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AGRICULTURAL EDUCATION AND DAMN STATISTICS I: GRADUATE COMPLETIONS

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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, the NSW Primary Industries Ministerial Advisory Council and the National Council for Agriculture, Fisheries and Food of the Australian Academy of Science. He completed a Ministerial Review into Agricultural Education and Training in NSW in 2013.

ABSTRACT

This paper describes the confusion surrounding the use of the official Field of Education (FoE) categories to describe the graduate completion levels of recent graduates in agriculture. Official FoE categories have agriculture and environment in the same category which, when used as a whole, results in a misrepresentation of agriculture by up to 9x. The importance of asking the right question in order to obtain the answer needed is demonstrated. This remains an ongoing issue for the industy sector if the public is to be correctly informed about key educational matters in agriculture.

BACKGROUND

In 2007, the Australian Council of Deans of Agriculture (ACDA) was constituted, in part because of concern about declining enrolments in university agriculture in Australia and the instability in some institutions about agriculture courses continuing to be offered. Compounding this scenario was the pressure being placed on universities by industry complaining about the lack of university graduates in agriculture. This suggested there was a case of market failure in place and ACDA approached the federal government of the day to seek assistance in redressing this issue. The government response was that, according to official data, there were plenty of graduates and no jobs, the complete antithesis of the experiences of the universities. The problem was that the official data provide the basis for the policy platform on agricultural education in government and this was unlikely to change unless the data could be challenged. Yet these data on graduate completions are derived from the official annual statistics provided from universities and thus are well founded.

The ACDA determined that it would collect its own data, with members agreeing to provide graduate completions for agriculture and related courses from their individual schools and departments. A decade of data was sourced and these data have been collated, analysed and published (Pratley and Copeland, 2008; Pratley 2012a; b). Data on job advertisements across Australia from both paper and internet (Pratley 2012a) were sourced with the collaboration of the agricultural graduate employment company, Rimfire Resources, to provide a better basis for estimating the 'ballpark' figures on job opportunities. The outcome has been the firm indication that the job market has required consistently over the recent 5 year period 5 to 6 times as many graduates annually as the universities have been able to supply. The ACDA data have been well accepted and have contributed to a buildup in concern by the sector and by the various parliaments around Australia.

While the challenge has now been articulated and the policy platforms of government have aligned with the ACDA position, the question remains as to why the official data continue to provide a misleading position. The ACDA has investigated this issue and this paper sets out to explain why the discrepancy occurs and the contrasting positions created, depending on how the data are used. The importance of asking the right question is paramount.

THE OFFICIAL STATISTICS

Universities submit an annual return to government on a range of issues. Part of that return comprises statistics on the student population. The student data are categorised according the established 'Fields of Education' (FoE). There are 12 "Broad" FoE which are shown in the Appendix (Table A1) and which have a 2-digit code associated. For Agriculture that code is 05 and a standard request for agriculture data will deliver the totals data for the *broad* field, ie FoE 05.

Within those categories are data classified to 4 ("Narrow") and 6-digit ("Detailed") codes. Table A2 in the Appendix shows the *Narrow and Detailed* sub-code descriptions

that are contained within the 05 code and others relevant to agriculture. The disciplines of 'Soil Science' and 'Food Science and Biotechnology' reside in the Natural and Physical Sciences Field (01, 2-digit code), 'Veterinary Science' is located with the Health Field (06 code) and Management and Commerce (08 code) house the 'Farm Management' and 'Agribusiness' data.

The FoE 05 is of particular interest as it contains various categories of agriculture, horticulture, forestry, fisheries and aquaculture *as well* as all the environment courses. Herein lies the source of discrepancy experienced by those wishing to have agriculture data. Unless the data request specifies the 4-digit or 6-digit data, the provision will be at the 2-digit level and will include all the environmental course data as well as some primary industries like forestry and aquaculture that may not be relevant to the task being undertaken. The question to ask here then is whether it makes much difference to the outcome to warrant the extra layers of data for analysis. This paper evaluates that question.

The official data were sought from the then Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) for the decade 2001 to 2010 on completions in undergraduate university degrees in Field of Education 05, but to the six-digit code. Attaining the correct information took detailed discussion to identify the particular question to ask in order to receive data that were needed. Some aspects of the request specificity are described in the following evaluation.

HANDLING THE DATA

The particular focus of this exercise is the FoE 05 category for domestic students. Official data were sourced at the 6-digit level so that the data for agriculture and environment could be separated. Thus categories 050901, 050999 and 059999 were allocated to environment whilst the remainder were considered for inclusion under agriculture as 'primary industries'. A challenge in the analysis was what constituted 'agriculture'. The decision was taken to treat the components at the 4-digit codes, so Horticulture, Forestry and Aquaculture were analysed separately and together to measure the relative impacts. The 6-digit code 050199 Animal Husbandry potentially confounds the analysis as it likely includes the many Animal Science courses around Australian universities and it is difficult to dissect livestock husbandry from wildlife and from companion animal studies.

A further complication with the data is the interpretation by individual universities as to the most appropriate category for their data return. Thus categories 050199 and 059999 are somewhat nebulous categories and there is no way of knowing whether the entries are more towards agriculture or environment but, based on the complement of particular universities, 050199 tended to relate to universities that offered agriculture whereas 059999 related to some universities that do not offer agriculture and was therefore considered as relating to environmental course entries. In both cases numbers were relatively small and have little impact on the analysis.

