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A Preliminary Year Course in Veterinary Science: Course Overview and Student Progression

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The Preliminary Year course in Veterinary Science was originally designed for high achieving students from non-science backgrounds and those with relevant vocational qualifications. Subsequently, students who have completed the required science qualifications, but due to lack of opportunity are unable to gain direct entry to veterinary medicine, have been accepted onto the course. The year-long course comprises seven compulsory modules, five of which are closely aligned to A-level Biology and Chemistry specifications. An animal care and behaviour module allows students to experience working with different species and gain insight into all aspects of the profession. A maths module provides support in topics which some students find challenging. Since its inception in 2007, 241 students have registered on the course, of whom 191 (79.3%) have progressed successfully to the five year course. There was no significant difference in performance between Preliminary Year students and the remainder of the cohort on the five year course and to date only five (2.6%) students who progressed have left the five year course with no further qualification. The Preliminary Year course has been successful in widening access to higher education and the veterinary profession for students without the traditional entry requirements for a degree in veterinary medicine.

Preliminary Year Course Origins and Admissions

The Preliminary Year course in Veterinary Science accepted its first cohort of students in 2007. The course provides access to a five-year degree course in veterinary medicine and science, from which graduates automatically become members of the Royal College of Veterinary Surgeons, with the right to practise veterinary surgery. Originally the course was designed for high achieving students from non-science backgrounds and those with relevant vocational qualifications. This has included students who do not have the required science qualifications for direct entry to a veterinary medicine degree course, but have pursued alternative career paths unrelated to the veterinary profession. In addition a number of veterinary nurses with vocational qualifications and extensive relevant experience have been admitted to the course. Since 2010,

students who have completed the required science qualifications, but due disadvantaging circumstances and lack of opportunity are unable to gain direct entry to veterinary medicine, have been accepted onto the Preliminary Year course. Both routes onto the course have provided the opportunity to upskill capable students who might otherwise be unable to access a career in veterinary medicine. This aligns with the aims of widening participation within higher education (Bibbings, 2006) as well as increasing the diversity of applicants to veterinary medicine (Andrews, 2012, Robinson et al., 2007).

Admissions requirements are dependent on the route, but include AAB at A-level (or equivalent) in non-science subjects, and graduate and vocational qualifications, for example the BTEC National extended diploma. The widening participation route requires students to achieve BBC at A-level to include Chemistry and Biology and to fulfil three widening participation criteria, set by the university, for example being a first generation entrant to higher education or attending a school or college with a low average A-level score.

All prospective students must attend an interview day comprising a traditional interview, a practical assessment and a group working test. They are scored on their performance and offers made to the highest performing candidates.

Preliminary Year Course Content

Regardless of route of entry, all students enrolled on the Preliminary Year course complete seven compulsory modules over one year (table 1). Five modules are closely aligned to UK A-level Biology and Chemistry specifications. This is important to benchmark the performance of students against those gaining direct entry to the five-year course and to ensure those who progress have the scientific background to succeed in subsequent years. The content of the biology modules allows students to adopt a more comparative approach to their studies, exploring the anatomy, physiology and mechanisms of disease in a wide range of species. This is often limited in current A-level biology specifications in the UK, which have a predominantly human biology focus.

The content of the chemistry modules has been selected to provide students with a basic science background relevant to further study in biomedical sciences. Some students pursuing a veterinary career struggle to engage with chemistry as a subject or to see its relevance to veterinary medicine. However, it is seen as a fundamental requisite for all UK veterinary degree courses, ensuring prospective students can demonstrate problem solving skills and an understanding of in-depth scientific concepts (Hudson et al., 2009).

An animal care and behaviour module allows students to experience husbandry and handling of a variety of different species. This ensures all students, regardless of background, have the opportunity not only to work with companion animals, but also equines, farm animals and exotic species. Gaining this experience can be challenging for some students before entry to vet school. During this module students also develop an insight into many aspects of the profession, for example through trips to pharmaceutical companies, charity organisations and the Defence Animal Training Regiment, home of the Royal Army Veterinary Corps.

A maths module was introduced to include topics which are required for success in the science modules and also on the remainder of the veterinary degree course, for example graphing skills, scientific notation, units and drug dose calculations. Historically, some students find numeracy and its application to a scientific or veterinary context challenging (Keates et al., 2013). This module has provided valuable support to students, enabling confidence in their numeracy skills.

Delivery of these modules includes a variety of methods: interactive seminars, laboratory-based practical sessions, live animal handling, clinical skills practice, self-directed learning and clinically orientated problem-based learning sessions all provide students the opportunity to develop their knowledge and understanding of basic science within a veterinary context.

