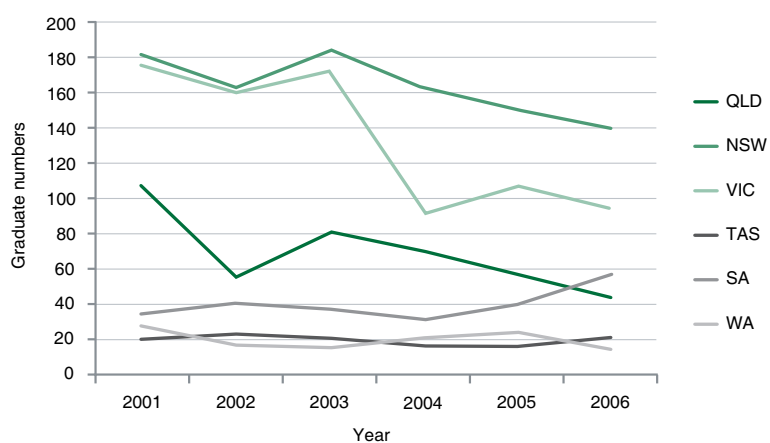
**Figure 1b:** Graduate completions from individual Australian universities in agriculture degrees for the period 2001–2006. Figures include three and four year graduates in agriculture but do not include graduates in natural resource management, food science or forestry.



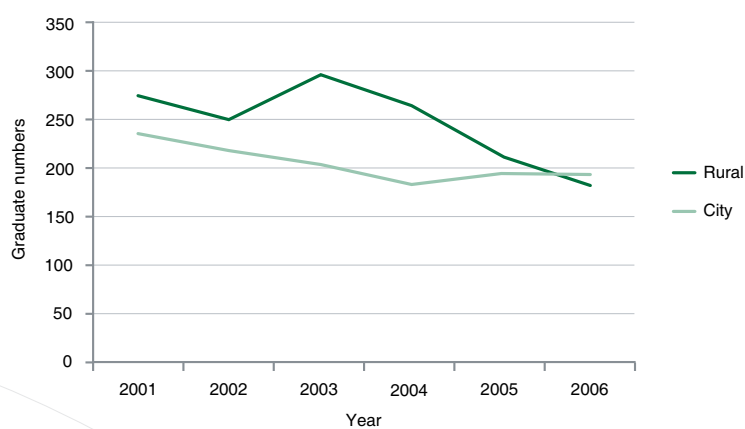
**Figure 1c:** Graduate completions from individual Australian universities for four year agriculture degrees for the period 2001–2006.



**Figure 1d:** Graduate completions from individual Australian universities for three year agriculture degrees for the period 2001–2006.



**Figure 1e:** Graduate completions in agriculture from Australian universities for states over the period 2001–2006.



**Figure 1f:** Graduate completions in agriculture from Australian universities based on geographical location of the instruction, for the period 2001–2006.

universities or evolved into universities in recent times, whereas the four year programs are largely located in the older universities.

The contributions from individual universities to agriculture completions is provided in Figure 1b. James Cook University is included as one of the 12 universities offering agriculture degrees but as yet has no graduates due to the recent establishment of the degree program at that institution. CUT is included but its specialisation is in agribusiness (Figure 2b) rather than the science/technology courses considered here.

Seven of the 10 universities represented graduated on average more than 20 students per year but at most institutions there has been a decline in numbers with time. Six universities dominate the output, being University of Melbourne, University of Queensland, Charles Sturt University, University of New England, University of Sydney and University of Adelaide with around 40 or more graduates annually per institution.

The universities with four year degrees are shown in Figure 1c. There are seven providers. University of Adelaide has in recent times phased out the four year model for the 3+1 model. From 2008, University of Melbourne ceased intakes to the four year program as the institution moves to generic undergraduate degrees ('the Melbourne model') of which agricultural studies will be a part.

