MEAT & LIVESTOCK AUSTRALIA

on farm

# Review of AMRC, MRC & MLA Postgraduate Scholarship Scheme

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# EXECUTIVE SUMMARY

Meat and Livestock Australia and its predecessor organisations have, since the 1960s provided funds to support a postgraduate training program relevant to industry needs. In the period 1975—2000 some 187 scholarship awards were provided, with at least another 20 students funded separately to the program from within specific research grants provided by the organisations. Based on present day values for stipends and support funds, the estimated total investment of approximately $5.6m represents an annual investment of the order of $225,000 to support on average about 7.5 students per year.

A database of student information was assembled containing complete or almost complete information on 167 students, records for the balance being too incomplete for inclusion. A majority (80%) of students studied in Australian universities, the balance in the USA and Europe. Most students were enrolled in PhD (70%) or Masters (12%) programs, the remainder in Graduate Diploma/ Graduate Certificate courses.

On-farm disciplinary areas were most heavily supported, two thirds of all students being in the areas of animal production, animal health or plant sciences. Significant numbers of students studied Economics, Extension and Meat Science and Technology, while a diverse range of other disciplinary areas were also represented. A subjective ranking was made of contributions to the red meat industry of awardees, some 75% of these being judged to have made high level contributions during their careers. Whilst a majority (76%) of scholarships were awarded on a merit basis, other awards were targeted for specific programs, particularly Animal Breeding and Extension. A surprisingly high proportion (67%) of all awardees were still involved in various segments of the red meat industry, whilst others (12%) were involved in other aspects of Australian agriculture. This industry retention rate is extremely high by any standards, and indicates a very high level of industry interest and commitment by awardees, which, together with the high levels of contributions made, validates the selection processes used over the years. Movements out of the industry over 25 years of only one third of all awardees represents a very low annual attrition rate which, together with the other criteria mentioned, leads to the conclusion that the scheme has been successful in providing a very significant amount of intellectual capital to the red meat industries.

Trends toward a decline in enrolments in the traditional “agricultural science” areas, together with internal university targeting of other areas of research strengths, pose potential problems for the future for education for the industry. Any reductions in MLA support could exacerbate this decline, which could be partly alleviated by using some MLA funds as top-up grants for APA and APAI awards, thereby increasing both quality and quantity of postgraduates. As part of its overall strategic planning activities, MLA should undertake a review of intellectual capital needs to 2020 in order to best plan future needs for industry research, extension and support staff.

University staff emphasised the need for education expenditure to be seen as a long term investment for the future, with suggestions that the program be broadened to include support for Honours students and postdoctoral positions, the latter preferably linked to projects. Consideration also needs to be given to linking a small proportion of awards to ongoing research projects, but a majority should be stand-alone though in areas of relevance to the strategic directions of MLA.

Current levels of stipend support should be reviewed with a view to small increases to take them to the top of the range of stipends provided by other RIRDCs. A biennial review of stipends and operating allowances should be undertaken. A majority of awards to date have been for PhD or Masters programs. This approach should continue but changing and/or emerging training needs in specific areas mean that other training support at Graduate Diploma/Graduate Certificate levels should continue to be made available where appropriate.

A recent innovation by another funding agency has been an annual workshop for scholarship holders to enable them to present research results to and interact with program managers and other staff, as well as providing opportunities for briefings on funding agency activities. This approach is worthy of consideration by MLA.

Overseas postgraduate training was not considered to confer any special advantages to students or to the industry, other than when specific disciplinary areas are not represented or are not available within the Australian university sector.

Future levels of investment in education need to be carefully considered by MLA in the context of its other portfolios of investment. The Australian grains industry is investing significantly greater proportions of funding in developing its intellectual capital for the future than MLA is currently doing. This aspect should be examined as part of any strategic planning activities.

In summary, a considered view is that the operations of the postgraduate scheme have been very successful and that MLA, should be congratulated on these successes, and see these benefits as a valuable investment return. Continuation and indeed expansion of this investment will help to secure the future intellectual capital needs of the industry.

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# RECOMMENDATIONS

**Recommendation 1**

That MLA should continue the operations of its highly successful postgraduate training scheme; that consideration be given to specific allocations of funds to both merit based and targeted scholarships on a suggested ratio of 70:30; that consideration be given to adding additional funds to the scholarship pool (suggested $30,000pa) for top up of relevant APA and APAI awards, and that MLA should, as part of its strategic planning process, undertake a review of intellectual capital needs to 2020 in order to best plan future needs for industry research and extension staff.

**Recommendation 2**

That MLA should consider as a matter of priority the provision of additional targeted scholarships in the areas of Extension/Distance Education/Adult Learning methodologies and in the areas of Veterinary Pathology/Epidemiology, pending any review which may be undertaken of future intellectual capital needs of the red meat industry.

**Recommendation 3**

That in allocating awards for postgraduate scholarship both stand-alone and project linked awards should be provided. A recommended allocation ratio is two thirds stand-alone : one third project linked awards. Future needs for different components of the industry also need to be taken into account in scholarship allocations.

**Recommendation 4**

That those seeking information on postgraduate awards be provided with details of projects appropriate for postgraduate study, that the selection panel should include an external, university-based member, and that for shortlisted candidates, the final selection should include, wherever possible, a brief interview conducted by program managers.

**Recommendation 5**

That MLA consider increasing its current postgraduate stipend levels to at least $25,000 with an operating grant of $5,000; that the Program manager responsible for the postgraduate program be given discretionary powers to consider applications for increases in operating grants to a maximum of $8,000pa, reviewed annually, and a budgetary contingency established for this purpose; that a biennial review of stipends and allowances should also be undertaken.

**Recommendation 6**

That a majority (≈ 70%) of funds should be directed towards support of PhD and Masters students in areas relevant to likely future needs of the red meat industry; that consideration be given to establishing a summer scholarship scheme; that from 4—6 Honours scholarships be established to support Honours programs in areas relevant to the industry; and that, where training at these levels is the most appropriate, Graduate Certificate,

Graduate Diploma studies be supported in those areas relevant to the strategic directions of MLA.

# 1. INTRODUCTION

Since the early 1960s the then Australian Meat Research Corporation (AMRC) and its successor organisations the Meat Research Corporation (MRC) and Meat and Livestock Australia (MLA) have supported via scholarship schemes postgraduate training of Australian students in areas of relevance to the Australian red meat industry.

Training opportunities have been offered for PhD, Masters, Graduate Diploma and Graduate Certificate programs, which whilst primarily undertaken within Australian educational institutions, have also been undertaken where appropriate in institutions overseas.

The rationale for this training support was to provide for the red meat industry a pool of highly skilled research, technical and extension staff to service the needs of the component parts of the industry. To date there does not appear to have been any formal examination of the impact of this program, though a brief report in 1985 (AMRC Annual Report 1985) provided some summary statistics on the number of studentships funded to that time (181), and on completion rates for PhD (94%) and Masters and other courses (100%). However no additional analyses appear to have been undertaken, and potential benefits to the industry on the effectiveness of the investment do not appear to have been examined.

# 2. OBJECTIVES

The objectives of the current review, which cover the operations of the scheme between 1975—2000, a 25 year time frame, were indicated to be as follows:

The primary purpose of the review is to identify innovative ways in which MLA can use scholarships in the future. This review should challenge the status quo and identify new, stimulating approaches to studentships. Specific components of the review included:

1. Information on the AMRC, MRC and MLA postgraduate scholarship schemes that have been funded by the red meat industry over the last 25 years, detailing the following:

    - Numbers — overall total numbers of postgraduate scholarships awarded.
    - Names of all students and gender.
    - Terms of scholarship, year of commencement and completion.
    - Institution student located and principal supervisor.
    - Degree program undertaken.
    - Analysis and overview of the value that the student added to the meat and livestock industries in subsequent career — this is to include comments on the role of the supervisor.

- Comment on appropriateness of a random compared with a targeted selection process for studentships to encourage development of areas of strategic importance to industry.

2. Advise MLA on the best way to gain maximum financial advantage from its scholarship funds, having regard to the various funding formulas available to universities through DETYA and other sources.

3. Contact with Deans of Agriculture, Veterinary Science and Agricultural Economics Faculties to identify their needs.

4. Advice on the merits of linking PhDs to projects or allowing them to stand alone.

5. Advice on an innovative selection process.

6. At what level should scholarships be funded.

7. Consult with other RIRDCs to determine any change in their approaches to scholarships.

8. Should scholarships be limited to PhD/Masters.

9. Consult with David Skerman in relation to Animal Health Australia (AHA) specific veterinary scholarships.

10. Provide a brief analysis of a considered view on the value of Australian compared to overseas postgraduate training.

# 3. METHODOLOGY

## 3.1 Student database construction

The existing student database held by MLA was examined but it was evident that insufficient information was on this database to enable a full response to the brief to be developed. In part, the paucity of the database information reflected the fact that three separate organisations (AMRC, MRC, MLA) had been responsible for the scheme over the period under review.

A detailed search of the existing database, of current student files, of old annual reports, of archived student files and of archived theses was then undertaken to create a new database whose elements included:

- Name and gender
- Start and completion date of scholarship
- Funding agency (AMRC; MRC; MLA)
- Institution
- Degree program
- Supervisor
- Disciplinary area

- Career contribution of candidate
- Impact of supervisor
- Method of allocation of scholarship
- Current contribution to red meat industry

Despite considerable background searching, many records were incomplete. However, extensive discussions with a range of individuals including MLA staff, university supervisors where appropriate and through professional contacts of the consultant, enabled a very high proportion (89%) of the records to be completed or partially completed.

## 3.2 DETYA discussions

Telephone discussions and a meeting with senior DETYA staff in Canberra, provided a background to current and possible future policies and practices relating to the Australian Postgraduate Awards program. Opportunities for collaboration/integration/coordination of scholarship schemes were also examined with DETYA and with a senior staff member at UNE, Prof B Stoddart, ProVice Chancellor Research, who has responsibilities in this area

## 3.3 University needs for scholarships

The current and future needs for postgraduate scholarships of Faculties and Schools of Agriculture/Veterinary Science/Agricultural Economics were identified through personal telephone or e-mail contacts with 16 relevant staff in 11 Australian Universities.

## 3.4 Discussions with other RIRDCs

A number of relevant staff in eight other RIRDCs (GRDC, RIRDC, DRDC, CRDC, Sugar RDC, Australian Pork, Horticulture Australia, Land and Water Australia) who had responsibility for their scholarship programs were contacted by telephone and issues relevant to their programs were discussed.

## 3.5 Discussions with MLA

Part of the brief was to discuss with Dr David Skerman of MLA the operations of Animal Health Australia (AHA ) specific veterinary scholarships . Telephone discussions were held on this matter.

# 4. REPORT

**Objective 1: Student statistical information**

In total some 187 students were supported over the period 1975 — 2000 inclusive, and full details are listed in **Appendix 1** for those 167 students for which complete or almost complete records could be assembled. In the case of 20 scholarship holders, the records were such that even the follow-up approaches adopted did not yield additional information and hence these records were not included in the database.