Module	**Overview of module content**
Cell Structure and Biochemistry	Fundamental concepts in molecular cell biology, cell division, biochemistry and techniques used in genetic modification. Topics are applied to a veterinary context, for example a case of canine osteosarcoma is used to explore uncontrolled cell division and students participate in an ethical debate around the use of GM techniques in farming.
An Introduction to Body Systems	A comparative approach to the anatomy and physiology of the major body systems, utilising dissection and live animal examination to complement theoretical teaching. The basic science is applied to clinical concepts, for example the generation of an ECG to illustrate physiology of the heart and the pathophysiology of glaucoma and cataracts to explain the anatomy of the eye.
Health and Disease	Introduces pathogens as a cause of disease in animals and the immune system as part of defence against those diseases. The importance of zoonoses to veterinary public health and epidemiology in disease outbreak investigations are emphasised. Non-infectious disease examples are also explored whilst learning the basic science, for example genetic, allergic and endocrine disease.
Atomic Structure and Bonding	Fundamental concepts regarding the composition and properties of matter. Key topics include chemical bonding, stoichiometric calculations and the importance of polarity to biochemistry. This module provides a platform for subsequent learning in the molecular basis of medicine.
Compounds and Reactions	Topics from A-level chemistry which are essential to any biomedical degree. For example basic organic chemistry, pH, dynamic equilibria and reaction kinetics.
Animal Care and Behaviour	A practically focused module involving husbandry and handling of common domestic species. Off-site visits allow students to realise career opportunities whilst production animal and veterinary nursing work placements provide further experience within the veterinary profession.
Maths for Preliminary Year	Topics are selected and integrated within the year to facilitate learning in clinical and basic sciences. For example indices and logarithms are taught alongside pH chemistry, and drug dose calculations prepare students for their work placements.

Table 1. An overview of the taught modules within the Preliminary Year course.

Assessment and Progression Requirements

Within all modules there are opportunities for formative assessments. These allow students to experience the assessment style on the course which may be different from their previous study, but also to evaluate their own learning and progress. An online discussion forum and regular 'wrap up' sessions enable students to ask questions about self-directed learning exercises and to get feedback on their work as they progress through the course.

Each module is summatively assessed and must be passed at 60% for progression to the five-year course. These summative assessments include short answer A-level style questions, online single best answer assessments, practical assessments, coursework assignments and a reflective diary. Each module utilises a combination of at least two of these assessment tools; the overall module mark is calculated and used for progression. Students who fail to achieve the progression requirements are given one further re-sit opportunity. Students who are unsuccessful following a second attempt, may be eligible for the award of Certificate in Veterinary Sciences, providing they have met University of Nottingham requirements at this level. Successful students automatically progress to year one of the five year course.

The transition to higher education is a challenging period for many students; establishing new friendship groups, coping with financial pressures and losing the immediate support of family and friends are just some of the issues students face (Scanlon et al., 2007, Lowe and Cook, 2003). This transition period has been identified as particularly challenging for students commencing a degree in veterinary medicine. High academic workload, additional placement requirements and the need for a professional approach to difficult situations are cited as some of the additional challenges students face (Hafen Jr et al., 2008, Collins and Foote, 2005). The Preliminary Year course has facilitated this transition for many students, allowing students to adjust to the pressures of higher education before commencing the five-year degree course. The following sections will discuss progression and subsequent performance of students from the Preliminary Year course.

Student Progression and Subsequent Performance

Since its inception in 2007, 241 students have registered on the Preliminary Year course. Of those students 191 (79.3%), have progressed successfully to the five year course, giving an attrition rate of 20.7%. Of the 191 students to progress, 87 (45.5%) have now completed the course and graduated as veterinary surgeons; 89 (46.6%) are progressing successfully on the five year course and 15 (7.9%) left before completing the five year course. Of the fifteen students who left without completing the course, ten graduated after three years with a Bachelor of Veterinary Medical Sciences and left the course at this point. The three year degree provides an exit route for students who have not met the academic requirements to progress to the clinical years of the course and for those who wish to pursue alternative career options at that stage, enabling them to leave with a degree qualification without completing the five year course. Only five students (2.6%), progressing from the Preliminary Year course to date have left the five year degree course with no further qualification.

There is no statistically significant difference between the performance of Preliminary Year students (median mark for year 1 = 65.9%) and the rest of the cohort in year one of the five year course (median mark for year 1 = 66.0%). Academic success within the Preliminary Year appears to predict similar academic achievement on the five year course (figures 1 and 2): Preliminary Year exam performance is significantly correlated with year 1 performance (r_s=.65, p<.001) and with performance in the three year degree (r_s=.70, p<.001). Furthermore performance in year 1 by those students who re-sat one or more modules in the preliminary year (median = 61.5%) was significantly lower than those students without re-sits (median = 69 %; U=248.5, p=.022). This difference in students requiring a re-sit opportunity persists throughout the first three years of the course: performance in the BVMedSci by those students who re-sat one or more modules in the preliminary year (median = 64%) was significantly lower than those students without re-sits (median = 69%; U=95.5, p=.013).