Institutions which provide three year degrees are University of Adelaide, University of New

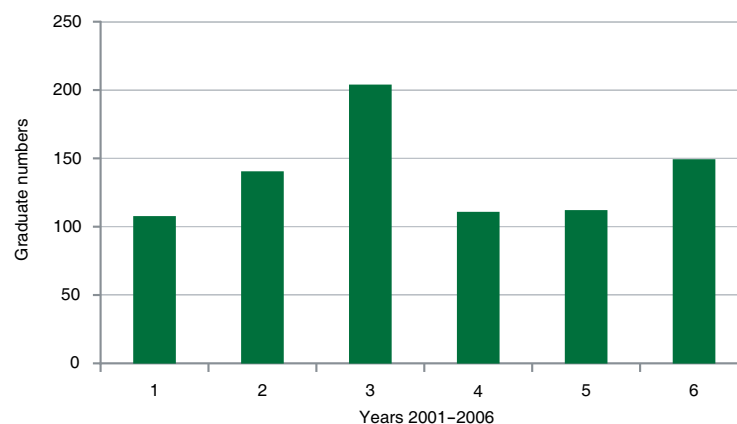
England, University of Queensland, Charles Sturt University, University of Melbourne, University of Tasmania and University of Western Sydney. University of Queensland, University of New England and University of Tasmania provide both three and four year offerings as did University of Melbourne during the period of this study.

Three states in particular are affected by the decline in graduate numbers (Figure 1e), these being Queensland (58%), Victoria (46%) and NSW (22%).

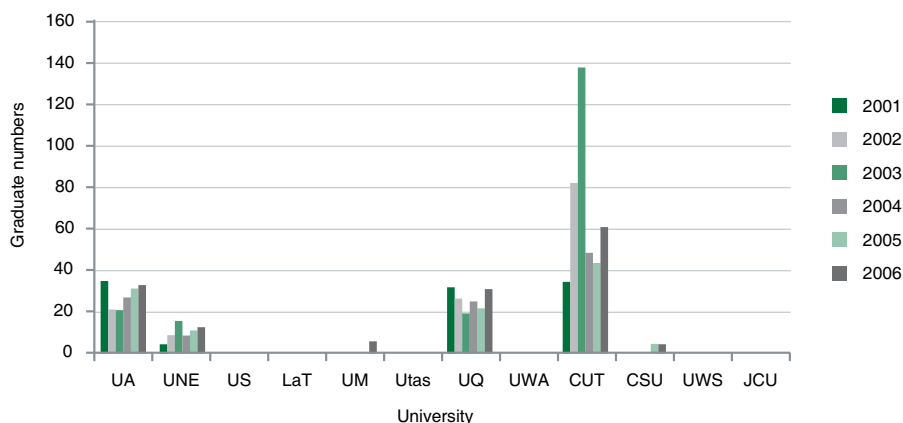
Both rural and city based education has experienced a decline being 19% for city based courses and 35% for those based in rural locations. In 2003–2004 the steep change in completions in Victoria is largely explained by the transition at the University of Melbourne from the BAppSc degrees of the former Victorian Colleges of Agriculture to the University of Melbourne BAgric degree in 2000 with a prerequisite of mathematics and a higher ENTER score.

### Degrees in agribusiness

The universities that provide degrees in agribusiness deliver around 140 graduates per year to the market (Figure 2a). Of these some 20 graduates are in the more specialist area of wine marketing offered by the University of Adelaide. There are no apparent trends due to variability, to some extent affected by the large number of graduates from Curtin University of Technology in 2003 (Figure 2b). This peak was caused by



**Figure 2a:** Total graduate completions in agribusiness/wine marketing from Australian universities for the period 2001–2006.



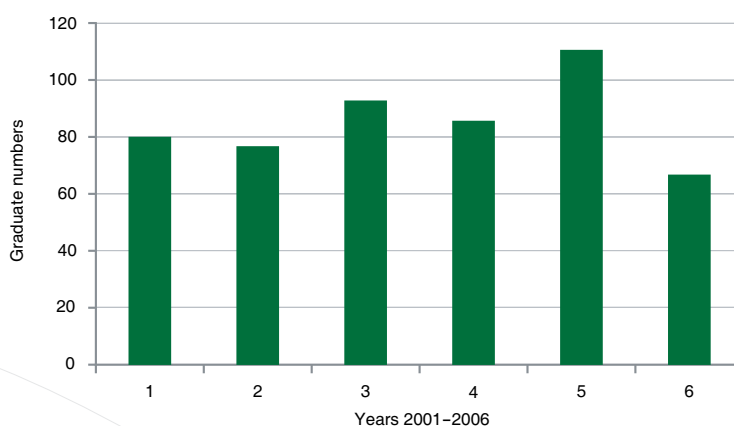
**Figure 2b:** Graduate completions from individual Australian universities in agribusiness/wine marketing for the period 2001–2006.

the coincident graduation of a terminating four year degree and the initial graduation of the replacement three year degree.