Also excluded from the data analysed here were a substantial number of overseas study awards, details of which were recorded in annual reports and in the database held by MLA. These awards, primarily to senior or established personnel, were usually of 2-3 months

duration, did not include degree study and therefore fell outside the ambit of this review. In addition it became apparent during the search process that there had been a considerable number (20+) of postgraduate students supported on research grants to institutions by AMRC, MRC or MLA. The exact number of these is impossible to determine however, without a detailed search of archival records on research grants over the review period, since these student's details were not included in any files or database on scholarship holders held by MLA.

From the database assembled using ACCESS 2000  a series of analyses were undertaken details of which follow:

1. 1. Total postgraduate numbers supported over the period 1975 — 2000 were 187, and of the 167 student records analysed it appeared that all but two successfully completed programs, a majority within the period of funding support. This apparent attrition rate (<2%) is extremely low by all Australian postgraduate standards ( Estimates range from 20 – 40 % ). The files also indicate that only a small proportion (<10%) applied for and were granted an extension to their scholarships which in most cases were either 3 years (PhD); 2 years (Masters) or shorter periods (1—1.5 years) for Graduate Diploma and Graduate Certificate programs. Where extensions were sought, the files indicate that these applications were carefully scrutinised by organization staff, and extensions were usually limited to 6 months other than in exceptional circumstances. However it was not possible from the files to determine with any certainty the proportion of candidates who actually completed and submitted within the period of scholarship though impressions were that a majority did so within the period of support. These relatively short postgraduate completion times are at variance with recent estimates for completion times in Australian Universities, which for PhD programs range between 3.7-4.8 years for full time candidature.

2. The earlier years of the awards were characterised by a complete absence of women scholarship recipients. It is unclear though from the available records whether many women were unsuccessful in applications for scholarship support. However, the first award to a woman appeared to be in 1981, and in that decade there was only one other woman supported. The situation changed however in the decade commencing 1990 during which some 27 other women were awarded scholarships. Throughout the period under review, awards to women represented some 17% of total awards provided. This figure contrasts with the current (2000) situation where female candidates enrolled in PhD and Research Masters programs in Agriculture/Animal Husbandry and Veterinary Science represent 43% of all enrolments.

3. **Table 1** provides information on the number of scholarships provided by each of the successive organisations (AMRC, MRC, MLA) in the period 1976 — 2000. In the 10 year period to 1986, the AMRC supported on average about 8 scholarship holders annually, but annual numbers decreased marginally to about 7 during the life of the MRC. MLA has only been in existence since mid 1998 and hence numbers of students supported over the review period are small and agency comparisons meaningless.

**Table 1:** Distribution of awards by funding body

| | **Period** | **Number of students** |
|---|---|---|
| AMRC | 1975 – 1985 | 76 |
| MRC | 1986 – 1998 | 86 |
| MLA | 1998 + | 5 |
| | | 167 |

4. Scholarships have been offered to students to undertake studies at both Australian and overseas institutions. A majority (80%) of students studied at Australian institutions, some 12% at institutions in North America and the balance in European or New Zealand institutions. Full details of these are shown in **Figure 1**. Within the Australian universities, students studied in a range of institutions relevant to their disciplinary areas. However a majority enrolled in programs at the Universities of Adelaide (7), Melbourne (14), Sydney (15), New England (36), Queensland (15) and Western Australia (7), all of which have strong agricultural and /or veterinary science programs. The very high number of students who studied at the University of New England reflects the fact that a large number (17) of these were enrolled in a targeted program, the Graduate Certificate in Rural Science (Animal Breeding) which was supported by the MRC for about 4 years.

**5.** **Table 2** summarises data on programs of study undertaken. Some 70% of students were supported for PhD studies, 12% for Master studies, whilst the balance were supported for Diploma, Graduate Diploma and Graduate Certificate programs. As indicated above, some of these latter programs were supported at specific institutions, particularly the University of New England, University of Melbourne, and the then Hawkesbury and Roseworthy Agricultural Colleges to target specific programs in Animal Breeding and Extension methodology. A majority of participants in these programs appear to have been State Department of Agriculture personnel in the technical support and extension areas.

**Table 2:** Distribution of awards by study program

| | **Number** | **%** |
|---|---|---|
| PhD | 117 | 70 |
| Masters | 20 | 12 |
| Grad Dip/Grad Cert | 26 | 16 |
| Diploma | 3 | 2 |
| | 167 | |

6. The wide diversity and number of University supervisors involved reflects changes in personnel within institutions over time, but also reflects the diversity of areas of study which have been supported under the program. Given the comments in 4 and 5 above, names of some supervisors appear very frequently and there is no doubt that a number of supervisors have had significant impacts on the training of personnel for the red meat industry of Australia over the past 25 years. Supervisors who have trained three or more students in this period include: Ryan (Hawkesbury Ag); Brandon (UMelb); Hawkins (UMelb); Morley (UMelb); Kinghorn (UNE); Thompson (UNE); Lindsay (UWA); and Sinclair (Vic U Tech/RMIT).

7. As indicated earlier, the breadth of disciplinary areas of students supported under this program has been incredibly wide. The selection of disciplinary areas for this

study was of necessity somewhat arbitrary and was adopted following discussions with MLA staff. The following classifications were used:

| Classification | Sub-discipline |
|---|---|
| Animal Production | Ruminant Nutrition |
| | Animal Reproduction |
| | Animal Physiology |
| | Genetics and Animal Breeding |
| | Behaviour and Welfare |
| Animal Health | Microbiology |
| | Virology |
| | Immunology |
| | Parasitology |
| | Pathology |
| | Epidemiology |
| Biotechnology | |
| Economics and Marketing | |
| Entomology | |
| Extension | |
| Human Nutrition | |
| Management | |
| Meat Science and Technology | |
| Pasture Agronomy | |
| Plant Pathology | |
| Rangeland Management | |
| Waste Management | |
| Wildlife Management | |

8. **Figure 2** summarises data on scholarships provided under these broad disciplinary areas. A majority of students (95- 57%) supported were in the areas of animal production and animal health. Support for training in genetics and animal breeding has been the single most important disciplinary area but as mentioned, a number (17) of these students were enrolled in the Graduate Certificate in Rural Science (Animal Breeding), a short course at UNE, thereby elevating numbers involved. Next in order of numbers were awards in animal reproduction and ruminant nutrition with smaller numbers in physiology and behaviour and welfare. Within the broad disciplinary area of Animal Health, all sub-disciplinary areas were represented with greatest emphasis on training programs in microbiology and epidemiology.

9. Additional areas of concentration of students were in Economics (7%), Extension (9%) and Meat Science and Technology (9%). Significant numbers of students were also supported in other areas particularly the plant sciences (9 %), clearly indicating the breadth and depth of the program over the years designed to accommodate the diversity of components of the Australian red meat industry.

10. A subjective ranking of the contribution of a student to the red meat industry, both during their studies and subsequently, was rated on a scale of 1—5 (5 highest). This ranking was determined following extensive discussions with a range of individuals including MLA staff, research and extension staff in State Departments, University supervisors and through the professional knowledge of individuals

known to the consultant. The ranking is influenced by the subjective nature of assessments of each individual's career and by the length of time since graduation. The distribution of this ranking criterion is shown in **Figure 3**.

11. Clearly a significant number (117 —75%) of former scholarship holders have made high level (scale 3—5) contributions to the Australian red meat industry both during and following their postgraduate training. Conversely, other students (40—25%) have made low level (scale 1—2) subsequent contributions. In the case of this latter group, this low level of contribution appeared to be closely linked to a number of factors including time since graduation (trend to lower scores for graduates < 5 years, 17/40) and area of employment subsequent to graduation, (23/40 currently working in areas other than red meat industry). The ratio of 3 : 1 for high : low contributions is an indication of the overall success of the program, bearing in mind that contributions from recent graduates currently fall into the low group.

An attempt was made to provide some subjective assessment of how involvement in supervision of students under the program may have influenced the supervisor's contribution to the red meat industry. Again, a similar consultative approach to that outlined above was undertaken, but particularly for overseas institutional supervisors such data needs to be interpreted carefully as many overseas supervisors were not known to those consulted, or to the consultant. In general the conclusions drawn from this criteria were that participation in the supervision of students supported under the program had a positive impact on the contribution of the supervisor to the red meat industry, ie Australian universities have had multiple benefits by training scholarship holders.

The extensive records which were reviewed indicated that in a majority of cases (73%) the decision on allocation of scholarships was based principally on the merit of the application (Random — **R** in **Appendix 1**), but in some cases also on an assessment of the institution and of potential supervisors. Unfortunately, detailed records for some students supported in the decade 1990 — 2000 could not be located, and for this group the above criteria could only be assumed. However, there was an impression from the contemporary records sighted that some targeting (Targeted — **T** in **Appendix 1)** of disciplinary areas was undertaken during this time period. This may well have been on the basis of linking the program to the Strategic directions of the Organization(s) at that time. The records did indicate, however, a considerable number (24%) of cases where a targeted approach to allocation of scholarships was made. This applied in particular to a number of programs (Masters, Grad Dip, Grad Cert, Dip) in extension and animal breeding, comment on which was made earlier.

In addition, the records indicated that in some cases targeting of specific training areas (and of staff to be trained) had also been undertaken by employing agencies, (State Departments of Agriculture and, to a lesser extent, CSIRO) prior to applications being submitted for consideration.

As indicated above, a majority of scholarships have been offered on merit (Random), based on quality of the applicant/application. There were and still are cogent reasons for a continuation of this approach within the broad framework of relevance of the proposed area of study to the red meat industry. Clearly an important reason for continuation of this mechanism is to ensure the maintenance

of a bank of high quality intellectual capital to serve industry needs for the future, through the selection and training of our best potential research and extension personnel.

Selection on merit (or combination of merit/experience/suitability) is a process that has been widely used and has worked well in all areas of research activity. This conclusion can be supported from the current review as evidenced by the large numbers of former students who have made significant contributions to (point 9 above), and continue to work in (point 12 below), the various components of the industry. The fact that almost 70% of former students were continuing to contribute to research and extension activities in the Australian red meat industries is an indication that the merit allocation process to date has been effective and has served the industry well, particularly given recent trends in changing career paths in the Australian workforce. Expressed another way, a long -term employment attrition rate of some 33% over a 25 year time span represents a very low level loss of intellectual capital to the red meat industry relative to the training investments made in generating this capacity.

Equally though, the targeted approach to scholarships has been successful. Some 75% of former students supported with targeted scholarships continue to contribute to the red meat industry, particularly in extension methodology and in technical as against research based activities. However, the contributions of this group of students do not cover all component parts of the industry (eg meat science, nutrition), as do members of the random group.

Given the rapidity of changes within the industry, and the development of MLA's strategic directions, with a need for ongoing review of training requirements, the organization may wish to give consideration in the future to allocating a fixed proportion of its scholarship funds to random (but industry relevant ) or to targeted areas of activity.

A considered view is that an allocation ratio in the vicinity of 70 : 30 for random and targeted scholarships would be appropriate.

However it should be recognised that in the event of rapid and/or unexpected changes in the industry which may require urgent training/retraining of relevant personnel, some flexibility in this suggested ratio would be needed to move more funds into targeted as against random scholarships. Examples of issues which could emerge in the future and which may need specific targeted training support include food hygiene, new meat product developments, emerging exotic diseases, veterinary epidemiology, veterinary pathology, extension activities related to incorporation of new molecular genetics data into breeding programs, to name but a few.

