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Postgraduate education in animal breeding management

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Abstract

An articulated postgraduate coursework degree program was developed to train professionals in the animal industries to develop knowledge and skills in animal breeding genetics, relevant reproductive techniques and principles, and biotechnologies. This program was developed by the Faculty of Veterinary Science, University of Sydney, in conjunction with the University of New England. The first student enrolments were in 2007. The program has had six candidates that have graduated with the Master in Animal Science (Animal Breeding Management), three graduates with a Graduate Diploma in Animal Science (Animal Breeding Management) and six graduates with a Graduate Certificate. Enrolments have steadily decreased from 2007 to 2011, to unsustainable numbers to conduct the program; accordingly the future of the program is uncertain.

Executive summary

In order to respond to a growing deficit of skilled workers for the animal industries, specifically in the area of genetic improvement programs for domestic animals, a postgraduate coursework Masters degree program was developed to train professionals in the animal industries to develop knowledge and skills in animal breeding genetics, relevant reproductive techniques and principles, biotechnologies, conducting research and leadership to address the direct needs of the animal industries. This program was developed by the Faculty of Veterinary Science, University of Sydney, in conjunction with Professor Julius Van der Werf, Professor of Quantitative Genetics and Animal Breeding, University of New England. Candidates who had experience in the animal industries were able to enrol either full- or part-time and graduate at Graduate Certificate level by completing 24 credit points of prescribed core units of study, or graduate at the Graduate Diploma level by completing 36 credit points of core and electives units, or graduate with a Masters level by completing 48 credit points of core, elective units and a six credit point research project. Meat and Livestock Australia provided scholarships to candidates, awarded on academic merit, to off-set the cost of the program tuition fees. The first student enrolments were in 2007. Since that time the program has graduated six candidates from the Master in Animal Science (Animal Breeding Management), three candidates with a Graduate Diploma in Animal Science (Animal Breeding Management) and six candidates with a Graduate Certificate in Animal Science. There are currently four candidates completing the research units of study who we expect will graduate with a Masters degree in the near future.

There was an initial burst of enrolments in 2007 and 2008 but enrolment numbers have not been sustained. The lack of enrolments (below six per year) has been the major threat to the sustainability of the program. The relevant faculty representatives met to discuss this issue and formulated a discussion paper on the future of this program that was sent by email to our MLA contacts on 21 November 2011 to which we received no further feedback. Unfortunately enrolments have steadily decreased from 2007 to 2011, to numbers that make it unsustainable to conduct the program. Furthermore, changes to the higher education sector require further changes to be made to the structure of the program, perhaps pricing the program beyond the current market demand. Accordingly, the future of the program is uncertain. However the Faculty is planning to collect expressions of interest from potential candidates to consider running the program in 2016.

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1 Background

There is a recognised and growing deficit of skilled workers in the agricultural workforce in Australia (http://www.daff.gov.au/data/assets/pdf_file/0011/1530020/work-train-skills.pdf) which is pervasive and across all parts of the industry. This includes workers with graduate level education. For example, Copeland and Pratley (2008)[1] estimated that while some 2000 graduates are required per year to meet the broad agricultural industry wide demands, only about 800 are being produced. A tipping point could be created by the age structure of the existing agricultural workforce in Australia. It has been estimated that by the year 2020, 30% of the agricultural workforce will be 60 years of age and at or close to retirement and over half the workforce will be over 55.

This deficit extends to the animal industries and specifically to the area of management of breed societies and genetic improvement programs for domestic animals. As well as access to technically qualified research scientists, these organizations need qualified people with a combination of management and technical skills in animal genetics and breeding who can go out and service the direct needs of the animal industries.

Following his retirement as Dean of the Faculty of Veterinary Science in 2003, Professor Reuben Rose worked for a period as General Manager, Livestock Production Innovation, at Meat and Livestock Australia (MLA) until 2006. During that time, he recommended to MLA that they should instigate an articulated coursework Masters program in Animal Breeding Management, modelled on the very successful Master of Veterinary Public Health Management (MVPHMgt) degree being run by the Faculty of Veterinary Science at the University of Sydney, to curtail the impending skills shortage in this area, specifically for the extensive grazing industries. The unique and highly sought after feature of the VPHMgt degree was a joint focus on provision of leadership and management training alongside the provision of relevant technical skills. Another very important aspect of the VPHMgt model was that it was provided by distance education and was therefore more suited to the needs of a dispersed rural workforce.