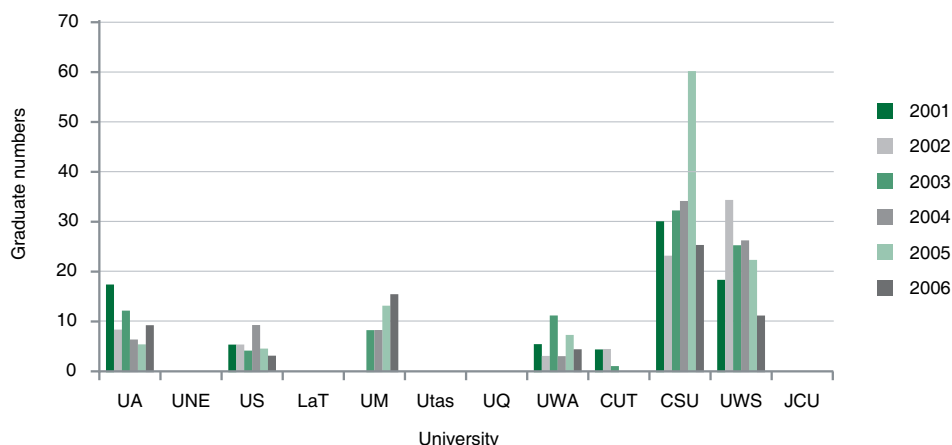
There are five universities that contribute agribusiness graduates, the main provider being Curtin University of Technology. University of Adelaide (in wine marketing), University of New England and University of Queensland are significant providers whilst Charles Sturt University is currently a minor provider through its recently acquired Orange campus. There is also an arrangement between Marcus Oldham College at Geelong and Deakin University whereby diploma graduates of the College can top up with university business subjects to attain a degree. Those data are not included in this study.

### Degrees in horticulture/viticulture

The data for graduate completions in agriculture/horticulture indicate that, over the period of study, there has been a mid-period peak and then a decline (Figure 3a). This would tend to be largely explained by fluctuations in viticulture demand, since viticulture is the dominating component. There was great interest in viticulture around the late 1990s and this is reflected in graduate completions for full time students at University of Adelaide in 2001 and at Curtin University of Technology in 2003 whereas the peak at Charles Sturt University in 2005 reflects intake into the predominantly distance education program 6 years earlier (Figure 3b). Since the peak year, there has been a notable decline in graduate completions.



**Figure 3a:** Total graduate completions from Australian universities in horticulture/viticulture for the period 2001–2006.



**Figure 3b:** Graduate completions from individual Australian universities in horticulture/viticulture for the period 2001–2006.

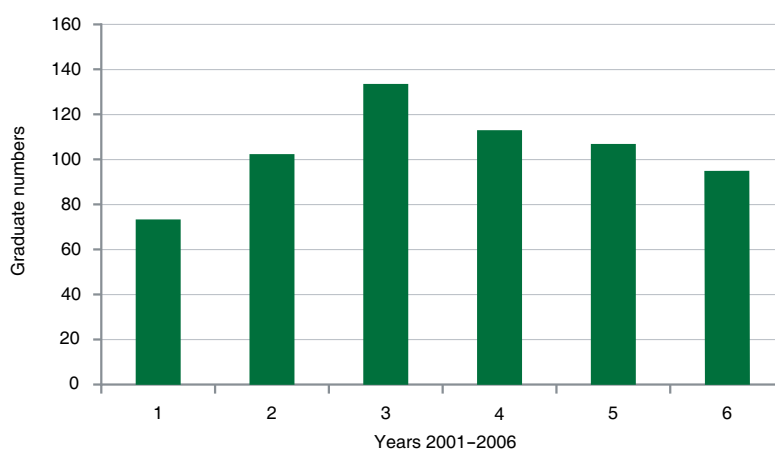
It is important to note that degrees in general horticulture are not popular with students and limited numbers of graduates enter the workforce. This is surprising given the strength of the horticultural industries in Australia which have a need for well trained professionals. The lack of availability of professionals in horticulture has prompted the federal government to list horticulture as one of the skill sets sought in the skilled migration program.