12. Information on current contributions to the Australian red meat industry is summarised in **Table 3.** This subjective assessment (score 1 —4, where 1 — Red Meat Industry; 2 — Other Agriculture; 3 — Other Non Agriculture; 4 — Unknown) was undertaken using a consultative process as described above, and on the professional judgement of the consultant of individuals known to him.

**Table 3:** Current contributions of scholarship holders to areas of employment

| Area | Number | % |
|---|---|---|
| 1. Red Meat Industries | 112 | 67 |
| 2. Other Agriculture | 20 | 12 |
| 3. Other non-Agriculture | 12 | 7 |
| 4. Unknown | 23 | 14 |
| | 167 | |

A very high percentage (67%) of former scholarship holders were continuing to contribute to some aspects of the Australian red meat industry, indicating that the return to the industry on the initial investment for training was of a quite high level. However, when the percentage of those contributing to other aspects of Australian agriculture (12%) is added to this figure, then the overall contribution rate to the Australian agricultural industries of almost 80% of personnel trained under the scheme clearly indicates the benefits of the training investment.

Of those students judged to be now contributing to other areas, a number had retired in recent times, were involved in other biological or medical research, whilst others were contributing to activities as diverse as the hospitality industry and financial business activities. Current activities could not be identified for only a relatively small number of scholarship holders.

**Objective 2: Advice to MLA on future funding of postgraduate programs**

**1. Assessment of program achievements to date**

The data presented earlier provides a number of criteria by which the success of the scheme to date can be judged. Attrition rates of scholars have been extraordinarily low compared to those reported from Australian university postgraduates in recent years, suggesting that the selection process used identified students committed to and interested in their programs.

There has been a very high retention rate of MLA trained staff within the red meat industry, much greater than anecdotal evidence from other industries would suggest. A level of loss of some 33% over the 25 year review period suggests considerable stability in this component of the work force and clearly indicates the benefits the industry has obtained from its training investment.

In terms of contributions made to the red meat industry, again the subjective data indicate a high level of contributions by at least 75% of former scholarship holders, a further indication of the significant return on the training investment.

A considered view is that the organisations involved (AMRC, MRC, MLA) have achieved significant and positive intellectual capital returns on the investments in training made over the period of review, and that by the criteria used the scheme has achieved very successful outcomes.

**2. Commonwealth funding for postgraduate training**

The Department of Education Training and Youth Affairs (DETYA) has overall responsibilities for the Commonwealth funding of Post Graduate training in Australian Universities. The numbers of Australian Post Graduate Awards (APAs) and Australian Post Graduate Awards Industry (APAIs) provided to each institution are determined annually by DETYA based on a

formula approach which takes into account factors including current post graduate enrolments, completion rates, research income and publications. In addition many universities provide additional scholarships from internal resources, whilst a range of other bodies also provide postgraduate support eg. NHMRC and other Rural Industry R & D organisations.

DETYA funding of post graduate scholarships now requires universities to direct a proportion of APAs to their identified areas of research strengths. Whilst this approach is a logical one, it does create some potential problems for Australian agricultural research and extension training for the future, in the sense that if agricultural/veterinary/economic areas within an institution are not judged by that institution to be areas of strength or priority, then APA scholarships may be re-allocated to other areas. In the event other sources of scholarship support cannot be obtained, this can result in a run-down in postgraduate activity in the research area and a fairly rapid decline in the numbers of well-trained personnel entering the work force.

There is also an overall trend within most Australian universities for a run down in staffing and support for agriculture/veterinary/economic areas. For example between 1996 and 2000 there was a decline of 6.4% in postgraduate enrolments in Agriculture/Animal Husbandry, though in Veterinary Science post graduate enrolments increased by 6.5%. In the latter case however some of these increases may reflect greater interest in companion animal rather than in food animal research.

Hence it is highly likely that postgraduate output in these areas will remain static at best, but more likely will decline. Reference to this problem was made earlier. In addition, the fact that the best and brightest of students in these areas generally have good employment opportunities with prospects of adequate monetary returns in many cases mitigates against them undertaking postgraduate study with its costs of financial constraints and missed opportunities. This problem is further exacerbated by the reduced employment opportunities within Australian R&D organizations and universities once students complete postgraduate training. This trend to declining postgraduate numbers and output is becoming evident in most disciplinary areas of relevance to the red meat industry, two noteworthy examples being in the areas of Extension Methodology and Veterinary Pathology.

In the area of Extension Methodology, recent activities by MLA in developing and supporting a range of producer/processor educational activities need to be coordinated with targeted support for training in extension/distance learning/adult learning methodologies. The whole area of information technology, relevant to rural industry needs, should also be part of this training package.

A considered view is that the generic areas of extension methodology, technology transfer, educational programs and utilisation of information technology should be reviewed by MLA to determine future needs and requirements for training.

Recent outbreaks of BSE and FMD in Europe and Japan have highlighted the needs for effective security measures and adequate diagnostic and disease control capabilities within Australia. There has been a considerable decline over recent times in the pool of well trained veterinary pathologists and veterinary epidemiologists in Australia, and these issues must be addressed if our disease surveillance and control capabilities are to be maintained and strengthened.

It is a considered view that emphasis needs to be placed on targeted support for veterinary pathology/epidemiology training programs both in Australia and, where appropriate, in relevant overseas institutions.

## 3. Future MLA approaches to postgraduate training

Given these trends, any reduction in future funding of the MLA postgraduate training scheme could lead to adverse flow-on effects in terms of the run down in intellectual capital of the industry. Further, long term strategic planning in terms of manpower needs should incorporate an element of succession planning to encourage will trained graduates to enter and continue in the industry.

It is a considered view that a review of the future needs for intellectual capital of the industry to 2020 should be undertaken by MLA in order to plan and rationalise future training programs

There are no indications at the moment that levels of DETYA funding for postgraduate research will increase substantially, regardless of the election outcome. There are however some recent changes to APA and APAI awards in that there is provision for top-up of these awards from other sources. Such an approach has been successfully adopted by a number of Cooperative Research Centres, who by top-ups to increase APA stipends from about $17,300 to $23.000-25,000 have attracted high quality students into their targeted areas of research. MLA should examine this approach with a view to attracting additional high quality students by using a proportion of its postgraduate scholarships for top-up awards, whilst retaining its existing programs.

A considered view is that an additional amount of about $30,000 per year should be added to the pool of funds allocated for post graduate training to top-up APA and APAI awards for 4 — 5 students in areas of relevance to MLA's strategic objectives.

MLA should also give consideration to industry discussions with a range of Commonwealth Agencies including DETYA, AQIS, Primary Industries and Fisheries and AUSTRADE with a view to determining how coordination and integration of scholarship schemes can be achieved in those areas of mutual interest.

Land and Water Australia has recently introduced a Scholarship Holders annual workshop where scholars are invited to LWA headquarters for presentation of their results to, and interaction with, LWA Program Managers and other staff. These successful workshops have provided opportunities for students to obtain a better appreciation of LWA activities, of other student projects and of the broader industry LWA serves, than would otherwise be possible through their home university associations. The funding agency is no longer an unknown entity (other than a source of stipend support) and a greater commitment to industry is likely to flow from this approach.

MLA may wish to consider a similar approach to further enhance the value to industry of its scholarship holders.

Given the scenarios outlined and the considered views presented, the following recommendations are provided for consideration.

**Recommendation**

That MLA should continue the operations of its highly successful postgraduate training scheme; that consideration be given to specific allocations of funds to both merit based and targeted scholarships on a suggested ratio of 70:30; that consideration be given to adding additional funds to the scholarship pool (suggested $30,000pa) for top up of APA and APAI awards, and that MLA should, as part of its strategic planning process, undertake a review of intellectual capital needs to 2020 in order to best plan future needs for industry research and extension staff.

**4. Future MLA support to other university training programs**

Discussions with other RIRDCs indicated that some had a fairly wide portfolio of training programs within the tertiary sector. The broad rationale behind support at undergraduate and honours levels is that involvement with the industry at this time results in a greater likelihood of interest in and involvement with the industry in an individual's subsequent career.

Areas worthy of consideration in terms of the future intellectual capital bank of the red meat industry include:

(i) Summer scholarships — for undergraduates in relevant degree programs to encourage early participation in and gain experience of particular segments of the red meat industry. Support at levels of about $350 per week for 6 — 8 weeks employment periods is a relatively cheap long term investment with an annual cost for, say, 6 students of about $17,000 per annum.

(ii) Honours scholarships in relevant disciplinary areas, as a means of attracting more such students into postgraduate programs that address the strategic objectives of MLA. Honours students invariably move into postgraduate studies, and assistance at that stage of their career would increase the number of bright young people likely to be attracted to a red meat industry career. Support at levels of about $5,000 per annum for 4 selected students would incur an annual cost of about $20,000.

(iii) Postdoctoral support should also be considered as part of an overall training portfolio. However, a considered view is that provision for such support should be included in specific project budgets rather than as a stand-alone activity.

Additional recommendations in respect of funding are included in the response and recommendations to Objective 8.

**Objective 3: Future needs of universities in relation to postgraduate training for the red meat industry**

As part of the brief, contact was made with Deans or Heads of relevant schools involved in agriculture/veterinary science/agricultural economics education in Australian universities, seeking their views on future needs for support of postgraduate training. Contact was made with 16 individuals from the following universities:

- NSW Sydney, Charles Sturt, New England
- Qld Queensland, James Cook
- Vic Melbourne, Latrobe
- SA Adelaide
- WA Western Australia, Murdoch
- Tas Tasmania

During the course of these discussions and communications a number of issues were raised and responses provided. While an attempt is made subsequently to distil these diverse views and comments, it was considered appropriate to document here for the record some of the comments and responses received. These responses covered, in addition to views on the future needs of Universities for postgraduate scholarships, a number of other issues related to the brief. The responses and comments below were organised under a number of headings as follows:

**Allocation procedures and processes for postgraduate awards**

- "Scholarship applications should be judged on a combination of academic merit (you can't beat smart people) and commitment to the industry".
- "Allocate combination of random and targeted awards-not sure of proportions".
- "Suggest 60/40 split of random/targeted awards".
- "Selection criteria should include potential suitability of candidate for field of study and for working in red meat industry, as well as academic merit - this is sole criteria for APAs".
- "MLA should take advantage of fact that many potential students committed to industry may not have had outstanding u/g academic career, and this should not be sole criteria for selection".
- "Mix of targeted and merit allocations".
- "Mix of two approaches with range somewhere about 60-70% allocated for merit based awards".
- "Selective targeting no problem, and mixture of two would be best approach".
- "Mixture OK. No views on proportions".
- "Many successful agricultural researchers did not perform well in u/g career. Hence selection should be on basis of several criteria including employment record and industry commitment".

**Utilisation of scholarship funds**

- "Top up funds for APAs could be very valuable".

- "Believe awards should be mainly stand alone, though not averse to some funds being used as top ups for other awards ".
- "Favour funds being used for stand alone awards. Many CRC's however provide top up funds for other awards".
- "Don't use as top ups for APAs. This has effect of reducing numbers of scholarships available across the sector".
- "Funds should be used for stand-alone awards, not as top ups which would reduce number of scholarships available".
- "Provide funds for both stand-alone and top-up scholarships".
- "Support combination of two approaches".