Following discussions among various potential stakeholders, it was agreed that the Veterinary Faculty would provide access to the same leadership and management modules already in use for the MVPHMgt degree and that the University of Sydney and the University of New England would jointly provide access to technically focused units of study, with the more basic units of study coming from University of Sydney and the more advanced coming from the University of New England. Various negotiations were commenced and eventually an agreement was signed between all parties (USyd, UNE, MLA, AWI) and the Master of Animal Breeding Management program came into existence in 2007.

2 Projective objectives

1. Develop a productive partnership between the University of Sydney and the University of New England for the pedagogically sound delivery of an innovative online distance course in Animal Breeding Management

2. To investigate, enhance and evaluate methods of providing advanced training to professionals working in animal industries

3. Design a reliable framework for delivery of a University of Sydney award course offered in partnership with the University of New England, governed by sound quality management, policies and systems

4. Develop and repurpose technical and leadership units of study for coherent delivery to professional and lifelong learners working in animal breeding in Australia

Enrol at least 10 students per year in the online distance course in Animal Breeding Management from 2007/2011.

3 Methodology

The postgraduate coursework program in Animal Breeding Management was developed. This program could be undertaken at:

Masters level – required the completing of 48 credit points for the award of Master in Animal Science (Animal Breeding Management) or

Graduate diploma level – required completion of 36 credit points for the award of Graduate Diploma in Animal Science (Animal Breeding Management) or

Graduate Certificate level – required completion of 24 credit points for the award of Graduate Certificate in Animal Science (Animal Breeding Management).

This program offered either full-time or part-time attendance.

The following units of study were designed for this program:

A candidate for the GradCertAnimSc (Animal Breeding Management) will complete:

- VETS8004 Advanced Animal Genetics
- VETS7025 Leadership, People & Organisations
- VETS8002 Genetic Evaluation and Breeding Program Design (taught by Professor Van der Werf UNE)

Either VETS7027 Project Management or VETS7026 Leadership: Managing Change and VETS7028 Leadership Skills,

A candidate for the GradDipAnimSc (Animal Breeding Management) will complete:

- VETS8004 Advanced Animal Genetics
- VETS7025 Leadership, People & Organisations
- VETS8002 Genetic Evaluation and Breeding program Design (taught by Professor Van der Werf UNE)

- VETS7026 Leadership: Managing Change
- VETS7028 Leadership Skills

And an additional 12 credit points of elective units of study, selected from the following:

- VETS8005 Advanced Animal biotechnology
- VETS8003 Advanced Applications of Animal Breeding (taught by Professor Van der Werf UNE)
- VETS7027 Project Management

Or other suitable electives with permission from the program Academic Supervisor.

Students could select one of the following units offered in Bioethics:

- BETH5201 Ethics and Biotechnology
- BETH5202 Human and Animal Research Ethics
- BETH5000 Core concepts in Bioethics

A candidate for the MAnimSc (Animal Breeding Management) will complete: VETS8021 Animal Research Project 1 and a further 6 credit points of electives, which may include another 6 credit points of research.

Facilitators and teaching mode:

Professor Van der Werf teaches the core unit VETS8002 Genetic Evaluation and Breeding Program Design. This unit consists of a 4 day residential at UNE with on-line teaching and the elective VETS8003 Advanced Applications of Animal Breeding (fully on-line).

The other units of study are taught by the Faculty of Veterinary Science, University of Sydney, either face-to-face teaching mode or as a combination of face-to-face teaching + online, or fully online depending on the unit of study.

The Unit of Study VETS8017: Technologies of Animal Reproduction is taught over four weeks, 50% practical tuition at the university farm at Camden, and a practical field trip to the university property Arthursleigh, with the remainder a mix of self-directed (on-line) learning, case studies and presentations.

4 Results

Since 2007 the program has graduated:

- Six students in the GradCertAnimSc (Animal Breeding Management) (two male, four female)

- Three students in the GradDipAnimSc (Animal Breeding Management) (all female).
- Six students in the MAnimSc (Animal Breeding Management) (five male; one female).

As part-time attendance is an option for this program we currently have four students completing the research project component of the program.

There are currently two students who have enrolled but have suspended their candidature.