ASSESSING THE OUTCOMES

The outcome achieved from the data depends on the question asked of the database. The paper demonstrates the range of answers likely, depending on the phrasing of the question, and emphasises the importance of being very specific in the request.

Question 1. The most straightforward enquiry would be to ask for the number of graduates in agriculture. That question will deliver the simple answer shown in Figure 1. On that basis, the questioner would have a number ranging from 3500 to 4000 graduates per year and there is little change across the decade. This number comprises all the graduates in FoE 05, being graduates from both undergraduate and coursework postgraduate courses across the primary industries and the environmental spectrum.

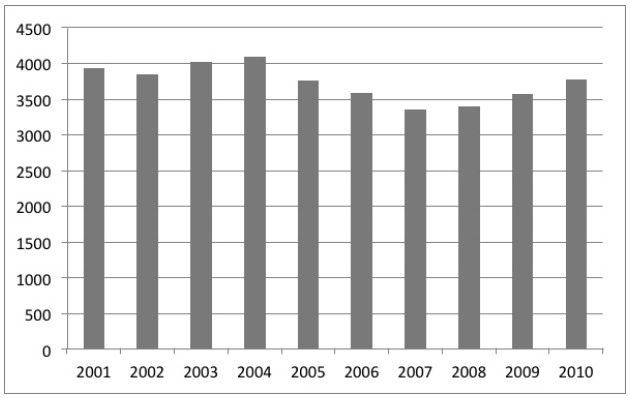

Figure 1 Graduate (UG + coursework PG) completions by domestic students in FoE 05 for the decade 2001-2010 (derived from DIISRTE data 2012)

These data could then be further broken down into the primary industries group and the environmental group as has been shown in Figure 2. Thus the data from Figure 1 are compared with the two components. It is clear that environmental graduate numbers have been steady to increasing and there is a consistent and sharp decline in the primary industries. By 2010, primary industries had declined to 1000 graduates compared with over 2500 environmental graduates in the same year. Thus, If the question asked delivered the simple answer, the number would over-

estimate 'primary industries' numbers by up to 4x the actual. Clearly if those numbers were used to establish policy, then the policy platform would mislead the policy process.

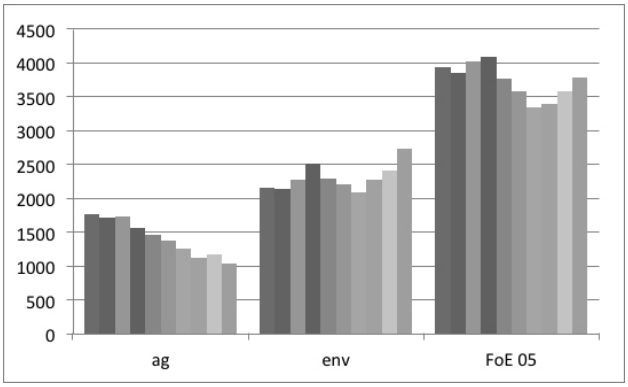

Figure 2 Graduate (UG + coursework PG) completions by domestic students in environment courses, primary industries courses and in FoE 05 for the period 2001 to 2010 (derived from DIISRTE data 2012)

For a more complete understanding, the 'primary industries' can be separated into the 4-digit codes described in Table 2 and there are substantial declines in all industries except the animal husbandry code reflecting the buildup in animal science degrees across Australia. This breakup is shown in Figure 3. Agriculture declines from around 1100 in 2001 to just over 600 by 2010. Forestry and Aquaculture have declined to negligible levels whilst horticulture numbers reflect Viticulture and Amentity Horticulture, with Production Horticulture also negligible nationally. The 'Primary industries' together number around 1000 in 2010 whereas the 'Agriculture' numbers are just over 600. Depending on the question asked then, there could be an overestimate by more than 60%.

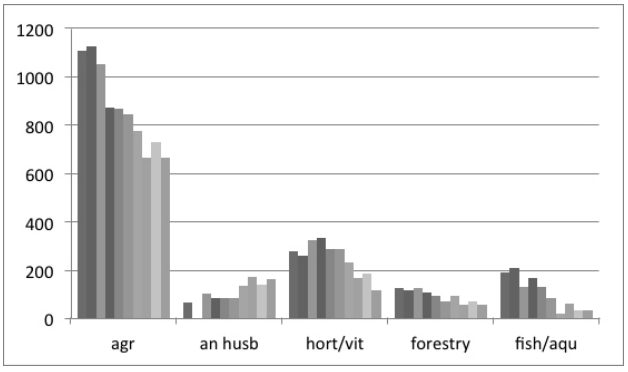

Figure 3 Graduate (UG + coursework PG) completions in primary industries for the decade 2001-2010 inclusive (derived from DIISRTE data 2012)

Question 2. The more pertinent question for the sector is the number of *undergraduate* completions in agriculture from the universities in Australia. Again the database would provide the FoE 05 data at the two digit code unless otherwise specifically requested. Figure 4 shows the FoE 05 data and its components of environmental and primary industries course graduate numbers. Over the decade the combined tally has declined from 2500 graduates to around 2000. There was a minor slump in environmental graduate numbers in the mid period but there were just under 1500 in 2010. The primary industries numbers however have declined consistently from over 1300 in 2001 to 680 in 2010. The wrong question would result in a number 3x actual.