**Linking postgraduate awards to MLA supported projects**

- "Yes, believe this is a good approach".
- "Scholarship allocations should be funded separately from funded projects, to ensure they are not compromised if project terminated unexpectedly".
- "Proportion of scholarships should be linked to projects, but some should be stand-alone particularly in high risk and/or high tech areas to enable generation of new ideas".
- "Yes should be linked to projects if possible but some risks and dangers with this approach".
- "Combination of linked and separate scholarships preferable".
- "Think it is better to tie scholarship to person rather than project, since many projects don't lend themselves to independent study required for p/g training".
- "Don't see problem with linking provided project appropriate for training and of duration long enough to enable student to complete program".
- "Better linked to projects to provide more focus".

**Alternative use of scholarship funds for undergraduate and/or postdoctoral programs**

- "No, don't believe funds should be used for u/g scholarships, but some of my staff believe differently".
- "Yes for specific u/g courses aligned to strategic directions of MLA".
- "Don't support specific earmarked funds for Post-Docs, but these could be built into project funding. See better return on these than in linking p/g scholarships to projects".

- "Rather than u/g support, support for Honours students (1 year) who are more likely to be potential research students who go onto p/g training".
- "Post Doc support needed in relevant areas".
- "Any u/g support would be better used in providing u/g student work experience support in relevant industry sectors".
- "Some funds should be earmarked for Post Docs".
- "Yes for some specific u/g courses where long term shortages may create later problems for industry".
- "No for u/g support, perhaps for Post Docs, but prefer concentrate funds on Postgrad support".
- "No for u/g, yes for Post Docs, but tie these to specific projects of at least 3 years duration".
- "Agree with funding u/g but only on targeted basis for specific areas".
- Support Post Doc stipends but only on basis of linking these to projects linked to strategic directions of MLA".

**Impact if MLA postgraduate program not continued**

- "Disaster, Tragic, Unjustifiable, Damaging to industry, Retrograde step, were some of the comments made. Others were even less complimentary!".
- "Would further reduce pool of available scholarships leading to a worsening of the present situation".
- "Programs of this type must be seen as a long term investment by the industry in its future, and not as an immediate cost".
- "Impact if program ceased would add to existing drastic situation in this Faculty in terms of viability of post graduate training programs. It is not exaggerating to say that the long term viability of sections of the Faculty would be put at risk if this eventuated".

**General comments and suggestions**

A very diverse and wide ranging set of comments were made by the respondents which are summarised below:

- "Postgraduate training programs must be seen as an investment for the long term future of all component parts of the red meat industry. ( This comment and variations on it were made by many respondents) ". *An example follows:*

- *"Australian Governments, despite their political rhetoric, fundamentally believe in the user pays approach to research and research training. Hence industry, if it is to move forward, must accept this responsibility, but must see research and research training as a long term investment to ensure it's future".*

- "MLA and other Rural Funding Agencies need to make scholarship financial conditions more attractive in order to attract a pool of the best people to undertake training rather than seeking employment opportunities elsewhere".

- "Absolutely essential to have operating funds available at levels commensurate with different types of postgraduate research programs. Universities are no longer funded at levels which enable post graduate programs to be supported at even sub-optimal levels".

- "Options for career paths for people completing post graduate programs in Australian universities have in some cases been greatly reduced in recent times, reflecting the down turn in employment opportunities in most research establishments. This has had an impact on numbers of people expressing an interest in postgraduate education, has contributed to a down turn in numbers in many areas of relevance to the red meat industry, and has resulted in many well trained staff seeking employment opportunities either overseas or in areas other than agriculture". (This theme was also commented on by a number of other respondents).

- "Real concern was expressed by a number of respondents regarding the ageing profile of research and extension staff in the red meat industry. Many of these staff will retire and leave the industry in the next 5-10 years, but it is believed that the pool of younger people in or entering the industry may not replace this older group". An example follow:

  - *"I have been to conferences recently where the majority of attendees were in the 50+ age group with relatively few younger people. I worry about what will happen in the next 10 years. Will we be importing all our research and technology?".*

- "Often difficult to get students with the right background to undertake postgraduate studies, particularly in some areas where a pre-requisite to the program is an understanding of industry issues".

- "Believe we need more MLA scholarships but these should be aimed at areas MLA considers need support".

- "Better use of MLA funds could be achieved by diverting some promotions funds to greater support for postgraduate and other related training programs. I believe this would yield a better long term yield on the investment".

- "More funds should be invested in training in high tech/high risk areas, as a long term investment for the future, even though potential benefits may not be apparent in the short term".

In summary, Deans and Heads of Schools of relevant Faculties in a number of Australian universities were of the view that continuation of the MLA scholarship scheme was vital to ensure that a pool of well-trained personnel are available to service the future needs of component parts of the industry. Any reduction in the current scheme was seen as potentially damaging not only for the industry but also those sections of universities already under threat through internal and external factors.

There was a consensus that scholarships should be allocated both on a merit basis, but also to targeted areas relevant to the strategic directions of the MLA. Whilst views were not unanimous, usage of some MLA funds for top-ups for APA awards should be considered in conjunction with the current stand-alone scholarships. Caution was exercised by some in linking scholarship awards to MLA funded projects and a combination of project linked and stand-alone scholarships was generally seen as acceptable. Diverse views were expressed regarding use of funds to support undergraduate scholarships and postdoctoral stipends. A consensus was that funds would be better directed to supporting postgraduate training and that while some funds could be earmarked for post doctoral stipends, it would be better to link the latter within MLA funded projects.

Level of scholarship funding was believed by some to be too low to provide sufficient enticement for students to enter postgraduate training rather than entering the general work force. Concerns were also expressed regarding reduced employment appointments for postgraduates and the fact that many move overseas and may not return to Australia. However, the dilemma in this situation is that the age profile of the current research and extension workforce is such that the industry may face severe manpower shortages in the next 5-15 years as older staff move out of the work environment.

Finally, there was a strong underlying theme in many of the comments and suggestions that the long standing and valuable participation of MLA in postgraduate training programs must be seen as an investment for the future of all sectors of the red meat industry.

**Objective 4: Advice to MLA on the merits of linking PhDs to projects or allowing them to stand alone**

This issue was discussed with a number of senior personnel in the industry and with Deans and Heads of Schools of Agriculture/Veterinary Science/Agricultural Economics in a number of Australian universities. An outcome of these discussions, together with the considered views of the consultant is as follows:

1. MLA should consider an approach whereby a proportion (suggested two thirds) should be stand alone awards, not linked to a particular project but which have the capacity to contribute to the long term strategic directions of the MLA. The balance of scholarships could be provided on a linked basis to specific MLA funded projects relevant to the strategic directions of the organisation.

   The rationale for this advice is that many funded projects do not necessarily lend themselves to appropriate PhD training, may be of too short a duration, and carry the risk that premature termination of the project for whatever reason could seriously compromise the ability of the student to complete the program. Further, stand-alone awards provide opportunities for independent (but directed to industry needs) study and development, particularly in high risk and/or high technology areas which enable generation of new ideas or approaches.

For those scholarships linked to projects, care must be taken in the selection of the student to fit the project and the project should be carefully assessed to ensure that its objectives also enable a PhD program to be completed without compromising either the project or the student.

2. MLA should also take into consideration future research, extension and technical manpower needs of the component parts of the red meat industry in determining awards, regardless of whether these are linked or not linked to specific research projects. This may mean in effect that in some time periods there are variations in the suggested proportions of award types.

**Recommendation**

That in allocating awards for postgraduate scholarship both stand-alone and project linked awards should be provided. A recommended allocation ratio is two thirds stand-alone : one third project linked awards. Future needs for different components of the industry also need to be taken into account in scholarship allocations.

**Objective 5: Advice to MLA on an innovative selection process**

Brief comment on this issue was also made earlier under 1.11.

The analyses of the operation of the scheme over the past 25 years clearly indicate that the current selection processes based on awards on both merit and targeted (specific courses) approaches have served the organisation well, as judged by the high retention rates within the industry and the levels of contributions made.

However, some refinements to this process could be made and the following suggestions are put forward for consideration:

(i) Prior to advertisements being placed for postgraduate applications, current research project leaders should be canvassed as to capacity to include a postgraduate in their programs, and asked to supply a brief outline of possible postgraduate work. This information should be made available to those expressing interest in the awards.

(ii) Advertisements should specify the broad areas in which at the time MLA wishes to support award programs.

(iii) Once applications have been received a decision should be made on the proportional allocation for stand-alone and project linked or targeted awards for the year.

(iv) Once references and letters of support together with applications are reviewed by a panel of MLA staff plus one external (preferably university) member, short listed applicants should be briefly interviewed as to suitability. This could be done at their home locality during visits by MLA Program Managers to that area.

(v) Final selection should be based on the number of stand-alone/linked awards, on merit of the applicant and, if appropriate, suitability of the research project for postgraduate study.

**Recommendation**

That those seeking information on postgraduate awards be provided with details of projects appropriate for postgraduate study, that the selection panel should include an external, university-based member, and that for shortlisted candidates, the final selection should include, wherever possible, a brief interview conducted by program managers.

**Objective 6: At what level should scholarships be funded**

Discussions with eight other RIRDCs indicated scholarship stipends in the range $22,500 – $25,000 per annum with an operating grant ranging from $3,000 – 5,000. The current MLA stipend of $23,000 is at the lower end of the range, whilst the operating grant of $5,000 is at the top end. In relation to the operating grant, project work involving animals is always more expensive than for plant agricultural work and this level appears appropriate. However, there could be situations where some postgraduate project costs may exceed the allowance and some discretionary flexibility should be incorporated in the policy to enable requests for additional funds to be considered.

GRDC and LWA indicated their stated intention of attempting to attract the best possible students into their postgraduate programs and their stipend levels are at the top end of the range. MLA will undoubtedly have a similar objective for its postgraduate program. Given the inducements to many high quality graduates for immediate workplace employment, MLA needs to give consideration to some small increase in postgraduate stipends, if it is to continue to attract high quality students.

**Recommendation**

That MLA consider increasing its current postgraduate stipend levels to at least $25,000 with an operating grant of $5,000; that the Program manager responsible for the postgraduate program be given discretionary powers to consider applications for increases in operating grants to a maximum of $8,000pa, reviewed annually, and a budgetary contingency established for this purpose; that a biennial review of stipends and allowances should also be undertaken.

Comments have been made earlier (Objective 2.) regarding levels at which other scholarships, if supported could be funded.

**Objective 7: Consultations with other Rural Industry Research and Development Corporations**

Telephone discussions and one interview were held with relevant staff in the Grains, Cotton, Dairy, Rural Industries, and Sugar R & D corporations, and with staff in Australian Pork, Horticulture Australia and Land and Water Australia regarding operations of their scholarship schemes. A summary of these discussions follows:

- Subject areas for postgraduate scholars are frequently aligned with strategic directions of Corporation.

