Veterinary science

Subject benchmark statements

Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of programmes in a specific subject. They also represent general expectations about the standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate.

This *Subject benchmark statement* does not address explicitly the level at which the qualifications for veterinary science might be placed within either *The framework for higher education qualifications in England, Wales and Northern Ireland* or *The framework for qualifications of higher education institutions in Scotland* (the *frameworks*). However, the *statement* includes expressions of the professional/employment related abilities that graduates in veterinary science would be expected to have developed during their higher education and associated practice based experiences. These align, albeit with an emphasis on 'professional ability', with the abilities expressed in the Masters degree descriptor included within the *frameworks*[1].

Subject benchmark statements are used for a variety of purposes. Primarily, they are an important external source of reference for higher education institutions when new programmes are being designed and developed in a subject area. They provide general guidance for articulating the learning outcomes associated with the programme but are not a specification of a detailed curriculum in the subject. Benchmark statements provide for variety and flexibility in the design of programmes and encourage innovation within an agreed overall framework.

Subject benchmark statements also provide support to institutions in pursuit of internal quality assurance. They enable the learning outcomes specified for a particular programme to be reviewed and evaluated against agreed general expectations about standards.

Finally, *Subject benchmark statements* may be one of a number of external reference points that are drawn upon for the purposes of external review. Reviewers do not use *Subject benchmark statements* as a crude checklist for these purposes however. Rather, they are used in conjunction with the relevant programme specifications, the institution's own internal evaluation documentation, in order to enable reviewers to come to a rounded judgement based on a broad range of evidence.

The benchmarking of academic standards for this subject area has been undertaken by a group of subject specialists drawn from and acting on behalf of the subject community. The group's work was facilitated by the Quality Assurance Agency for Higher Education, which publishes and distributes this *statement* and other *statements* developed by similar subject-specific groups.

In due course, but not before July 2005, the *statement* will be revised to reflect developments in the subject and the experiences of institutions and others who are working with it. The Agency will initiate revision and, in collaboration with the subject community, will make arrangements for any necessary modifications to the *statement*.

[1] Please refer to additional supplementary statement: http://www.qaa.ac.uk/crntwork/benchmark/supstat.htm

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Academic standards - Veterinary science

Introduction

Definition

Veterinary science is the study, diagnosis, treatment and prevention of disease in animals both as individuals and as groups. There is also a key role for members of the profession as guardians of human health in the context of disease transmission from animal or animal products to man.

Historical and current perspective

Once early man had moved from hunting to herding he had an interest in the health and husbandry of his stock. By the time of the ancient civilisations there is evidence of close interaction between man and animals in contexts which are still familiar today including the use of animals for production, draught and war and, increasingly, as human companions. The first book of the modern era devoted to veterinary medicine, 'Artis Veterinariae', was produced by Publius Vegetius Renatus in the second half of the 5th century. The 'veterinarii' were the animal doctors of ancient Rome, and the word came back into use in the 17th and 18th centuries as the veterinary profession emerged from its origins amongst the farriers. By the 18th century several veterinary texts had been published and the first veterinary school in Europe was established at Lyon in 1762. The first to be established in the United Kingdom was the Royal Veterinary College in 1792. Although the term 'veterinary surgeon' is widely used within the UK, the term 'veterinarian' (first used in the English language in 1646) is employed here.

The veterinary workplace has changed in the last century with less emphasis on the horse (especially as a draught animal), an increasing emphasis on companion animals kept for pleasure, and greater veterinary involvement in production animals, public health and food hygiene. The role of the profession in protecting the health and welfare of more diverse species groups such as laboratory animals, zoological collections, wildlife and, indeed, the contribution to conservation of endangered species, continues to grow. There is also an increasing body of specialists, both in individual species and in disciplines which cut across species groups, as opportunities for training and the demand for specialist services have grown. The comparative approach of veterinary science will continue to provide insight and support for basic scientists and contribute to the understanding of human disease.

The beginning of the 21st century finds the veterinary profession and its work held in high esteem by the general public and a source of considerable interest, with unprecedented exposure of veterinary matters in the popular media. Veterinarians are regarded as guardians of animal health and welfare, and the veterinary schools have a responsibility to continue to produce graduates in whom the public will have confidence.

The sustained public appeal of veterinary work has led to a level of demand for places on veterinary courses which far exceeds supply. This demand enables the schools to select strongly motivated, high achievers with entry qualifications among the highest in UK university courses. Most applicants are attracted in the first instance by the prospect of veterinary clinical practice with its unique combination of science, art, practical skills, human-animal and interpersonal interaction. However, an increasing number follow other career paths as they become aware of the diverse opportunities provided by a veterinary degree.