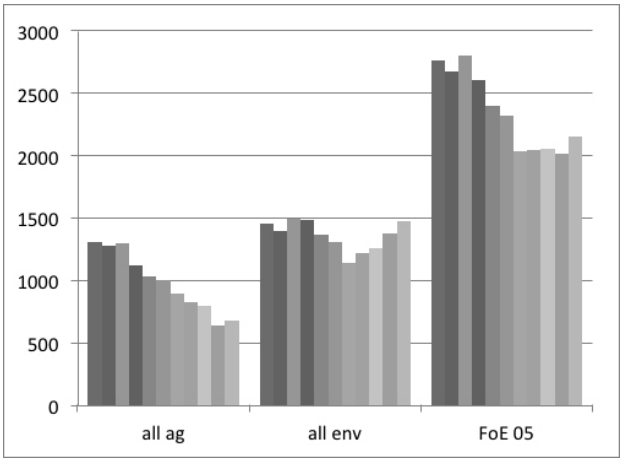

Figure 4 Undergraduate completions on FoE 05 and its 'primary industries' (all ag) and environment (all env) components for the period 2001-2011 (derived from DIISRTE data 2012).

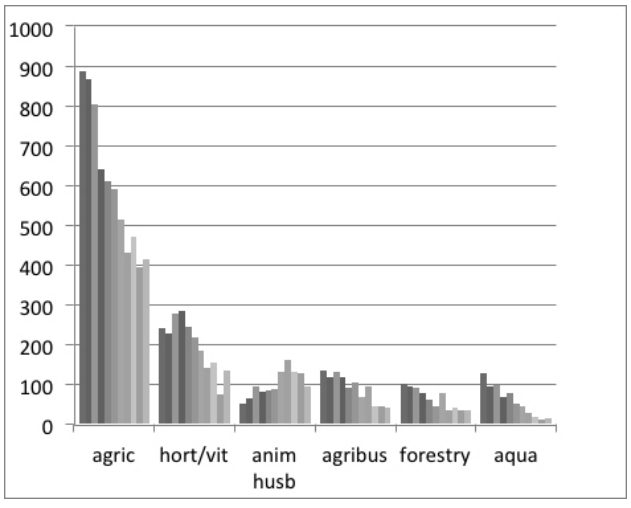

Figure 5 Undergraduate completions for primary industries 2001-2011 inclusive (derived from DIISRTE data 2012)

The 'all ag' data from Figure 4 are further broken down into the components in Figure 5. It can be seen that Aquaculture, Forestry, Agribusiness (and Production Horticulture) are in a parlous state and survival is threatened for these disciplines. The real number then for agriculture undergraduate completions has declined from just under 900 at the start of the decade to about 400 at the end, a decline of 53%. Undergraduate completions for animal husbandry have doubled over the period of study and can be expected to continue to increase as all the Animal Science degrees come fully into operation around Australia. Figure 6 shows various combinations of the 6-digit codes over the decade for the undergraduate completions. There is a cluster of lines around the agriculture/primary industries courses which largely decline with time. The environmental courses line dips in the middle of the decade but recovers to separate clearly from the agriculture/primary industries lines and there is a large separation of the total FoE 05 line from that of agriculture. Asking the right question is clearly necessary if the right answer is to be obtained.

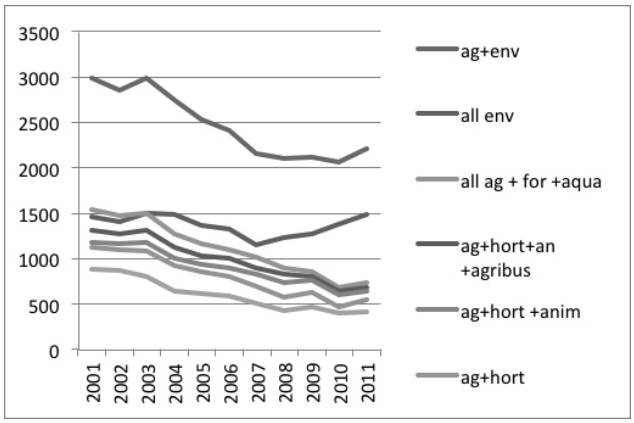

Figure 6 The undergraduate completions for 'agriculture' based on the definition of agriculture: all ag refers to agriculture + horticulture/viticulture + animal husbandry + agribusiness; for = forestry; aqua = fisheries/ aquaculture; agribus = farm management/agribusiness (derived from DIISRTE data 2012).

Table 1 Comparison of answers to agriculture graduate completion numbers in 2001 and 2010, depending on the question asked of the data

SOURCE	2001	2010	% decline
A Graduate completions (FoE 05) – PG +UG Q1. 2 digit code	3870	3871	0
B Agriculture graduate completions – PG + UG Q1. 6 digit code	1310	680	48
C Undergraduate (UG) completions (FoE 05) Q2. 2 digit code	2991	2207	26
D Undergraduate (UG) agriculture completions Q2. 6 digit code	886	413	53
E ACDA estimates (UG) 6 digit code	519	290	44

To further emphasise the discrepancies, Table 1 compares the data depending on the question asked in the text. The official data for undergraduate course completions (Question 2, 6-digit code) are shaded as Row D in Table 1 and are used as the actual data in this paper. It is clear that if Question 1 was asked (Row A), the answer provided for 2010 would be 9.4x the actual. If Question 2 was asked (Row C), the answer provided for 2010 would be 5.3x the actual. What is also apparent is that the decline in undergraduate agriculture completions over the decade is officially 53%, up from the estimate of 44% from the Australian Council of Deans of Agriculture (ACDA). However the simple Question 1 (Row A) shows no decline in graduate numbers over the decade.