### Degrees in wine science

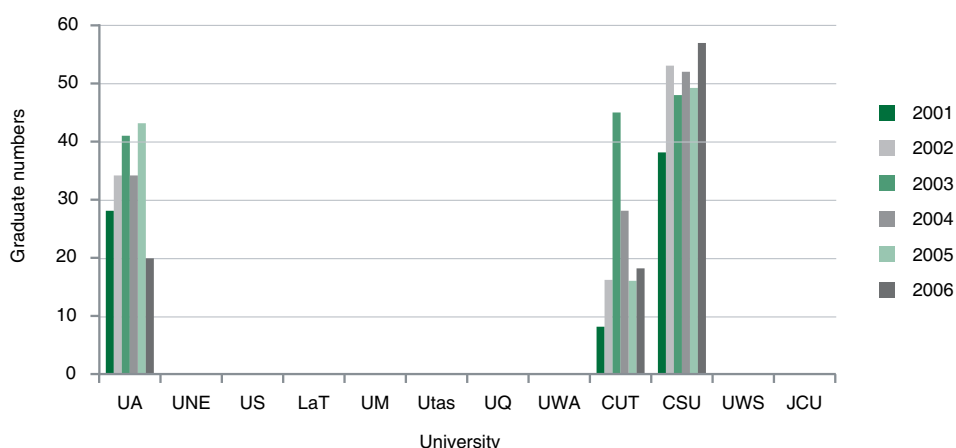
The wine industry has been a success story over the past decade or so, exceeding all its targets for export product and earnings. This prompted entry into the industry of many new players and

considerable expansion of the industry. This was mirrored by strong demand for places in wine science degrees and graduate completions show a healthy 70 to 90 graduates from mainly three providers. Overproduction and some rationalisation has followed and the demand for places has declined in recent years and is evident in 2006.

Figure 4b shows that University of Adelaide, Charles Sturt University and Curtin University of Technology comprise the providers. With Charles Sturt University having mainly a distance education offering, the decline trend has not taken effect in the period of study because of the longer time taken to gain the degree by this mode of study.



**Figure 4a:** Total graduate completions from Australian universities in wine science for the period 2001–2006.



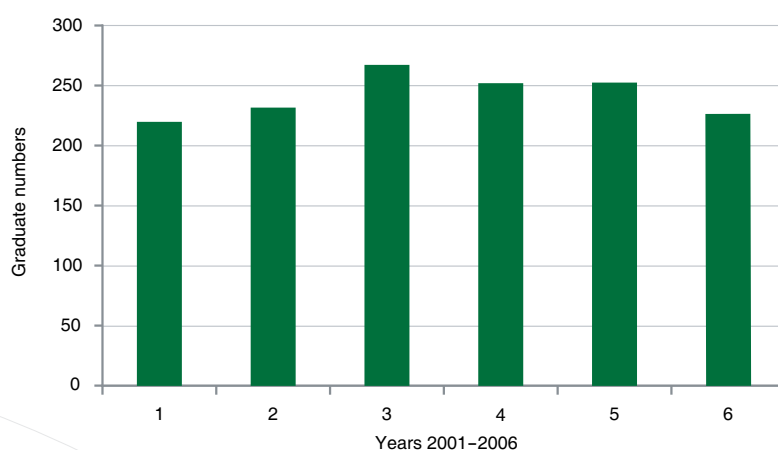
**Figure 4b:** Graduate completions from individual Australian universities in wine science for the period 2001–2006.