Careers in veterinary science

Veterinary graduates have a wide range of career options.

- Most graduates are employed in general practice. Practitioners act as anaesthetists, radiologists, physicians and surgeons. The provision of a 24-hour service is mandatory. Some practitioners work with a wide range of species whereas others are more specialised.
- Practitioners specialising in companion animals are likely to find that individual animals are their patients, although they will also find scope for preventive medicine and advisory work. Treatment is often highly sophisticated and there are a number of private veterinary hospitals. There are also referral hospitals where more specialised treatments are available.
- Practitioners specialising in farm animals are as much concerned with preventive medicine in flocks and herds as with the treatment of individual animals. They are knowledgeable in breeding and nutritional problems and the spread and control of disease. They also advise on the production of safe, wholesome food and the associated animal welfare issues. Veterinarians in farm animal practice must be familiar with computerised records on health and production and be able to interpret them in the formulation and appraisal of disease control programmes.

- Graduates can also choose a career in research and/or teaching, usually after postgraduate training in one of the basic biological sciences or in a clinical speciality. Veterinary scientists are employed in natural science laboratories, in veterinary and medical schools, in medical research institutes and in those institutions which deal expressly with animal health and disease.
- Many opportunities exist in either government services or related 'Agency' services: for example in the Veterinary Field Service (VFS), the Veterinary Medicines Directorate (VMD), the Meat Hygiene Service (MHS) and the Veterinary Laboratories Agency (VLA) which consists of regional veterinary investigation centres, and the Central Veterinary Laboratory (CVL). The Scottish equivalent is part of the Scottish Agricultural Colleges and for Northern Ireland the Northern Ireland Department of Agriculture Veterinary Service. The VFS is involved in controlling and eradicating major epidemic diseases of farm animals, controlling the import and export of animals and animal products, operating animal health schemes and matters relating to animal welfare. In addition the VFS is involved in consumer protection especially in relation to meat hygiene and diseases communicable between people and animals. To assist the VFS in its more routine duties, veterinarians in general practice are appointed as Local Veterinary Inspectors (LVI).
- The VMD deals with the licensing of veterinary medicines and has opportunities for those with an interest in pharmacology and toxicology.
- The VLA is staffed by veterinary and scientific staff who support statutory control and eradication schemes for animal diseases or public health and play an important role in endemic disease surveillance. Linked to the latter they assist practising veterinarians with problems of diagnosis by laboratory and on-farm investigations.
- Veterinary graduates are employed by the Home Office to work within the Animals (Scientific Procedures) Inspectorate, by Animal Welfare Societies such as the Royal Society for the Prevention of Cruelty to Animals (RSPCA), Scottish SPCA, Blue Cross, People's Dispensary for Sick Animals (PDSA) and by the Royal Army Veterinary Corps.
- Veterinary graduates also find employment in overseas universities, in pharmaceutical companies, with pet food manufacturers or other commercial organisations and supra-governmental organisations such as the Food and Agricultural Organisation (FAO) of the United Nations.

1 Defining principles

1.1 The *Veterinary Surgeons Act* (1966) regulates the veterinary profession in law by its governing body, the Royal College of Veterinary Surgeons (RCVS) for the protection of the public and its animals. Only a Member of the Royal College of Veterinary Surgeons (MRCVS) may 'carry out an act of veterinary surgery' and the only route to membership for graduates of UK universities is by graduation with a veterinary degree registerable with the RCVS. The Royal Veterinary College (University of London) and the Universities of Bristol, Cambridge, Edinburgh, Glasgow and Liverpool currently offer such degrees. These courses are subject to regular in depth review by the RCVS and, more recently, by the European Association of Establishments of Veterinary Education (EAEVE) who together ensure that standards and facilities are maintained.

On registration and admission to Membership, the RCVS requires all new graduates to swear the following declaration:

> 'Inasmuch as the privilege of membership of the Royal College of Veterinary Surgeons is about to be conferred upon me, I promise and solemnly declare that I will abide in all due loyalty to the Royal College of Veterinary Surgeons, and will do all in my power to maintain and promote its interests. I promise above all that I will pursue the work of my profession with uprightness of conduct, and that my constant endeavour will be to ensure the welfare of animals committed to my care.'

This declaration is the foundation of the College's Code of Conduct.