OFFICIAL AND ACDA DATA

In order to challenge the government position at the time (ie 2007/08)the ACDA agreed to collect its own data from each university. These data have been used successfully to engage politicians, the industry and the media in the understanding of the problem of a shortfall in agriculture degree completions. The data collection process by ACDA is onerous and time-consuming and it is preferable to be able to use official sources provided there is confidence in the latter. The decade of data collection from ACDA sources is compared with the official data for the same courses over the period. The comparison is presented in Figure 7 for undergraduate completions in agriculture/agricultural science. Several aspects become apparent:

- The government numbers are consistently higher than those of the ACDA. Some of the difference can be explained by: the inclusion of graduate numbers (albeit relatively small) from Marcus Oldham College and Northern Melbourne Institute of TAFE; entries of minor courses by university administrators that were not considered as part of the ACDA interpretation of agriculture; and perhaps timing issues (asynchrony) in counting graduates;
- The larger discrepancy occurs in the earlier years. ACDA data were retrospectively sourced from 2008 and so it is likely that some courses were not counted if they were terminated in the early part of the decade;
- There is reasonable agreement from 2006 between the two sources with government number being 1.4x that of the ACDA in 2010.
- There is greater decline in graduate number over the decade in government data compared with that in ACDA data.

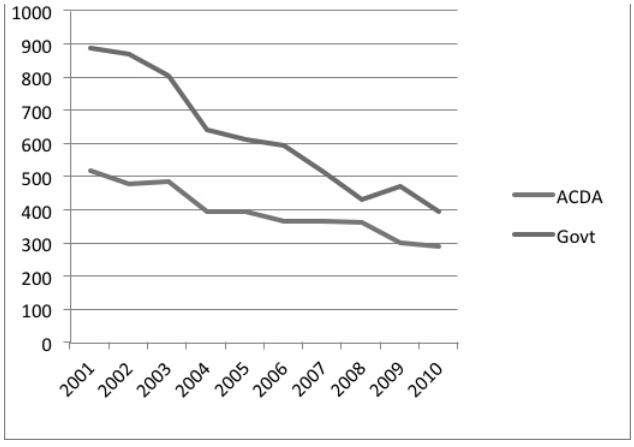

Figure 7 Comparison of the official data set and ACDA data compilation for university agriculture undergraduate completions for the period 2001-2010 (derived from DIISRTE data 2012 and Pratley 2012a)

Over the second half of the decade, the differences seem not to be too serious and are in the same 'ball-park' relative to the demand for graduates. This analysis suggests that the specific official data set is sufficiently representative of the views of the ACDA.

Further analysis of the agriculture and related course completions by undergraduates (ie agriculture, horticulture/viticulture, animal husbandry and agribusines/farm management) is presented in Figure 8. There is less discrepancy overall than for agriculture alone, although there are differences early in the decade and some variability in 2007/08. Again the decline over the decade in official figures is higher than those from ACDA. Differences are not large and the official data are representative of the views of ACDA.

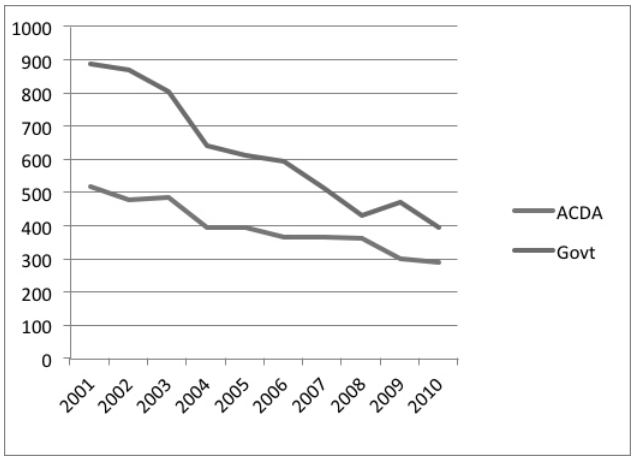

Figure 8 Comparison of the official data set and ACDA data compilation for university agriculture and related (agriculture, horticulture/viticulture, animal husbandry and agribusiness/farm management) undergraduate completions for the period 2001-2010 (derived from DIISRTE data 2012 and Pratley 2012a)

DISCUSSION

It is now clear and understandable why the discrepancies exist depending on the data used. Knowing this provides a stronger base to enter into dialogue with policy makers and advisors. The use of data, however, remains a point of contention as most people sourcing and using the data are largely unaware of the differences and of the consequences of their application. Without the intervention of the ACDA the policy platforms of government would have been slow to change as the official data show little cause for concern if the gross data for FoE 05 are consulted (Row A, Table 3). Since the time of that intervention there has been a Senate Enquiry, two Victorian Parliamentary Enquiries and the Ministerial Review in NSW around agricultural education and training and the issue of attracting young people into

agricultural careers. These are noted in the references. There are numerous working parties in industry and the education system is now sensitised to the issue.

Frustration remains, however, that as new people move into public service positions, a regular occurrence, the lessons of this extensive episode will need to be relearnt. It is to be hoped that this detailed explanation will provide a reminder to those using agricultural statistics to be mindful of the potential outcomes and ensure the right question is asked.