### Degrees in animal science

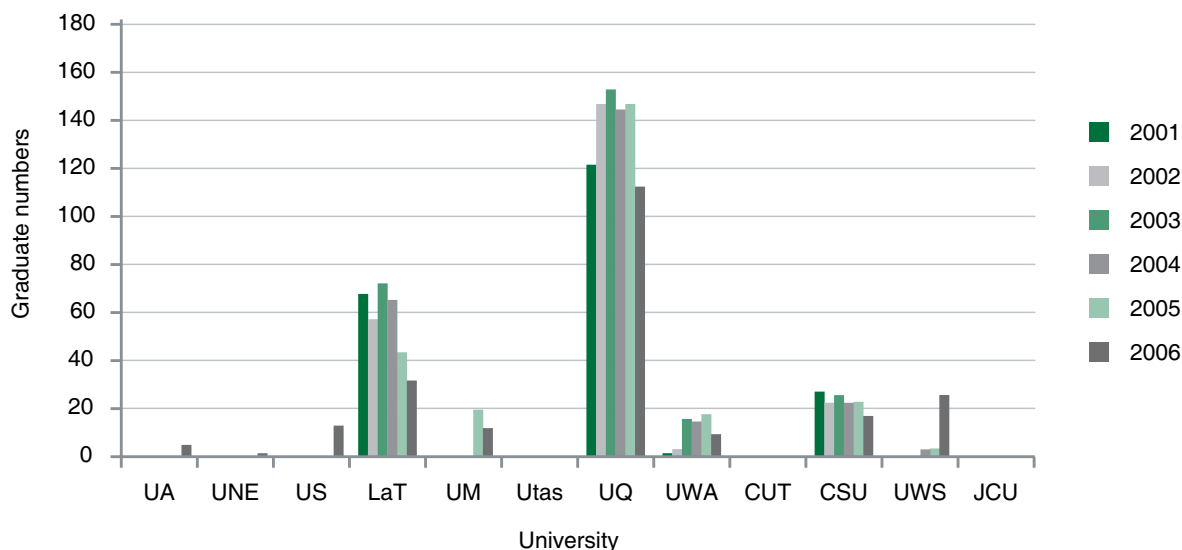
The data for degrees in animal science are provided in Figures 5a and 5b. It is indicated that these data do not include veterinary graduates nor those from wildlife programs. They do however include equine science and some are associated with offerings of veterinary science, in this case attracting students who failed to gain admission to veterinary science. It needs also to be noted that there is not necessarily a focus on livestock and so the data need to be interpreted with caution. Clearly only a portion could be realistically counted as part of the emerging agriculture workforce.

There are more than 220 graduates per year from Australian universities over the period of study. This number is set to increase significantly in the near future as new programs build up at University of Adelaide, University of New England, University of Sydney, Charles Sturt University and University of Western Sydney. Murdoch University also has an animal science degree but those numbers are not included.

The major providers currently are University of Queensland, La Trobe University and, through its equine program, Charles Sturt University (Figure 5b).



**Figure 5a:** Total graduate completions from Australian universities in animal science for the period 2001–2006. Data include graduates in equine science but do not include graduates in veterinary science or wildlife studies.



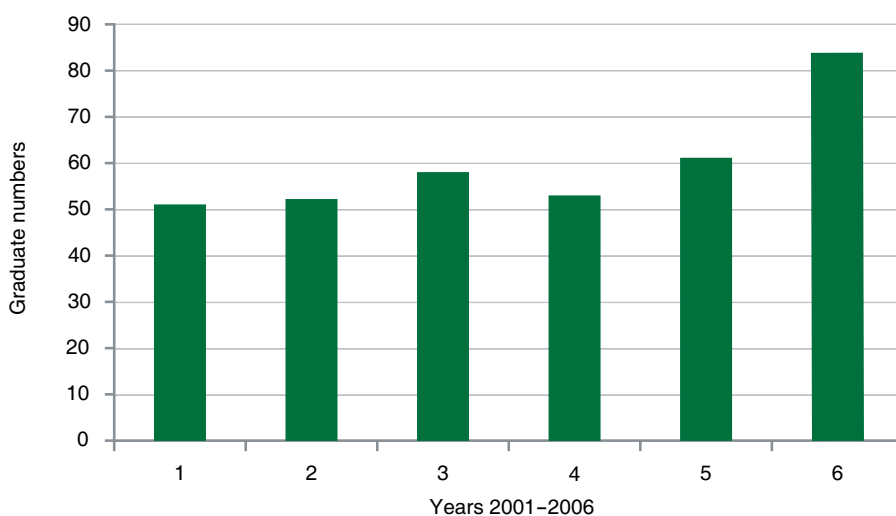
**Figure 5b:** Graduate completions from individual Australian universities in animal science for the period 2001–2006. Data include graduates in equine science but do not include graduates in veterinary science or wildlife studies.