- Many, but not all, only support PhD training, though one Corporation also supports Honours students.
- Selection processes vary but generally merit based, others combinations of merit linked with strategic/industry importance of proposed area of study, others combination of merit and linkage of student with appropriate supervisor/ongoing research project. Calibre of applicant, not of project, is usually of prime consideration.
- In one case, selection process also involved personal interview.
- Many only support stand-alone scholarships and only in some cases are funds used as top-up for other awards. Where this is done it is from research project funds, rather than from the scholarship scheme.
- Majority do not tie scholarships to a particular funded research project but in practice this often develops as the operating situation.
- Stipend levels were in the range $22,500 — 25,000, with operating fund support ranging from $3,000 — 5,000 per annum.
- In all cases, extensions when sought were carefully considered and, if appropriate, approved. Only small numbers sought extensions.
- Little information was available on retention rates of award holders in the relevant industries awards were directed towards.
- Available information from some indicated high levels (90% +) of completion rates amongst awardees.
- Concerns were expressed by a number of corporations at potential future shortages of trained postgraduate personnel in some specific areas of their industries, eg plant breeders in sugar industry, and some commented specifically on their long term commitments to building a “knowledge based” industry.
- All corporations indicated they would be continuing postgraduate scholarship schemes as these were viewed as a long term investment to ensure the intellectual capital of their industries.

Many of these points have been incorporated in the material presented under previous Objectives. However, it is noteworthy that an underlying philosophy across all the RIRDCs contacted was that training investments represent an essential investment for the future of their particular industries. It must also be recognised that the “supply chain” for top quality research and extension staff begins early in schooling when images of agriculture and the food chain are first faced. Increasing student interest and take up of science and agricultural science in general is a key challenge that the meat industry shares with the rest of agriculture.

Given these views, it is important also to emphasise an ongoing need for provision of training support in other support areas, including marketing, economics and food safety, all areas of importance to MLA's activities.

**Objective 8: Should scholarships be limited to PhD/Masters**

Some of these matters were discussed briefly in Objective 2. of this report. Over the period 1975 — 2000, a large majority of awards were for PhD and Masters studies, and as indicated a large number of these personnel have been retained in the red meat industry.

However, there have been equal benefits obtained through targeted training programs particularly for extension and technical staff, leading to Graduate Certificate and Graduate Diploma awards.

As mentioned earlier, MLA needs to give consideration to a review of the intellectual capital requirements of the red meat industry to, say, 2020, as part of long term strategic planning. Such a review would assist in determining future strategies for support of postgraduate education. However, given new developments within all components of the industry, there will be a need for support for some upgrading programs at Grad Diploma equivalent levels for technical support personnel as against research personnel.

MLA may also wish to give consideration to broadening the operations of its educational portfolio to include support for summer scholarships, honours programs (see earlier comments) and relevant on the job training for both on-farm and off-farm personnel to upgrade their skills base.

**Recommendation**

That a majority (≈ 70%) of funds should be directed towards support of PhD and Masters students in areas relevant to the likely future needs of the red meat industry; that consideration be given to establishing a summer scholarship scheme; that from 4—6 Honours scholarships be established to support Honours programs in areas relevant to the industry; and that, where training at these levels is the most appropriate, Graduate Certificate, Graduate Diploma studies be supported in those areas relevant to the strategic directions of MLA.

**Objective 9: Consultations in relation to Animal Health Australia (AHA) specific veterinary scholarships**

When contacted, Dr D. Skerman of MLA could not assist with this matter and suggested contact with Dr Geoff Neumann, CEO of AHA. Dr Neumann was unaware of any discussions on specific MLA support for veterinary scholarships. He pointed out, however, that there had been discussions involving the Australian Veterinary Association, NSW Farmers Association, Cattle Council of Australia and the Minister for Education, Dr Kemp, on these matters. He also indicated that the concept of increased support for veterinary education was on the election agenda of both political parties.

As this issue will be in the pipeline for some time, and as there does not appear to be any current MLA involvement, the Objective could not be developed further.

**Objective 10: A brief analysis of a considered view on the value of Australian compared to overseas postgraduate training**

In the period under review almost 80% of scholarship holders were enrolled in Australian universities in a majority of the disciplinary areas identified. Those that studied in overseas universities were in fewer disciplinary areas, the most numerous being enrolled in programs in US universities in Rangeland Management and in Feedlot Medicine. In the majority of other cases of overseas studies, it appeared from the records that prior supervisor contacts or a very specific area of expertise were the deciding factors in decisions to study outside Australia.

The recent establishment of Rangelands Australia will facilitate training within this disciplinary area in a number of Australian universities. However, Feedlot Medicine is an area not well represented in Australian universities and there could be ongoing needs for training offshore in this area.

The reality is that in a majority of areas of interest to the red meat industry, there are existing research and training strengths in one or more Australian universities. Whilst overseas training provides some advantages in terms of exposure to differing views and people and experience of related industries in other countries, it is difficult to identify specific instances where overseas training has conferred significant advantages to individuals. Modern communications technologies, including disciplinary networking, opportunities for postdoctoral work and for conference attendance, have in the view of the consultant, overcome many of the earlier difficulties of intellectual isolation that were a problem 20-30 years ago.

It is also the view of the consultant, having worked in universities in Australia, the UK, USA and a range of developing countries that the standards of Australian postgraduate training are of a high level and frequently more rigorous than in many overseas institutions. In addition, much of this Australian training, linked as it frequently is to industry problems, is often more relevant for the future needs of the individual and the industries he/she may work in.

A considered view is that overseas postgraduate training does not confer any special advantage to students in most disciplinary areas. Whilst each case should be treated on its merits, overseas support should only be considered in those disciplinary areas which are better represented, or of higher standing, in offshore institutions rather than in Australian universities.

# 5. GENERAL OVERVIEW

Significant benefits have accrued to the red meat industry as a result of its investment in postgraduate training over the past 25 years. A high proportion of former awardees remain in the industry, a majority of whom are making significant contributions to industry success and profitability.

Maintenance and indeed a strengthening of the profitability and international competitiveness of the red meat industry within a framework of an ecologically sustainable resource base will be key challenges for the future, as will be environmental issues related to both on-farm and off-farm production. Food production is increasingly science and technology based, however, other disciplines including biotechnology, environmental science, business

management, law and marketing must be added to the traditional "agricultural science" areas if MLA is to assist in the production and nurturing of a range of skills in its industry workforce, to develop an intellectual capital bank for the future. This will require some additional investment which, whilst assisted by Commonwealth funding will have to come from industry sources, given the current political climate.

The Australian Grains industry with a net worth in the vicinity of $7billion currently invests in support for almost 90 PhD students plus a wide-ranging portfolio of other training investments. Currently the red meat industry through MLA and related entities, supports some 10 — 15 PhD students, together with a range of other training packages for an industry not dissimilar in size and net worth to the Grains industry. Should investment continue at the current level, and given the age profile of research and extension staff, there is considerable danger of losing a large amount of the intellectual capital of the industry, unless schemes are put in place to replace this loss.

MLA and its predecessor organisations can be proud of the achievements and success of the postgraduate training scheme. Its ongoing success will, however, depend on increasing the level of investment, diversifying training support into some "non agricultural" areas but also continuing and increasing support in the traditional "agricultural science" areas.

Determining how best these investments can be made will be a challenge for MLA, its entities and all those involved in Australian education at all levels.

# 6. ACKNOWLEDGMENTS

This review would have been much more difficult if it were not for the assistance of a large number of people. Within MLA, Dr Hutton Oddy and Dr David Skerman, Project Managers, provided much advice and knowledge of the progress of former award holders. Particular thanks are due to Mr John Elias, MLA Librarian for abstracting information, assisting with record searches and retrieving material from archives in order to develop the database.

Thanks are due also to a very large number of colleagues and friends from across Australia who assisted in tracking down missing information on many former award holders, to enable compilation with a high degree of completeness and accuracy, the student database over a 25 year period.

Many colleagues provided valuable comments and suggestions from a university perspective on the MLA postgraduate program. Thanks are also due to the staff of eight other Rural Industry Research and Development Corporations for providing information and valuable comment on the operations of their scholarship programs.

Staff from the Department of Education, Training and Youth Affairs (DETYA), Canberra, and Professor Brian Stoddart, PVC (Research & International), University of New England, were very helpful in providing advice on current DETYA policies and processes in relation to postgraduate training and comments on opportunities for collaboration in the general field of postgraduate education.

Finally, special thanks are due to Shelley Harvey for her assistance in the preparation of this report.