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APPENDIX

Table A1 The *broad* classification of Fields of Education in the Australian education system

Broad Fields of Education Code	Description
01	Natural and Physical Sciences
02	Information Technology
03	Engineering and Related Technologies
04	Architecture and Building
05	Agriculture, Environmental and Related Studies
06	Health
07	Education
08	Management and Commerce
09	Society and Culture
10	Creative Arts
11	Food, Hospitality and Personal Services
12	Mixed Field Programs

Table A2 *Narrow and Detailed* code descriptions for official Field of Education data in agriculture and related fields

Broad code (2-digit)	*Narrow* (4digit) and Detailed (6-digit) code	
01 Natural and Physical Sciences	0107	Earth Sciences 010709 Soil Science
	0199	Other Natural and Physical Sciences 019905 Food Science and Biotechnology
03 Engineering and Related Technologies	0303	Process and Resources Engineering 030307 Food Processing Technology
05 Agriculture, Environmental and Related Studies	0501	Agriculture 050101 Agricultural Science 050103 Wool Science 050105 Animal Husbandry 050199 Agriculture, N.E.C.
	0503	Horticulture And Viticulture 050301 Horticulture 050303 Viticulture
	0505	Forestry Studies 050501 Forestry Studies
	0507	Fisheries Studies 050701 Aquaculture 050799 Fisheries Studies, N.E.C.
	0509	Environmental Studies 050901 Land, Parks And Wildlife Management 050999 Environmental Studies, N.E.C.
	0599	Other Agriculture, Environmental and Related Studies 059901 Pest And Weed Control 059999 Agriculture, Environmental And Related Studies, N.E.C.
06 Health	0611	Veterinary Studies 061101 Veterinary Science 061103 Veterinary Assisting 061199 Veterinary Studies, n.e.c.
08 Management and Commerce	0803	Business and Management 080321 Farm Management and Agribusiness

AGRICULTURAL EDUCATION AND DAMN STATS II: GRADUATE EMPLOYMENT AND SALARIES

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ABSTRACT

Careers advice to students regarding opportunities in agriculture is commonly reported as negative despite employment prospects for graduates being significant in recent years. Given the confusion in the use of data about graduate completions, the Australian Council of Deans of Agriculture explored whether such confusion extended to graduate careers advice through the Graduate Destination Survey. In cooperation with Graduate Careers Australia, ACDA has undertaken an analysis which shows that there is a significant discrepency in the employment outcomes when agriculture and environment graduates are considered independently. Such data are usually combined and show employment levels much lower than actual for agriculture.

BACKGROUND

The first paper describes how information regarding graduate completions in agriculture can be misleading where the data are misinterpreted. Such misinformation has had a profound dampening effect on the choice of careers, as students and their mentors have been reluctant to consider a career in agriculture because of the inaccurate perceptions created.

The other aspect of this scenario is the publicity about employment and salaries . One of the most recognised and trusted purveyors of data on employment levels and salaries of new graduates is Graduate Careers Australia (GCA) which surveys the class of graduating students annually, around four months after they complete their awards, in order to establish the extent of employment for the various course disciplines. The Australian Graduate Survey (AGS), of which the Graduate Destination Survey is a component, has been conducted since 1972 (www.graduatecareers.com.au) and in its own words represents "the only nationally consistent measure of graduate outcomes in Australian higher education".

As with the completions data described in Paper I, the published outcomes of such surveys do not align with the experiences of university agriculture schools and employers of agricultural graduates. Except for research careers, the job market has been buoyant since at least 2007 based on the quantity of advertisements in papers and on the internet, as monitored by Rimfire Resources and described by the Australian Council of Deans of Agriculture (ACDA) in Pratley (2012a). The question arises regarding the discrepancy that exists between the outcomes of the Graduate Career Surveys and the experience of universities in their dealings with graduates and employers. This paper explores the extent of the discrepancy.

GRADUATE CAREERS DATA

Data were sought from Graduate Careers Australia for both employment levels of graduates and starting salaries. The data period was 2003 to 2012, a decade in duration. It was apparent from the GCA website that the employment surveys were based on the Field of Education code 05 as described in Paper I (Pratley 2014). The data published each year by GCA show a category "Agricultural Science" but there is no mention of "Environmental Science/ Management". It is clear that the data collected for FoE 05 are then used at the 2-digit code level to describe agriculture in the market place. The question is whether such portrayal is reasonable or whether there needs to be some dissection of the FoE at the 4 and 6 digit codes to enable a more appropriate market place analysis. GCA provided the data to the 6-digit codes for FoE 05 and also for '080321 Agribusiness' to ACDA for analysis.

Figure 1 shows the number of agricultural data entries relative to those of the total for the FoE 05 respondents. Agriculture represents from 20% to 13% of the total, the lower proportions being from the most recent data collections and so the portrayal of FoE 05 as agriculture is not a true reflection of the sample where intra-differences occur. The GCA indicates a response rate consistently around 60% for the survey generally. In comparison with the graduate completion data (Pratley 2013), however, the survey response rate for agriculture ranges from 23% to 40% whilst for environment the range is 30% to 43%. The GCA survey data for FoE 05 show that number of entries for environmental graduates is 2.2 to 4.5 times those for agriculture over the period of study reported here. It follows therefore that considering these cohorts together will more closely represent environmental graduates than agriculture graduates where any differences exist. The question of interest is whether there are differences between such cohorts.