### Degrees in agricultural economics

Agricultural economics is largely confined to two universities, University of Sydney and University of New England, with University of Western Australia being a minor player. Graduate completions have increased over the period of study and a proportion of such graduates would be expected to move into mainstream economics rather than remain in agriculture.

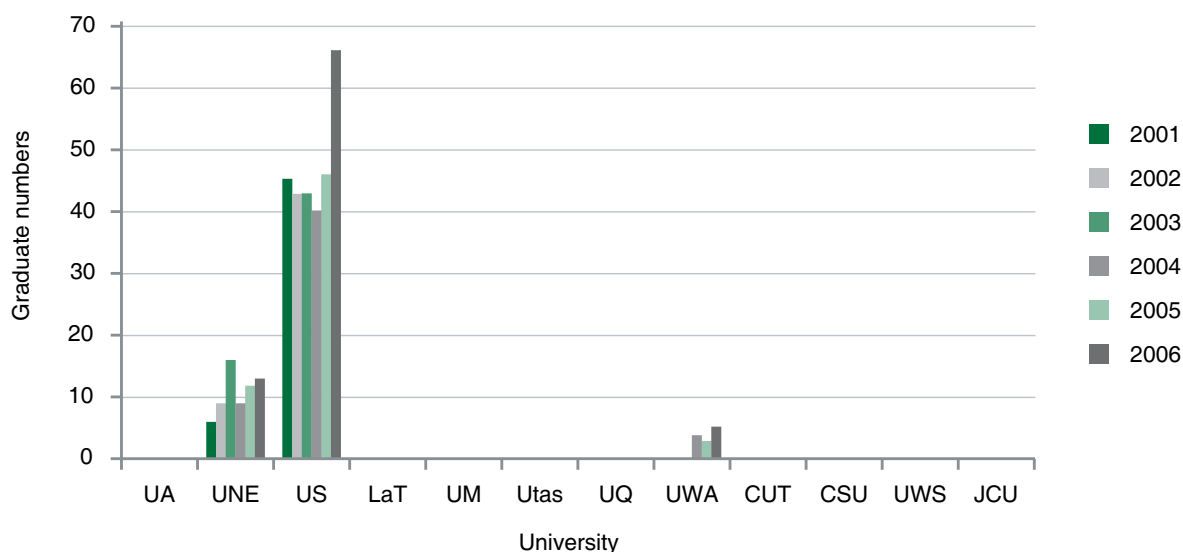
### The Demand for Agricultural Graduates

And what of the demand side of the equation? The Productivity Commission (2005) estimated that there were 320,000 employed directly in the agriculture industry, mostly in production. This accounts for around 3% of the total workforce and approximately 17% of the non-metropolitan inland workforce. Of these, around 50% would



**Figure 6a:** Total graduate completions from Australian universities in agricultural economics for the period 2001–2006.





**Figure 6b:** Graduate completions from individual Australian universities in agricultural economics for the period 2001–2006.

be in the grains, sheep and beef cattle sectors and 30% in horticulture. To these would be added an estimated 39,000 working in the input sector, 170,000 in the food processing industries, 80,000 in the service industries and about 15,000 providing specialised farm services such as financial and technological advice, bringing the total to around 624,000. This estimate is much lower than that of the Australian Farm Institute (2005) which indicated that the farm-dependant economy provides employment for some 1.5 million people or 17% of the workforce of Australia.

The Productivity Commission (2005) also estimates that only about 7% of the agricultural workforce have a university qualification (compared to 22% for all industries) and only 31% with other post-school qualifications (compared to 35% for all industries).

If it is assumed that employees spend an average of 20 years of their working life in the industry, this would generate over 32,000 new jobs annually, based on the conservative estimates of the Productivity Commission. Given that 7% are university graduates, this equates to around 2200 new jobs annually for graduates without making

any allowance for ongoing efforts to increase the skill base. If the agricultural sector were to aspire to have 15% of its workforce with university degrees, there would be 4800 new jobs for agricultural graduates per year. If the sector was to match the all industries average of 22% of the workforce university trained, there would be over 7000 new graduates required.