# APPENDIX 1.
## Students Supported Under Post Graduate Training Program, 1975-2000

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abbot | Kym | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 2 |
| Andrews | Todd | M | Jan 1992 | Feb 1995 | MRC | UNE | PhD | Whalley, W. Prof | PASTAGRON | 4 | 3 | R | 1 |
| Atkinson | Lewis | M | Jan 1991 | Jul 1994 | MRC | UQ | PhD | Johns M | BIOTECH | 2 | 2 | R | 1 |
| Ball | Alexander | M | Jan 1993 | Jul 1996 | MRC | UNE | PhD | Thompson, J. Prof | MEAT SCI | 4 | 4 | R | 1 |
| Barlow | Roger | M | May 1979 | Mar 1982 | AMRC | TrinCol | PhD | Cunningham, E. Prof | GENETICS | 5 | 4 | R | 1 |
| Barwick | Stephen | M | Jun 1985 | Mar 1989 | MRC | Ohio State | PhD | Harvey, W. | GENETICS | 5 | 1 | R | 1 |
| Batson | Marie-Grac | F | Mar 1993 | May 1996 | MRC | U Melb | PhD | Attiwill, P. | RANGELAND M | 3 | 2 | R | 1 |
| Baxter | Nadia | F | Mar 1994 | Sep 1997 | MRC | Vic U | PhD | | | | | | |
| Beard | Michael | M | Jan 1988 | Jun 1991 | MRC | U SYD | PhD | Egerton, J. Prof | PATHOL | | 2 | R | |
| Beckett | Sam | M | Jan 1996 | Dec 1998 | MRC | Massey U | PhD | Morris, R. Prof | EPIDEM | 3 | 3 | R | 1 |
| Bello | Paul | M | Jan 1987 | Jun 1990 | MRC | U Melb | PhD | Brandon, M. Prof | GENETICS | 2 | 3 | R | 4 |
| Bendixsen | Tuan | M | Mar 1996 | Feb 1999 | MRC | U SYD | PhD | Emery, D. | PARASIT | 2 | 1 | T | 2 |
| Bicknell | David | M | Jan 1980 | Dec 1980 | AMRC | Hawk Ag | Grad Dip Ext | McAdam, L. | EXTENSION | 3 | 2 | T | 2 |
| Billman-Jac | Helen | F | Mar 1991 | Jul 1994 | MRC | U Melb | PhD | Madford, T. | MICRO | 2 | 2 | R | |
| Billson | Mark | M | Jan 1992 | Jul 1995 | MRC | U SYD | PhD | Hodgson, J. | MICRO | 3 | 2 | R | 1 |
| Bootle | Ben | M | Feb 1994 | Feb 1997 | MRC | U SYD | PhD | McCauley, G. Prof | ECONOMICS | 2 | 3 | T | 1 |
| Bradfield | Micheal | M | Feb 1996 | Jan 1999 | MRC | UNE | PhD | Graser, H. | GENETICS | 3 | 4 | R | 1 |
| Burns | Brian | M | Aug 1991 | May 1995 | MRC | Texas | PhD | Taylor, L. Prof | GENETICS | 4 | 4 | R | 1 |
| Butler | Leslie | M | Sep 1976 | Sep 1979 | AMRC | Mich State | PhD | Monderscheid, L. Prof | ECONOMICS | 4 | 1 | R | 2 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cameron | Angus | M | Jan 1995 | Dec 1997 | MRC | UQ | PhD | Sharma,T | EPIDEM | 5 | 3 | R | 1 |
| Campbell | Douglas | M | Feb 1977 | Feb 1978 | AMRC | UNE | Dip Sc Ag | McWilliam, J. Prof | PASTAGRON | 5 | 3 | R | 1 |
| Carr | Anthony | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 2 | 4 | T | 1 |
| Catt | Sally | F | Apr 1994 | Jul 1997 | MRC | U SYD | PhD | Evans, G. Prof | REPROD | 3 | 3 | R | 3 |
| Cavalieri | John | M | Jan1995 | Jan 1997 | MRC | JCU | PhD | Fitzpatrick, L. | REPROD | 4 | 3 | R | 1 |
| Cohen | Roger | M | Jan 1976 | Jan 1977 | AMRC | UNE | PhD | Langlands, J. | NUTRIT | 3 | 4 | R | 1 |
| Corbett | Lawrence | M | Sep 1975 | Oct 1979 | AMRC | U Aberd | PhD | Kruuk, H. | BEHAV | 5 | 2 | R | 1 |
| Cornell | Larry | M | Jan 1981 | Nov 1983 | AMRC | Mich State | PhD | Johnson, G. Prof | ECONOMICS | 4 | 3 | R | 2 |
| Cummins | Leo | M | Jun 1978 | Jun 1981 | AMRC | UNE | PhD | O'Shea, T. | REPROD | 4 | 2 | R | 1 |
| Cusack | Paul | M | Feb 1997 | Jan 2000 | MRC | U SYD | PhD | Lean, I. | EPIDEM | 3 | 2 | R | 1 |
| Cutler | Stephen | M | Jan 1987 | Jan 1988 | AMRC | U SYD | PhD | Evans, G. | REPROD | 1 | 2 | R | 3 |
| Dann | Elizabeth | F | Feb 1992 | Jun 1995 | MRC | U SYD | PhD | Deverall, B. Prof | PLANT PATH | 2 | 2 | R | 2 |
| Davey | Lucy | F | Aug 1997 | Feb 1998 | MRC | U NSW | PhD | Tuan Pham, Q. | MEAT SCI | 3 | 2 | R | 1 |
| Denman | Stuart | M | Jan 1994 | Apr 1997 | MRC | Griffith | PhD | Gang-Pie Xue. | NUTRIT | 2 | 2 | R | 2 |
| Donnelly | John | M | Jan 1979 | Nov 1980 | AMRC | U Melb | PhD | Morley, F. Prof | NUTRIT | 3 | 4 | R | 1 |
| Donoghue | Katherine | F | Nov 1999 | Oct 2002 | MLA | U Georgia | PhD | Bertrand, J. Prof | GENETICS | 2 | 3 | R | 1 |
| Doran | Timothy | M | Mar 1991 | May 1993 | MRC | Monash | PhD | Hodgson, A. | NUTRIT | 2 | 3 | R | 1 |
| Douglas | Janelle | F | Jan 1994 | Jan 1995 | MRC | UNE | PhD | Faulkner, R | WASTE M | 2 | 2 | R | 1 |
| Dundon | Peter | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 5 | 4 | T | 1 |
| Earl | Judy | F | Jan 1994 | Sep 1997 | MRC | UNE | PhD | Whalley, W. | RANGELAND M | 2 | 3 | R | 1 |
| Earl | Colin | M | Mar 1984 | Mar 1985 | AMRC | U Adel | PhD | Setchell, B. Prof | REPROD | 2 | 3 | R | 1 |
| Farrell | Terrence | M | Jul 1996 | Aug 1998 | MRC | U Saskat | Masters | GRAY, R. | ECONOMICS | 3 | 2 | R | 1 |
| Faruqi | Mehreen | F | Jan 1996 | Jul 1998 | MRC | U NSW | PhD | Ashbolt, N. | MEAT SCI | 3 | 2 | R | 1 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fenton | Michelle | F | Jan 1999 | Dec 2001 | MLA | U Adel | PhD | Pitchford, W. | NUTRIT | 2 | 3 | R | 1 |
| Fenwick | John | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 1 |
| Fitzpatrick | Lee | M | Nov 1986 | July 1990 | MRC | JCU | PhD | Entwistle, K. Prof | REPROD | 4 | 3 | R | 1 |
| Freeman | Melinda | F | Jan 1997 | Dec 1997 | MRC | JCU | PhD | Hirst R Prof | MICRO | 3 | 2 | R | 3 |
| Galea | Charles | M | Feb 1994 | Sep 1997 | MRC | UQ | PhD | Blakely R | MEAT SCI | 3 | 2 | R | 3 |
| Gardener | Mark | M | Aug 1994 | Feb 1998 | MRC | UNE | PhD | Whalley, W. | PASTAGRON | 3 | 4 | R | 1 |
| Gardiner | David | M | Jul 1990 | Dec 1991 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| Gardner | Graham | M | May 1997 | Mar 2000 | MRC | Murdoch | PhD | Pethick, D. | MEAT SCI | 4 | 3 | R | 1 |
| George | Matthew | M | Jan 1993 | Jul 1997 | MRC | Colo State | PhD | Smith, G. | MEAT SCI | 4 | 4 | R | 1 |
| Gifford | Dennis | M | Feb 1981 | Feb 1984 | AMRC | UNE | PhD | Barker, S. Prof | GENETICS | 3 | 4 | R | 1 |
| Giles | William | M | Jan 1980 | Dec 1980 | AMRC | Rose Ag | Grad Dip Ext | Craig, L. | EXTENSION | 5 | 2 | T | 1 |
| Godden | David | M | Jan 1982 | Jan 1985 | AMRC | U London | PhD | Plott, P. | ECONOMICS | 4 | 2 | R | 1 |
| Greenwood | Paul | M | May 1993 | Nov 1996 | MRC | Cornell U | PhD | Bell, A. | PHYSIOL | 4 | 4 | R | 1 |
| Guerrini | Vincent | M | Jan 1983 | Dec 1984 | AMRC | UQ | PhD | English, P. Prof | PHYSIOL | 1 | 1 | R | 4 |
| Halls | Micheal | M | Jan 1976 | Dec 1976 | AMRC | U Melb | DipAgExt | Hawkins, S. | EXTENSION | 4 | 3 | T | 1 |
| Hastings | Kathleen | F | Mar 1994 | Feb 1996 | MRC | UQ | M Bus | Dunne,T | ECONOMICS | 2 | 2 | R | 1 |
| Hay | Theresa | F | Jun 1996 | Jun 1999 | MRC | UQ | PhD | Barkly, S. | MEAT SCI | 1 | 2 | R | 1 |
| Hennessey | David | M | Jan 1979 | Mar 1982 | AMRC | U Melb | PhD | Wilson-Coglan, M. | PHYSIOL | 1 | 1 | R | 4 |
| Hetheringto | Shane | M | Feb 1992 | Aug 1995 | MRC | UQ | PhD | Irwin, J. Prof | PLANT PATH | 4 | 2 | R | 1 |
| Holland | Brad | M | Feb 1978 | Aug 1979 | AMRC | UNE | MScAg | Hammond, K. | GENETICS | 3 | 4 | R | 1 |
| Holm | Alexander | M | Mar 1997 | Mar 2000 | MRC | UWA | PhD | Adams, M. | RANGELAND M | 3 | 2 | T | 1 |
| Hopkins | Ian | M | Mar 1975 | Apr 1978 | AMRC | U NSW | PhD | James, J. Prof | GENETICS | 3 | 3 | R | 3 |
| Hopkins | David | M | Dec 1997 | Dec 2000 | MRC | UNE | PhD | Thompson, J. Prof | MEAT SCI | 4 | 4 | R | 1 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inglis | Sam | M | Jan 1979 | Jan 1980 | AMRC | Hawk Ag | Grad Dip Ext | Ryan, D. | EXTENSION | 5 | 2 | T | 1 |
| Irwin | John | M | Aug 1977 | Mar 1980 | AMRC | U Wisc | PhD | Maxwell, D. | PLANT PATH | 5 | 2 | R | 2 |
| Ives | David | M | Mar 1990 | Mar 1993 | MRC | Texas | PhD | Bansler, R. | NUTRIT | 4 | 2 | R | 1 |
| Jahufer | Zulfi | M | Jul 1994 | Aug 1997 | MRC | UQ | PhD | Cooper, M. | PASTAGRON | 3 | 2 | R | 1 |
| Jarvis | Sue | F | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 2 |
| Javro | Cheryl | F | Feb 1991 | Feb 1994 | MRC | CQU | PhD | Sillence, M. Prof | PHYSIOL | 3 | 2 | R | 1 |
| Johnsson | Ian | M | Apr 1981 | Apr 1984 | AMRC | U Reading | PhD | Hart, I. | PHYSIOL | 5 | 3 | R | 2 |
| Johnston | David | M | Aug 1989 | Aug 1992 | MRC | U Georgia | PhD | Bertrand, J Prof. | GENETICS | 5 | 2 | R | 1 |
| Johnston | Brian | M | Mar 1976 | May 1979 | AMRC | ANU | PhD | Gruen, F. Prof | ECONOMICS | 4 | 3 | R | 1 |
| Jordan | David | M | May 1995 | Aug 1998 | MRC | U Guelph | PhD | McLewen, S. Prof | EPIDEM | 4 | 2 | R | 1 |
| Kaiser | Alan | M | MAr 1976 | May 1979 | AMRC | U Reading | PhD | Bourne, J. Prof | NUTRIT | 4 | 1 | R | 1 |
| Kallincos | Nicholas | M | Feb 1989 | Aug 1992 | MRC | U Adel | PhD | Wallace, J. | PHYSIOL |  | 1 | R |  |
| Kelly | Fiona | F | Feb 1997 | Feb 1999 | MRC | RMIT | M App Sci | Sinclair, A. Prof | HUMAN NUTR | 2 | 3 | R | 1 |
| Kelly | Amelia | F | Jan 1997 | Nov 1998 | MRC | Monash | Masters |  |  |  |  |  |  |
| Kemp | David | M | Mar 1975 | Aug 1978 | AMRC | UWA | PhD | Blacklow, M. | PASTAGRON | 5 | 3 | R | 1 |
| Kennedy | Garry | M | Jan 1976 | Dec 1976 | AMRC | U Melb | DipAgExt | Hawkins, S. | EXTENSION | 4 | 3 | T | 2 |
| Kenney | Philip | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| Kerr | Richard | M | Jan 1989 | Jan 1992 | MRC | UNE | PhD | Kinghorn, B. Prof | GENETICS | 4 | 4 | R | 1 |
| Kilgour | Robert | M | Sep 1982 | May 1986 | AMRC | U Paris | PhD | Courot, M. | REPROD | 4 | 3 | R | 1 |
| Kirkland | Peter | M | Jul 1981 | Dec 1984 | AMRC | U Newc | PhD | Barry, R. Prof | VIROL | 5 | 2 | R | 1 |
| Knight | John | M | Feb 1979 | Feb 1980 | AMRC | UQ | M AG Stud | Crouch, B. | EXTENSION | 4 | 1 | T | 1 |
| Kubicki | Anthony | M | Jan 1979 | Jan 1980 | AMRC | Hawk Ag | Grad Dip Ext | Ryan, D. | EXTENSION | 5 | 2 | T | 1 |
| Kyme | Hilary | F | Jan 1989 | Sep 1993 | MRC | Murdoch | PhD | Carnegie P | MEAT SCI | 3 | 2 | R | 1 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lapworth | John | M | Jan 1980 | Dec 1980 | AMRC | Hawk Ag | Grad Dip Ext | McAdam, L. | EXTENSION | 5 | 2 | T | 1 |
| Lee | Rogan | M | Jul 1988 | Jul 1991 | MRC | UQ | PhD | Opdebeeck, J. | PARASIT | 3 | 1 | R | 1 |
| Lollback | Michael | M | Jul 1990 | Dec 1991 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| Loneragan | Guy | M | Jul 1996 | Dec 1998 | MRC | Colo State | MSc | Garry, F. Prof | NUTRIT | 2 | 2 | R | 1 |
| Loneragan | Guy | M | Jan 1999 | Jan 2001 | MLA | Colo State | PhD | Gould, D. | EPIDEM | 3 | 2 | T | 1 |
| Lord | Andrew | M | Mar 1992 | Mar 1995 | MRC | U Adel | PhD | Read, L. | PHYSIOL | 2 | 2 | R | 3 |
| Love | Kevin | M | Mar 1982 | Mar 1983 | AMRC | U Melb | M AG Stud | Hawkins, S | EXTENSION | 4 | 3 | T | 4 |
| Mackie | John | M | Mar 1983 | Jan 1985 | AMRC | ANU | PhD | Morris, B. Prof | PATHOL | 3 | 4 | R | 1 |
| Mansour | Maged | M | Jul 1991 | Dec 1994 | MRC | Deakin | PhD | Sinclair, A. Prof | HUMAN NUTR | 1 | 3 | R | 3 |
| Marlor | Stephen | M | Feb 1987 | Mar 1989 | MRC | UNE | M EC | McCauley, G. | ECONOMICS | 1 | 3 | R | 3 |
| Marshall | Jeffrey | M | Jan 1990 | Jan 1993 | MRC | U Nebras | PhD | Kelling, C. | VIROL | 4 | 2 | R | 1 |
| Martin | Graeme | M | Mar 1982 | Apr 1984 | AMRC | U Paris | PhD | Signorett, J. | REPROD | 5 | 3 | R | 1 |
| Matthews | John | M | Mar 1989 | Mar 1993 | MRC | U Adel | | | | | | | |
| Mawson | Michelle | F | Jan 1995 | Dec 1998 | MRC | Deakin | PhD | Kenway, J. | RANGELAND M | 3 | 2 | R | 2 |
| May | Jim | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| McFarland | John | M | Fev 1983 | Dec 1983 | AMRC | Rose Ag | Grad Dip Ag | Gallagher J | EXTENSION | | 3 | T | |
| McLellan | Lisa | F | Jan 1996 | Apr 1999 | MRC | CQU | PhD | D'Occhio, M. | REPROD | 3 | 4 | R | 1 |
| McLennan | Stuart | M | Aug 1987 | May 1991 | MRC | UNE | PhD | Leng, R. Prof | NUTRIT | 5 | 4 | R | 1 |
| McLoon | Martin | M | Feb 1999 | Dec 2001 | MLA | U SYD | PhD | Love, D. | MICRO | 3 | 3 | T | 1 |
| McSweeney | Chris | M | Jan 1979 | Mar 1981 | AMRC | UQ | PhD | Pass, M. Prof | PATHOL | 4 | 2 | R | 1 |
| Meischke | Roger | M | Jan 1976 | Nov 1978 | AMRC | U Glasgow | PhD | Jarret, W. Prof | PATHOL | 4 | 2 | R | 1 |
| Michalk | David | M | Sep 1977 | Sep 1980 | AMRC | Utah State | PhD | Norton, B. Prof | RANGELAND M | 5 | 3 | R | 1 |
| Midgley | Jocelyn | F | Feb 1997 | Feb 2000 | MRC | UQ | PhD | Desmarchelier, P. | MICRO | 2 | 2 | R | 1 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mitchell | Aaron | M | Jun 1995 | Jun 1998 | MRC | U Adel | PhD | McKay, A. | PLANT | 1 | 2 | R | 2 |
| Morcombe | Peter | M | Jan 1982 | Jan 1983 | AMRC | U Melb | Mast Vet Stud | Morley, F. | EPIDEM | | | T | |
| Morrison | Mark | M | Sep 1989 | Sep 1991 | MRC | U Illinois | PhD | Mackie, R. | NUTRIT | 5 | 4 | R | 1 |
| Munro | Robert | M | Jan 1979 | Mar 1981 | AMRC | U SYD | PhD | Moore, N. Prof | REPROD | 4 | 3 | R | 1 |
| Oddy | Hutton | M | Oct 1983 | Dec 1986 | AMRC | U Camb | PhD | Lindsay, D. Prof | PHYSIOL | 5 | 3 | R | 1 |
| O'Donnell | Chris | M | Feb 1985 | Mar 1988 | AMRC | U SYD | PhD | Woodlands, A. Prof | ECONOMICS | 5 | 2 | R | 1 |
| O'Halloran | William | M | Jul 1990 | Dec 1991 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| Oldham | Chris | M | Sep 1975 | Jul 1980 | AMRC | UWA | PhD | Lindsay, D. Prof | REPROD | 2 | 4 | R | 2 |
| O'Neill | Chris | M | Feb 1990 | Feb 1992 | MRC | CQU | M App Sci | Coates, M. | PHYSIOL | 3 | 1 | R | 1 |
| Palmer | William | M | Sep 1976 | Sep 1979 | AMRC | Texas | PhD | Bay, D. | ENTOMOL | 4 | 2 | R | 2 |
| Panizza | Bernie | M | Jul 1989 | Jul 1991 | MRC | UWA | MSc | Baker, S. | NUTRIT | 3 | 3 | R | 2 |
| Patterson | John | M | Jan 1983 | Jan 1985 | AMRC | U Melb | PhD | O'Shea, J. | REPROD | 1 | 2 | R | 4 |
| Pavlov | Peter | M | Mar 1981 | | AMRC | Monash | PhD | Nelson, J. | WILDLIFE M | 3 | 1 | R | 4 |
| Pearce | Karen | F | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 1 |
| Phillips | Andrew | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 5 | 4 | T | 1 |
| Phillips | Andrew | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 1 |
| Pitchford | Wayne | M | Jan 1990 | Jun 1992 | MRC | U NSW | PhD | James, J. Prof | GENETICS | 5 | 4 | R | 1 |
| Pocock | Peter | M | Jan 1990 | Dec 1990 | MRC | UQ | Grad Dip Ext | Chamala, S. Prof | EXTENSION | | | T | |
| Ponnampala | Eric | M | Feb 1996 | Jan 1999 | MRC | U Melb | PhD | Leury, B. | MEAT SCI | 2 | 3 | R | 1 |
| Poulton | Anthony | M | Mar 1981 | Mar 1984 | AMRC | U SYD | PhD | Robinson, T. Prof | REPROD | 2 | 4 | R | 4 |
| Puri | Nirdosh | M | Jan 1984 | Apr 1987 | AMRC | U Melb | PhD | Brandon, M. Prof | IMMUN | 1 | 4 | R | 4 |
| Quirk | Michael | M | Aug 1992 | Aug 1995 | MRC | Texas | PhD | Stuth, J. Prof | RANGELAND M | 5 | 2 | R | 1 |
| Ralph | Meredith | F | Mar 1981 | Nov 1984 | AMRC | U Adel | PhD | Seamark, R. Prof | REPROD | 1 | 3 | R | 4 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reddacliff | Leslie | F | Feb 1999 | Dec 2001 | MLA | U SYD | PhD | Love, D. | MICRO | 4 | 2 | T | 1 |
| Ridland | Peter | M | Jan 1982 | Jan 1985 | AMRC | Latrobe | PhD | New, T. | ENTOMOL | 3 | 1 | R | 2 |
| Riley | Micheal | M | Jan 1984 | Jan 1985 | AMRC | Rose Ag | Grad Dip Ag | Graig, R. | PARASIT | 4 | 1 | T | 1 |
| Roberts | Greg | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 4 | 4 | T | 1 |
| Rothwell | James | M | Feb 1990 | Feb 1993 | MRC | U SYD | PhD | Sangster, N. | PARASIT | 4 | 3 | R | 1 |
| Ryan | William | M | Mar 1984 | Dec 1987 | AMRC | UWA | PhD | Moir, R. Prof | NUTRIT | 5 | 5 | T | 1 |
| Saha | Sukanta | M | Jan 1996 | Dec 1998 | MRC | UQ | PhD | Mamcs, G. | HUMAN NUTR | 3 | 2 | R | 3 |
| Salmon | Elizabeth | F | Feb 1990 | Feb 1992 | MRC | U Melb | M Vet Clin | Morley, F. | GENETICS | 3 | 3 | R | 2 |
| Saunders | Glen | M | Feb 1989 | Mar 1992 | MRC | U Bristol | PhD | Harris, S. Prof | WILDLIFE M | 5 | 2 | R | 1 |
| Scanlan | Joe | M | Aug 1985 | Aug 1988 | AMRC | Texas | PhD | Aroes, A. Prof | RANGELAND M | 5 | 2 | R | 1 |
| Sheridan | Alison | F | Feb 1990 | Feb 1992 | MRC | UNE | PhD | Anderson, J. Prof | ECONOMICS | 2 | 3 | R | 2 |
| Shinner | Patricia | F | Jul 1997 | Jun 2000 | MRC | QUT | PhD | Preston, A. | MANAGEM. | | | R | |
| Singh | Albert | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 1 |
| Slade | John | M | Mar 1997 | May 1997 | MRC | U SYD | MSc | Cox, R. | MEAT SCI | 3 | 2 | R | 1 |
| Smith | Dominic | M | Jan 1997 | Dec 1999 | MRC | UQ | PhD | Brown, C. | ECONOMICS | 2 | 2 | R | 3 |
| Speck | Peter | M | Jan 1988 | Jun 1990 | MRC | UNE | PhD | Hinch, G. Prof | REPROD | 4 | 3 | R | 1 |
| Stephens | Stewart | M | Feb 1989 | Feb 1992 | MRC | UNE | PhD | Thompson, J. Prof | MEAT SCI | 4 | 4 | R | 3 |
| Strachan | Rodney | M | Jan 1976 | Dec 1976 | AMRC | Hawk Ag | Grad Dip Ext | Ryan, D. | EXTENSION | 5 | 1 | T | 1 |
| Summers | Phillip | M | Feb 1978 | Mar 1982 | AMRC | ANU | PhD | Morris Bede Prof | REPROD | 3 | 4 | R | 1 |
| Sutherland | Michael | M | Feb 1995 | Jun 1998 | MRC | UWA | PhD | | | | | | |
| Taing | Kheang | M | Jun 1996 | Jun 1999 | MRC | Vic U | MSc | Warner, R. | MEAT SCI | 1 | 3 | T | 4 |
| Thompson | Rodney | M | Apr 1988 | Mar 1991 | MRC | UNE | MScAg | Kinghorn, B. Prof | GENETICS | 5 | 4 | T | 1 |
| Thompson | Robin | M | Jan 1983 | Sep 1984 | AMRC | U Melb | M Ag Sc | Hawkins, S. | EXTENSION | 3 | 3 | T | 1 |