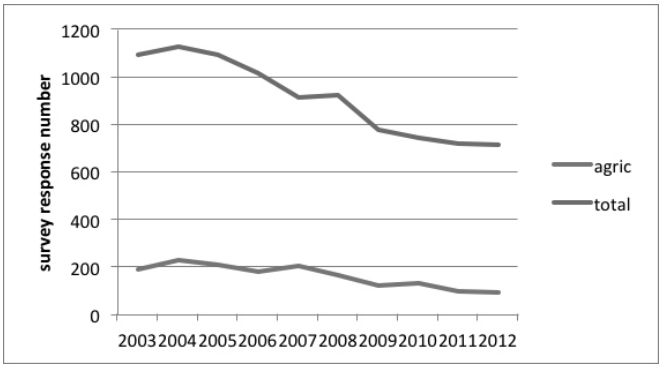

Figure 1 The number of agriculture graduate responses in relation to the total number of respondents in FoE 05 for the period 2003-2012

Employment. The GCA survey categorises respondents as 'in full-time employment' or 'seeking full-time employment'. In the latter case there is a split between those in part-time employment seeking full-time work and those not working. The data used in the analysis reported in this paper are those relating only to full-time employment. The converse (ie 100% less those in full-time employment) is often used, though not strictly correctly, as the level of 'unemployment'. Figure 2 shows the 'full-time' records for the decade 2003-2012 for the FoE 05 and for the agriculture and environmental cohorts within that Field. The FoE 05 outcome suggests that full-time employment has ranged from 70-80% over the period, being around 70% for the last three years or so. This is the figure that has been used by GCA to represent the employment status of agricultural graduates. The agriculture cohort however is substantially different from that representation, being between 80 and 90% over the decade and around or above 90% in recent years. The environmental cohort on the other hand has, for the majority of years, hovered in the 60-70% of full-time employment band, and particularly so in the recent years. Officially therefore agricultural employment has been substantially underestimated and environmental employment exaggerated by the way the data are used.

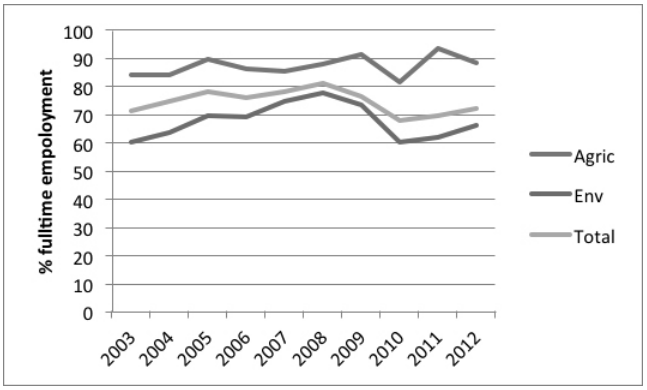

Figure 2 The level of full-time employment after graduation of the agriculture cohort, the environmental cohort and the total FoE 05 cohort for the period 2003-2012

Figure 3 shows the data in a different way, by displaying the range of full-time employment levels across the decade for each of the cohorts 'agriculture', 'environment' and 'FoE 05'. This depiction shows the ranges for agriculture and environment to be mutually exclusive over the decade with the FoE 05 range closely approximating that of environment and barely overlapping with that of agriculture. The GCA publications therefore clearly misrepresent the employment of agriculture graduates to their significant disadvantage. There is no suggestion that this is deliberate but rather an artifact of the way in which data are collected and then interpreted.

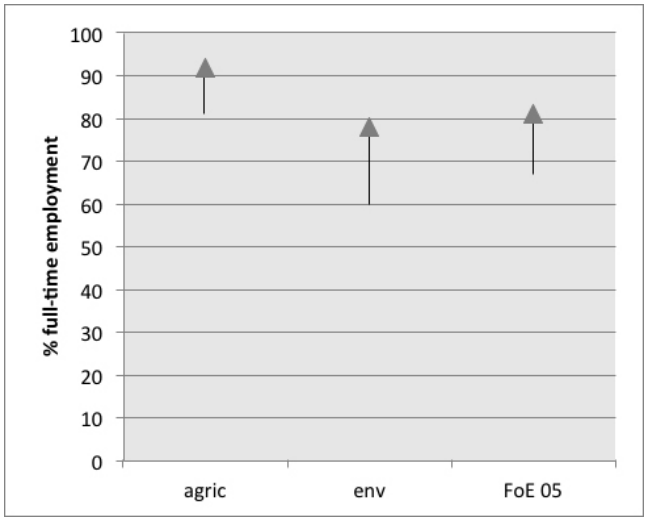

Figure 3 The ranges in percentage of fulltime employment for the agriculture, environmental and FoE 05 graduate cohorts for the period 2003-2012

The extent of the discrepancy over the period of the decade is shown in Figure 4. The percentage difference between the actual employment levels for agriculture graduates and those published by GCA, represented by the same data, ranges from 9 to 25%, the largest discrepancy occurring in the period 2009-2012 when the shortage of graduates has been most acute.

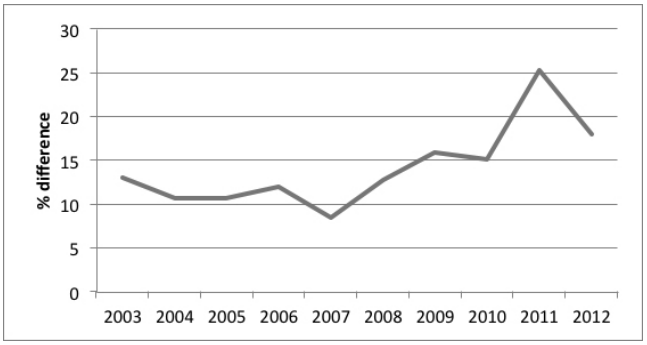

Figure 4 The percentage difference between full-time employment of all agriculture graduates and those for FoE 05 for the period 2003-2012

The data were also broken down into their primary industries components (Figure 5) to show that agriculture, agribusiness and horticulture/viticulture in the main were consistently in excess of 80% full employment whereas the cohort as a whole (ie FoE 05 including the primary industries) was, except for one year, below the 80% cutoff and closer to 70% in most years. The numbers for forestry and aquaculture are too low for meaningful conclusions to be drawn for those categories.