Because of the wide range of skills of agriculture graduates, there is always leakage to other careers, thereby exacerbating the problem. Given the shortfall, it is likely that the workforce numbers in agriculture will be made up by non-agricultural graduates. The extent to which these graduates have the interdisciplinary and integrative skills needed in agriculture and natural resource management remains an open question.



## General Comments

In round figures, the data suggest that there are around 370 agriculture graduates, 150 agribusiness graduates, some 70 horticulture/viticulture graduates, about 90 in wine science, 230 in animal science (and growing) and approximately 80 in agricultural economics. All up that is of the order of 990 agriculture and related studies graduates per year. This number can be discounted by specialists in wine science (about 90) and wine marketing (about 20) and non-agriculturalists in animal science (perhaps more than 50% or 120) reducing the effective number to significantly fewer than 800 and declining.

The significance of these data are that estimates of employment needs for new graduates are currently in excess of 2000 per annum and there are forecasts that there will be an increase of more than 30% in job opportunities in the near future. It appears therefore that there are two to three jobs for every new graduate and the concerns expressed by employers are valid. There are about the same number of graduates in rural and city degrees.

It needs to be noted that these data are for graduate completions and not enrolments. They therefore reflect intakes in 2003 for four year courses and 2004 for three year courses. Advice from universities indicate ongoing concern regarding the continuing decline in enrolments and so it can be anticipated that graduate numbers will decline significantly until at least 2011 even if there is a turnaround in enrolments henceforth.

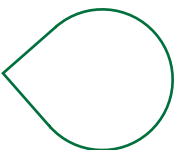
These data suggest that workforce planning at the professional level will be a major issue for the agriculture sector for the next five years at least. It is set to worsen and without some drastic action will impact significantly on the ability of the industry to improve productivity and address issues of sustainability and climate change.

## Acknowledgements

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## Reference

Productivity Commission 2005, 'Trends in Australian Agriculture', Research Paper, Canberra.



## About the authors

**Professor Jim Pratley** is Research Professor of Agriculture at Charles Sturt University and Secretary of the Australian Council of Deans of Agriculture. He graduated with BSc and PhD degrees from the University of NSW and took up an academic position at Wagga Wagga where he has been since 1972. He was Foundation Dean of Science and Agriculture at Charles Sturt University from 1990 until 2006. Professor Pratley has taught courses in agronomy and related areas and has published widely in conservation farming, weed management, herbicide resistance and allelopathy. He is a



former President of the Australian Society of Agronomy and former Vice President of the International Allelopathy Society. He has served on the Boards of the Cooperative Research Centres of Viticulture, Sustainable Rice Production, Weed Management Systems and Plant Based Management of Dryland Salinity. He is a member of the Research Advisory Committee of the Australian Farm Institute and the NSW Primary Industries Minister's Science Council.

**Professor Les Copeland** is Professor of Agriculture in the Faculty of Agriculture, Food and Natural Resources in the University of Sydney. He graduated with BSc and PhD degrees in Biochemistry from the University of Sydney, and after postdoctoral research in the USA at Yale University and the State University of New York, he took up an academic appointment in the University of Sydney, where he has been since 1974. He was Head of the Department of Agricultural Chemistry and Soil Science from 1993 to 2000, and Dean of the Faculty of Agriculture, Food and Natural Resources from 2001 to 2007. Professor Copeland has published extensively and taught courses in a wide range of areas of agricultural, food, plant and environmental chemistry and biochemistry. A major focus of his current research is on the relationship between form and functionality of starch and proteins in cereal grains. He is a member of the Research Advisory Committee of the Australian Farm Institute and of the Editorial Board of Plant Science, and he was the inaugural President of the Australian Council of Deans of Agriculture in 2007–08. He is a Fellow of the Royal Australian Chemical Institute, a Graduate of the Australian Institute of Company Directors and he has been a Fulbright Fellow in the University of California in Davis, USA, and a Visiting Fellow in the Australian National University.