| Last Name | First | Gend | StartDate | FinishDate | Agency | Institution | Program | Supervisor | Disciplinary | Cont | Role | Mechan | Current |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tierney | Terry | M | Jun 1984 | Jun 1998 | AMRC | ANU | PhD | Morris, B. Prof | IMMUN | 2 | 4 | R | 1 |
| Trott | Bart | M | Jul 1992 | Dec 1993 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 3 | 4 | T | 1 |
| Truscott | Terry | M | Mar 1977 | Mar 1980 | AMRC | U Bristol | PhD | Lister, D. | MEAT SCI | 5 | 3 | R | 1 |
| Uhe | Anthony | M | Feb 1990 | Feb 1991 | MRC | Deakin | MSc | O'Dea, K. Prof | MEAT SCI | 2 | 2 | R | 4 |
| Waugh | Ejar | M | Mar 1985 | Mar 1989 | MRC | Murdoch | PhD | Wales, R. Prof | REPROD | 1 | 2 | R | 4 |
| White | Margarete | F | Jan 1995 | Jul 1998 | MRC | Griffith | PhD | Brown, D. Prof | MEAT SCI | 2 | 2 | R | 1 |
| Whittle | Richard | M | Apr 1988 | Mar 1991 | AMRC | UNE | GRADCERT | Kinghorn, B. Prof | GENETICS | 2 | 4 | T | 1 |
| Wicksteed | Les | M | Apr 1989 | Mar 1991 | MRC | U Wagen | MSc | Poulder, J. | EXTENSION | 4 | 2 | R | 1 |
| Wilkins | John | M | Oct 1985 | Jun 1989 | MRC | UWA | PhD | Lindsay, D. Prof | REPROD | 5 | 4 | R | 1 |
| Wilson | Trevor | M | Sep 1977 | Feb 1979 | AMRC | U Guelph | Masters | Caldwell, H. | EXTENSION | 4 | 2 | R | 2 |