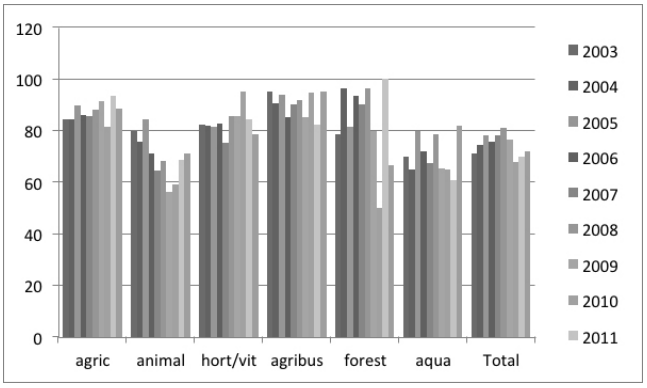

Figure 5 The proportion of graduates in primary industry categories in full employment for the period 2003-2012

Salaries. As with employment data, salary information was provided by GCA for the same decade. Respondents were asked to provide their gross (pre-tax) annual salary in Australian dollars. Records for salary levels represent a much smaller proportion of the survey recipients, presumably because of concerns about privacy issues. For the FoE 05 total cohort the responses ranged from 22-31% of recipients whereas the agriculture cohort response range was 48-62%. Why agriculture graduates would be more forthcomingwith salary details than the overall cohort remains an unknown.

The data provide the number of graduate respondents and the median salary for that cohort in that year. The *median* salary makes it difficult to combine cohorts and so the data are not manipulated in this analysis. Over the period of study the number of respondents has almost halved and the sub-cohort numbers in some cases are in single digit numbers and have not been used further except as a component of the full cohort. Where there are 10 or more in almost all years of the analysis the data are provided. The numbers are represented in Figure 6a for the subgroups considered. Agribusiness had been included in the analysis because of its relevance even though it is not part of the FoE 05 category and its numbers are not included in the Total for the FoE 05 field. Figure 6b then shows the median salaries for the subcohorts and total cohort for FoE 05.

The analysis suggests that the median salary level for graduates in full-time employment from FoE 05 (170 respondents) in the GCA survey was around $52K in 2012, there being a steady annual increase (just under 6% per year) in the values over the decade of study. For the agriculture cohort the median salary in 2012 was $55K (7 respondents) and the agricultural science cohort produced a median salary value of $52K. Combining those cohorts would raise the median but to what extent is unclear. An estimate of $53K would seem reasonable. Agribusiness reported a median salary of $51K.

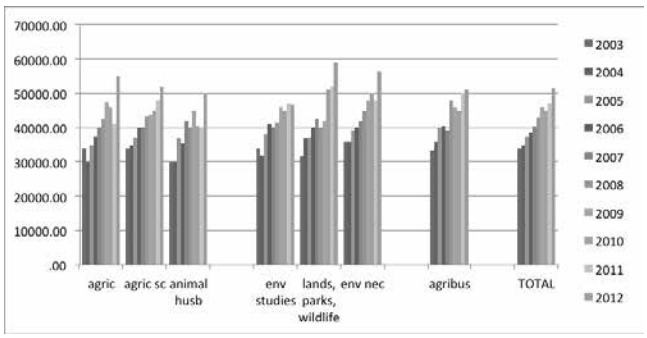

Figure 6a Number of respondents in respect of the GCA salary survey for the FoE 05 total cohort and subcohorts where greater than 10 respondents, 2003-2012.

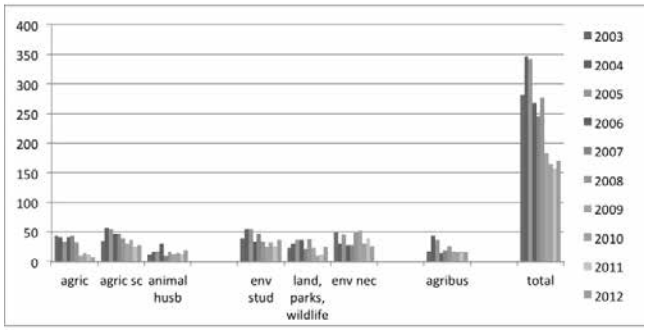

Figure 6b Median salary of respondents to the GCA salary survey for the FoE 05 total cohort and subcohorts where greater than 10 respondents, 2003-2012

Given the relatively small cohorts in the data for some classifications, it is difficult to judge whether the salaries are representative enough to guide prospective students in their choice of career. To provide some validation a comparison is made with a survey of agriculture graduate 'trainees' in agribusiness companies undertaken by graduate employment company Rimfire Resources. The analysis of salary in this case evaluated the salary packages of the employees and the outcomes reflect more than 60 respondents per year for the four years under consideration. Data are presented for median and average salaries in Figure 7 for the years 2010 to 2013. In 2012, which relates to the latest of the GCA data, the median base salary was $46K which is then supplemented by package arrangements to a median of $52K. The average values are $47K and $53K respectively. In 2013 the median values for base salary and salary package had risen to $47K and $53K respectively and average values to $49K and $56K.