1.2 The need for all veterinary degrees to meet the requirements of a statutory body leads to a greater degree of standardisation of course content between the schools than is the case with most degrees, and consequently the scope for undergraduates to select options and modules at their own discretion is more limited. The titles of the degrees awarded by the six universities variously include the terms 'Veterinary Science', 'Veterinary Medicine' and 'Veterinary Medicine & Surgery', but this reflects historical considerations only. In this *Subject benchmark statement* 'veterinary science' is used as a neutral term to denote the general area of veterinary study and practice.

1.3 Veterinary science is an integrating subject, providing breadth and depth to complement the discipline-based biological sciences. Veterinarians have a broad range of knowledge, understanding and skills enabling clinical disciplines to be learnt within the context of a firm foundation in basic science. It is this understanding of the scientific basis of clinical medicine which underpins most veterinary activity. In addition to the practising arm of the profession, holders of a professionally recognised degree in veterinary science are well qualified to enter positions in scientific research, public health and commercial areas allied to medicine and veterinary medicine.

1.4 UK veterinary programmes have all traditionally included pre-clinical, para-clinical and clinical components which are designed to develop knowledge and skills in a progressive and cumulative fashion. Alternative approaches to this traditional structure are currently being developed within the schools, particularly through vertical and horizontal integration of curricula and the introduction of problem-based learning. Such developments are likely to continue through the lifetime of this document. It is also important that graduates are well equipped for lifelong learning, allowing them to update their knowledge, understanding and skills.

1.5 Although curricula may vary in detail, they all share similar aims and objectives such that students acquire and develop:

- a spirit of intellectual curiosity and academic enquiry;
- an understanding of research techniques and critical evaluation;
- an understanding of the anatomy and physiology of the healthy animal in its normal environment;
- an understanding of the biological and welfare needs of animals, and how management systems meet those needs;
- skills in handling and examining animals;
- an understanding of pathological processes;
- an understanding of different disease agents;
- a knowledge of public health, including an understanding of how to prevent transmission of disease between animals and man;
- a knowledge of food production and processing;
- a knowledge of the economics of food production;
- a knowledge of epidemiology, pathogenesis, therapies and control measures relating to animal disease and the practical skills to apply that knowledge;
- problem solving abilities;
- a knowledge of the legal context of veterinary practice;
- a sense of care and responsibility to patients and their owners and a welfare ethic for animals in general;
- a knowledge of the business context of veterinary practice;
- communication skills with staff, colleagues and the general public;
- interpersonal skills and team-working ability;
- a good professional attitude and a high standard of professional behaviour.

2 Subject framework: the nature and extent of the subject

2.1 The framework within this section is an aid to articulating those attributes and capabilities that a veterinary graduate might be expected to demonstrate at the point of registration. It falls into three parts, but clearly this is for identification and presentational purposes only, since the essence of the competent veterinarian is the capacity to integrate scientific understanding, professional knowledge, skills and personal competencies.

Part 1 of the framework provides a means for describing the knowledge and understanding of the relevant subjects that are essential to underpin the informed, safe and effective practice of veterinary science.

Part 2 provides a means for describing the principles, skills and capabilities associated with professional practice that are applied to secure, maintain or improve animal health / well being.

Part 3 provides a means of describing the expectations that the profession, employers and the public at large have of veterinary graduates.

This section should be read in conjunction with Appendix 2 which is the current RCVS document on essential competences required of the new veterinary graduate.

2.2 Part 1: Subject knowledge and understanding

The new veterinary graduate should be able to demonstrate knowledge and understanding in the following areas as the basis for the study and practice of clinical veterinary science:

Structure and function of animals from molecules to populations

- molecular and ultrastructural basis of cellular function;
- macroscopic and microscopic structure of tissues and organs;
- physiological and biochemical basis of organ function and homeostasis;
- biology of the whole animal individually and in groups.

Health and husbandry of domestic animals

- principles of animal behaviour;
- scientific foundations of animal nutrition and its practical application;
- physiology and endocrinology of animal reproduction; maximising reproductive efficiency in commercial populations;
- the molecular basis of animal genetics and its practical application;
- husbandry and housing of domestic animals;
- biological and management strategies in limiting animal disease.

Understanding animal disease

- pathogenesis - the processes by which disease may develop;
- the biochemical and cellular basis of immune and inflammatory responses;
- principles of oncogenesis and tumour biology;
- macroscopic and microscopic changes in pathological processes as a basis for recognising and managing clinical disease;
- the epidemiology of animal diseases.

Disease agents

- structure and function of prions, viruses, bacteria, fungi and other parasites;
- biology, population dynamics, transmission and pathogenicity;
- agents causing diseases in animals; those which may also cause disease in man.