Candidates have undertaken six credit point research projects on the following topics:

- Investigating the effect of previous parity and phenotypic birth weight in White Suffolk sheep on genetic and phenotypic predictions in subsequent parities.
- Genetic and phenotypic parameters for stayability in a New Zealand research flock.
- Balancing genetic gain and the cost of production per ram sold in Merino ram breeding programs.
- Evaluating the economic value of products derived from advanced reproductive techniques.
- Improving the efficiency of frozen-thawed semen inseminations in super-ovulated ewes
- Integration of mature and emerging reproduction and selection technologies with optimal herd tier structure and progeny testing design for genetic gain to deliver return on investment in vertically integrated Northern Australian beef production systems.
- Modelling genomic and reproductive technologies in sheep breeding programs
- Design of a breeding program using the application of artificial reproduction technologies to establish the heritability of umbilical hernias observed heifers

The yearly enrolments of new candidates for this program from 2007 to 2011 are provided in the following Table 1:

2007	**2008**	**2009**	**2010**	**2011**
7	7	6	2	0

The entire number of candidates in this program from 2007 to 2011 are provided in Table 2:

2007	**2008**	**2009**	**2010**	**2011**
7	14	16	17	16

Meat and Livestock Australia (MLA) provided scholarships for candidates to cover tuition fees. Scholarships were awarded on academic merit and the candidate's perceived commitment to the animal industries. Seventeen scholarships were awarded and used in total, a few more scholarships were available for commencing students but not taken up.

5 Discussion/conclusion

Since 2007 the program has graduated outstanding professionals whose careers are likely to have been enhanced by this high quality learning experience. It is anticipated that these professionals have been up-skilled to improve outcomes for various animal breeding enterprises.

From the perspective of the Faculty of Veterinary Science, University of Sydney, the enrolment numbers have been tracked and although there was the initial burst of enrolments in 2007 and 2008, enrolment numbers have not been sustained. The lack of enrolments (below six per year) has been the major threat to the sustainability of the program. The relevant faculty representatives met to discuss this issue and formulated a discussion paper on the future of this program that was sent by email to our MLA contacts on 21 November 2011, with no feedback received from MLA. Some edited highlights from this discussion paper are presented:

Financial issues

However it was obvious to all parties from day one of the negotiations that this program of postgraduate teaching was not going to be financially viable on a conventional student recruitment and fee paying model. First there was insufficient student demand, despite the obvious industry needs. Second, many of the potential students to be targeted by the program came from unconventional educational backgrounds, with some lacking tertiary qualifications and therefore only able to engage up to the graduate certificate level in the program. Third, given the relatively parlous state of the agricultural industries in Australia, many of the potential students lack the financial resources to pay for enrolment. This was recognized from the start by MLA which provided generous financial support both for the development of additional teaching modules and more importantly scholarships to pay for the student enrolments. This financial support was conditional on meeting all relevant milestones, which has been achieved, but required renegotiation after 5 years of operation of the program. We have now reached that point of renegotiation.

The current problem

After reasonably strong enrolments in the early days of the degree with classes of about 10 or so, there has been a decline in enrolments to much smaller numbers. This has created many problems. The reduced income affects the ability of the faculty to justify providing the relevant units of study, especially if external coordinators are employed. Teaching very small class sizes is not a cost effective use of existing academic staff time. Finally the distance education model employed for the current units of study requires a healthy and vigorous online interaction among the students and with the relevant staff member. This can't happen with only 2 or 3 students in an online class. If financial support for student scholarships or some other form of subsidy by MLA or other relevant animal industries is not provided, the Master of Animal Breeding Management degree will become a completely unsustainable burden for the current providers.

Potential solutions

Biennial or triennial enrolments

To allow an accumulation of enough suitable candidates to make a financially and pedagogically sustainable cohort, the program would only be offered every second or third year. This creates a problem for students who may not be willing or able to wait and for the providers in maintaining momentum.

On campus provision

For the more problematic units of study, namely Advanced Animal Genetics and Advanced Animal Biotechnology, there are existing on-campus, face-to-face alternative units of study at the University of Sydney which have sustainable student numbers. The School of Public Health already has study mode options so that units of study can be presented in both on-campus and on-line so this was discussed as an option. This led to discussion about changing the structure of the ABMgt program so that it was presented as a specialization under the on-campus Animal Science program, rather than as a standalone distance program. This would be necessary if we were to accommodate an increased international student base. We are still awaiting feedback from the University on this, and while we anticipate that it would not be difficult, it would require some time for relevant paperwork to be prepared and committee approval obtained. The earliest this could be organized for would be for a 2013 start date. The role of the UNE partner in such a revised program could be problematic.