| COLUMN | CODE KEY | | |
|---|---|---|---|
| Column 1 | Last Name | = | Surname |
| 2 | First | = | First Name |
| 3 | Gend | = | Gender |
| 4 | Start Date | = | Start Date of Scholarship |
| 5 | Finish Date | = | Finish date of scholarship |
| 6 | Agency | = | Funding Agency (Successively AMRC, MRC, MLA) |
| 7 | Institution | = | University where study undertaken |
| 8 | Program | = | Type of study (eg PhD, Master) |
| 9 | Supervisor | = | Name of principal supervisor |
| 10 | Disciplinary | = | Disciplinary area (details page 6/7 of report) |
| 11 | Cont | = | Subjective assessment of contribution of scholarship holder to red meat industry on a scale of 1-5 (5 Highest) |
| 12 | Role | = | Subjective assessment of how involvement in supervision of students under program may have influenced the supervisors contribution to the red meat industry |
| 13 | Mechan | = | Mechanism of allocation of scholarships (R=Random or merit based; T=Targeted to specific program/ disciplinary area) |
| 14 | Current | = | Current involvement/employment (1= Red Meat Industry; 2=Other Agriculture; 3=Other Non Agriculture; 4=Unknown) |

FIGURE 1.
Number and Institution of Study of Postgraduate Students in Australian and Overseas Universities, 1975-2000

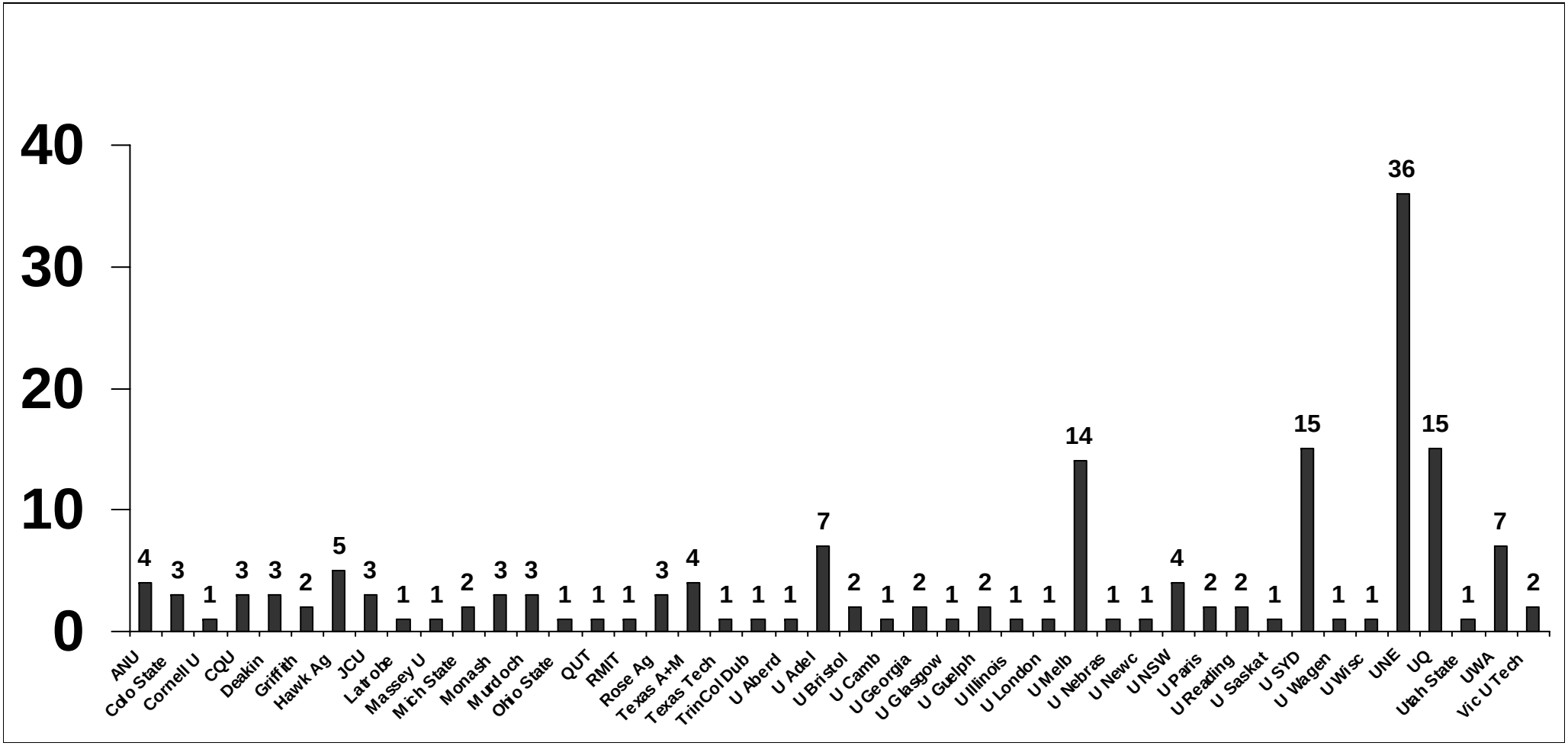

FIGURE 2
Distribution of Awards By Disciplinary Area, 1975-2000.

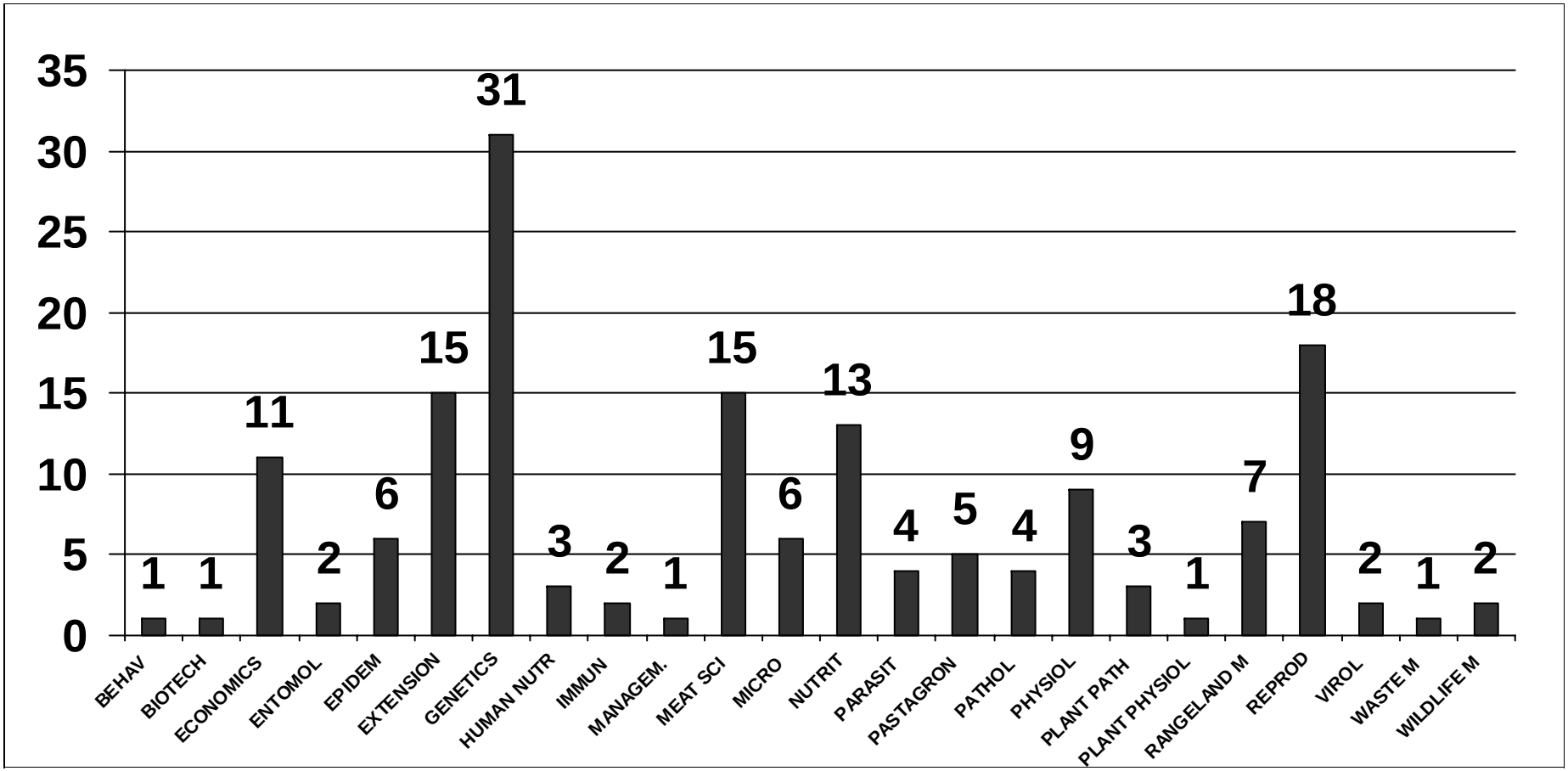

FIGURE 3

Distribution of Ranking of Contributions to Red Meat Industry (5=Highest).