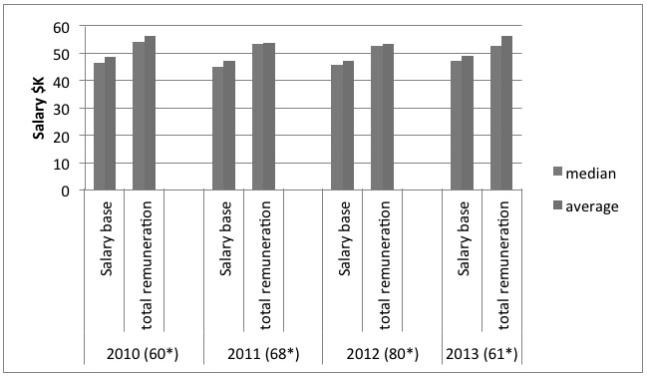

*Figure 7 The median and average base salary and package salary of agriculture graduates from the Agribusiness Salary Survey, Rimfire Resources, 2010-2013 (*are numbers of respondents)*

Figure 8 shows that the top 25% of employees had a base salary of at least $53K and a package salary of at least $57K in 2012 and this had risen to a minimum $53K base and minimum $65K package in 2013.

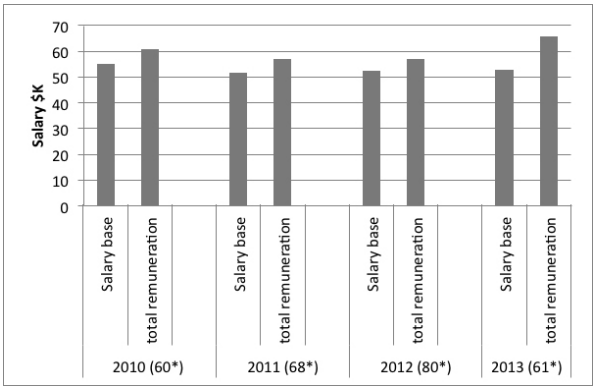

*Figure 8 The 75th percentile base and packaged salary of agriculture graduates from the Agribusiness Salary Survey, Rimfire Resources, 2010-2013 (*are numbers of respondents)*

These comparisons suggest that the information from both sources is similar for median values. Whether median value is the best indicator is a debate for another time. Indicating the range might be a useful addition. The important question here is whether the portrayal of agriculture is representative of the data. To further the evaluation the portrayal of agriculture in the GCA publication GradStats (December 2012) is reviewed. Table I shows the ranks determined by GCA for starting salaries across a range of fields of study. This is compared with rank based on the GCA median salaries. It is not clear why these rankings would differ. For agricultural science, the GCA rank in the publication is shown as 17th although median salaries suggest the rank as 12th.

Table 1 Rankings of Field of Education based on GCA determination (adapted from GradStats 2012)

Field of Education	Rank	median salary $K	rank on median salary
Dentistry	1	80	1
Optometry	2	79	2
Earth sciences	3	73	3
Engineering	4	63	4
Medicine	5	60	5
Education	6	56	7
Mathematics	7	57	6
Computer science	8	52.5	10
Law	9	53	9
Paramedical Studies	10	52	11
Physical science	11	56	7
Social work	12	50	12
Psychology	12	49	15
Accounting	15	50	12
Biological sciences	15	48	17
Economics/Business	15	48	17
Architecture/Building	17	48	17
Agricultural science	17	50	12
Veterinary Science	19	45	20
Humanities	20	45	20
Social sciences	20	47	19
Art/design	22	40	22
Pharmacy pre-registration	23	39	23

The analysis undertaken in this paper suggests that the median salary for agriculture as distinct from FoE 05 is closer to $53K (shaded figure in Table 1) than the published $50K. Both the GCA data at 6-digit level and the Rimfire Resources data suggest that $53K is an appropriate estimate. That then puts agriculture in the top 10 for the graduate salary stakes rather than the official 17th position determined by GCA.

DISCUSSION

Why does all this matter? It matters because the GCA is a reputable and accepted source of advice for prospective students. Its findings are widely used by careers advisors and are available to parents and students alike. The portrayal of perhaps 30% unemployment rather than the actual full employment is an immediate turnoff for students and the salary ranking of 17 v 10 also provides no incentive for their further consideration.

A survey of more than 500 Victorian secondary school students in 2012 showed the lack of understanding of careers in agriculture (Winkler, 2012). That is not surprising, with only 4% showing interest in seeking more information on agriculture courses. However, more than 40% indicated that a starting salary of more than $60,000 would make them consider studying agriculture. Salary levels do matter.

A Review into agricultural education in NSW (Pratley 2013) showed that many careers advisors discourage students from careers in agriculture on the basis that they perceive that there are no jobs and no future in such careers. The combination of agriculture with environmental graduates by GCA in employment and salary, using just FoE 05 data, does distinctly confuse the situation for agriculture and reinforces the negativity to agriculture common in career advice in schools. Over recent times that misrepresentation has been a significant disadvantage to agriculture.

This simple analysis emphasises the need to separate agriculture and other primary industries from environmental course data. The capabilities of such graduates are not interchangeable with environmental graduates having little or no training in primary production. Clearly demand for the two groups differs and their combination misrepresents both.

ACKNOWLEDGEMENT

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