Broadening the enrolment

Options for the future development of the ABMgt program have been explored since the milestone report was submitted at the end of May, with the idea of expanding the program's enrolments from other countries, and sectors of the animal breeding industry, and looking for alternative funding to support a wider student intake. This would make the program more viable as a whole, the classroom experience more robust and enable the Faculty to utilize the extensive and excellent development work done in creating the on-line units of study. It would also give MLA a structure through which they could sponsor promising candidates on an ad-hoc basis when they wished to develop individuals within their organization and client base.

Due to the strong number of enquiries received from developing African nations, and the need for scholarship support that was in evidence, we approached AusAid as to their current policy regarding support in this part of the world, and also the likelihood of distance programs being a part of their sponsorship plans in the future. The cost of international students attending the 4 residentials would make the current structure of the ABMgt program unsuitable in general for internationally based students. Ausaid have greatly expanded their support in Africa in recent years, but not for distance programs at this point, so they would only be able to sponsor those in an on-campus degree program. Ironically, the fact that this program is provided by distance education more or less rules it out for support from AusAid.

Broadening the sources of financial support

Approaches have been made to a) Dairy Australia, b) Australian Equine Veterinarians, c) Australian Pork Ltd, d) various Poultry bodies, e) Royal Agricultural Society of NSW and f)

Sergio Garcia and Aaron Cowlieson, leaders of the Dairy and Poultry groups respectively at the University of Sydney, to enquire about additional sources of scholarship or other support

The people/associations who returned our request for input did not in general see a large role for the ABMgt program in the priorities that their groups had. Some are still to report back. The Poultry Coordinator for the Royal Agricultural Society of NSW was the most positive, with possible opportunities for scholarships from their sponsors and marketing support spoken about, but most groups expressed an interest for material specifically tailored to their industry needs.

There has been some discussion of modifying the units of study to incorporate genetics principles that could be taught to those breeding companion animals as some interest has been shown in this sector. However, financial issues (the cost of enrolment when paid for on an individual basis) rule out there being a substantial enough number of applicants with interests in companion animals to warrant these changes.

Transferring some teaching responsibilities to the UNE partner

While there is no problem for the Veterinary Faculty in providing the leadership UoSs, given their concurrent provision to a sustainable cohort of MVPH and MVPHM students, the introductory technical UoSs (Advanced Animal Genetics and Advanced Animal Biotechnology) provided by the University of Sydney are more problematical. The UNE already has a strong program of distance education across the broad spectrum of their teaching activities. Professor Moran approached Dr Julius van der Werf at the University of New England to determine whether it would be possible for UNE to add the few Master of Animal Breeding Management students onto an existing sustainable sized UoS to provide this preliminary training. UNE already provides a suitable replacement for Advanced Animal Genetics as an external UoS, so this could be provided more or less immediately subject to any necessary cross institutional enrolment arrangements. Advanced Animal Biotechnology may be more problematic to replace at UNE.

Closing the program down completely

This most draconian solution should if possible be avoided, given the needs of Australia to sustain a viable agricultural workforce a discussed above. However, it is completely inappropriate and indeed impossible that the financial burden for doing this should fall on the University partners. They are already struggling. Either MLA and affiliated organisations like AWI or possibly the Federal government should provide specific and adequate funding for this purpose. However, if neither agrees to do so, it is obvious that the program has no future and the University of Sydney should disengage from it.'

The current status of the program

Since 2011 the Faculty has explored various means to support the program.

The Faculty has explored alternative funding models but none have been forthcoming to continue sponsorship of this project.

The Faculty has explored the possibility of making the program a stream of the Master of Animal Science. The University has been disappointed with the enrolment numbers and their preference is to close the program due to the low enrolment numbers.

Since 2011 the University of Sydney has requested that all postgraduate programs become compliant with the Australian Quality Framework and this requires that all applicants with a bachelor only degree (with no honours component) must undertake 72 credit points to fulfil the requirements for a Masters degree.

Therefore our current option is to seek expressions of interest from potential students to ascertain interest to reopening the program in 2016.

6 Bibliography

Pratley, J, Copeland, L (2008), Graduate completions in agriculture and related degrees from Australian universities, 2001–2006, Farm Policy Journal, Vol. 5, No. 3, Australian Farm Institute, Surry Hills, pp. 1–10.