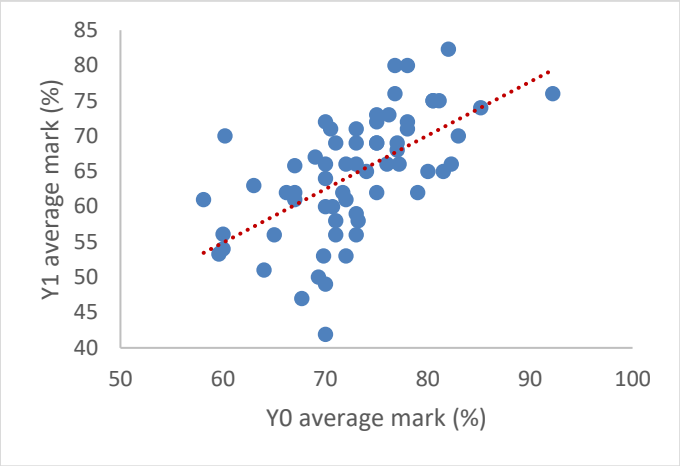

Figure 1. A comparison of students' mean average Preliminary Year (Y0) marks and year 1 marks. r_s=.65, p<.001 (n=64).

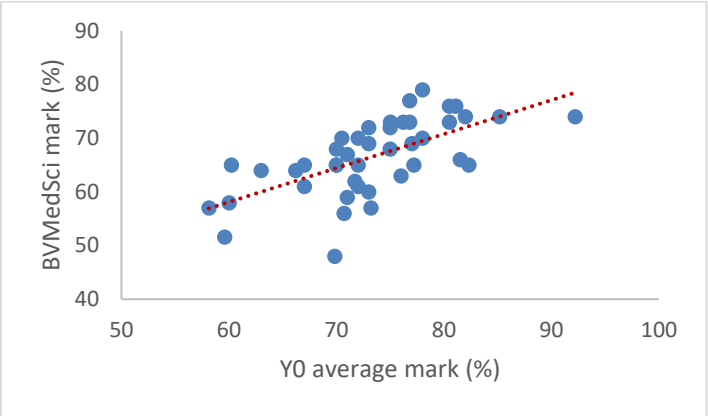

Figure 2. A comparison of students' mean average Preliminary Year (Y0) marks and BVMedSci degree marks. r_s=.70, p<.001 (n=43).

In addition to the academic success of Preliminary Year students, the following quotes from students in their fourth year of the five year course demonstrate that they perceived the Preliminary Year to be tough yet essential to their performance and access to the five year degree:

> I wouldn't still be here if it wasn't for prelim
>
> Having done the prelim year really benefitted me in first year
>
> Challenging year but it has to be to pass first year

Students describe the course content and assessment methods as useful preparation for their subsequent studies:

> We have used our prelim notes for neuro (eye), repro, acid base stuff in CRS, pharmacology etc etc etc

Practical exams were useful – I felt much more relaxed in OSPEs than other people

Coursework, especially referencing, helped with third year project

Conclusion

The Preliminary Year course has been successful in preparing students from a variety of backgrounds for the five year course in veterinary medicine at the University of Nottingham. Students perform well in subsequent years of the degree course and perceive the Preliminary Year to be excellent preparation for the five year course. The assessment methods used on the course are intended to prepare students for assessments they will face in subsequent years and, more importantly, demonstrate predictive validity in that success in Preliminary Year is associated with success on the five year degree. Significantly, these results also show that the assessments used to determine progression from the Preliminary Year are appropriately rigorous. Academic outcomes of Preliminary Year students progressing onto year 1 are absolutely within those results achieved by the general cohort. The assessments used are neither too rigorous, preventing students who might be successful on the five year course from progressing, nor are they too lenient, effectively progressing students destined to fail.

This account of the Preliminary Year course in Veterinary Science may have broader implications for other foundation year courses, and educators may be able to relate to some of the lessons learnt from this evaluation of student performance. For example, alignment of course content and assessment methods on future degree programs, optimises student preparation for continued higher education. Integration of foundation year students with other undergraduates enables students to relate their foundation year experience to planned future study. A structured admissions process increases the likelihood that students can cope with the demands of the foundation year but also with those of future degree courses. Tracking student progress subsequent to the foundation year provides useful feedback for course evaluation. Finally, feedback from previous students as they progress through their subsequent degree course is invaluable to make the foundation year effective and appropriate preparation for future study.

The Preliminary Year course has met the aim of widening participation in higher education and increasing diversity within the veterinary student population. These outcomes may help to address some of the issues around employability of graduates and attrition from the profession which it has been suggested could be linked to selection and admissions (Futures, 2016, Bell et al., 2018). Based on our experience and that of our students, the authors recommend continued support for courses that allow access to veterinary medicine and other similar vocational degree programmes at the University of Nottingham and other higher education institutions.

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Kate worked in first opinion small animal practice and as a secondary school science teacher before joining the University of Nottingham in 2006. Having been initially involved in the design and delivery of the Preliminary Year course, Kate is currently Associate Professor for Veterinary Education and Sub-Dean for Teaching, Learning and Assessment.

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Following graduation Vicki remained at the University of Nottingham to undertake a PhD and a post-doc researching ovarian cryopreservation as a method of preserving fertility. Vicki joined the School of Veterinary Medicine and Science in 2012 as a Teaching Associate on the Preliminary Year course and is the current course convenor.