The principles of pharmacology and toxicology

- structure, mode of action and pharmacokinetics of active compounds;
- scientific basis of safe and efficient use of veterinary drugs;
- ethical, environmental and human health implications of veterinary drug usage.

Legal, environmental and ethical considerations

- the economic, environmental and public health consequences (beneficial and otherwise) of keeping animals;
- medicine legislation and the guidelines on the responsible use of medicines;
- the law and ethical codes relating to animals and to food hygiene;
- statutory requirements for animal transport, slaughter houses, cutting plants and the storage of meat products;
- the importance of research for the extension of the knowledge base in veterinary science;
- the relationship between veterinary science, medical science and other biosciences;
- sourcing and synthesis of information; the principles of biological statistics and their correct application.

2.3 Part 2: Application of subject knowledge and understanding

The new veterinary graduate should be able to apply the knowledge and understanding outlined in 2.2 to clinical practice. Thus he or she will be able to:

- handle and restrain animals safely and humanely whilst ensuring personal safety and that of others in the vicinity;
- obtain an accurate and relevant history of the individual animal or animal group and its environment;
- perform a thorough clinical examination including non-specialist examination of all major body systems;
- collect, preserve and transport samples; perform standard practice laboratory techniques; interpret laboratory results (and results of other ancillary diagnostic aids) and integrate with clinical information;
- assess the nutritional status of an animal and be able to advise on appropriate husbandry and feeding;
- demonstrate a practical ability to apply knowledge of disease processes within a clinical environment;
- assess the reproductive efficiency of an animal or group of animals and advise on reproductive management, including obstetrical problems;
- advise on animal management, welfare and ethics and understand the importance of animal health economics in the context of acceptable animal welfare;
- provide emergency care to all species of animals;
- obtain and record data for current and / or retrospective assessment and analyse animal health and production records;
- understand the need to minimise the risks of contamination, cross infection and predisposing factors leading to the accumulation of pathogens in veterinary premises and in the field;
- apply imaging techniques, and advise on their safe use. Interpret the results of imaging techniques in the pursuit of a diagnosis;
- recognise the indications for medical and / or surgical intervention;
- advise on and administer appropriate treatment for disease in individuals and group;
- advise on preventive veterinary medicine including the promotion of optimum health and production;
- safely perform sedation, general anaesthesia and regional analgesia; assess and control pain;
- sterilise surgical equipment, correctly apply the principles of surgical techniques and carry out basic surgical procedures on animals;
- demonstrate an understanding of veterinary public health issues and the procedures to follow with notifiable and zoonotic diseases;
- recognise when euthanasia is appropriate whilst showing sensitivity to the feelings of owners and others. Humanely perform euthanasia of animals, ensuring personal safety and that of associated personnel; advise on carcase disposal;
- perform ante-mortem inspection of animals destined for the food chain and be able to recognise conditions affecting the quality and safety of animal products;
- perform a basic gross post-mortem examination, record findings, sample tissues and safely store and transport them.

2.4 Part 3: Professional and personal skills

The knowledge and skills outlined in parts 1 and 2 should be applied within a framework of good personal and professional behaviour. The new veterinary graduate must, therefore, be able to:

- conduct themselves in a professional manner with regard to the veterinarian's professional and legal responsibilities and understand and apply the ethical codes as set out in the *Guide to Professional Conduct* produced by the RCVS;
- work effectively as a member of a multi disciplinary team in the delivery of services to clients and employers;
- communicate effectively with the public, professional colleagues and appropriate authorities;
- respond appropriately to the influence of economic and emotional pressures;

- foster and maintain a good professional relationship with clients and colleagues, developing mutual trust and respecting their professional views and confidentiality;
- demonstrate an awareness of the role of veterinarians in the community, particularly in relation to ethical principles;
- demonstrate competence in information technology including the use of computers for word processing, data handling and information retrieval. Produce reports in a form that is satisfactory and understandable to the intended audience;
- recognise their own limitations; recognise when to seek assistance and understand the protocols for dealing with second opinions;
- demonstrate knowledge of the organisation and management of a veterinary practice. This should include:
    - their own and employers' responsibilities in relation to current employment, lay staff, health and safety legislation, public liability and data protection;
    - the principles of certification;
    - basic financial and accounting practices and record keeping;
    - practice standards and policies;
- understand the benefit, need and professional obligation for managing a programme of continuing professional development (CPD) throughout their professional life;
- understand the career paths, other than general practice, open to holders of a veterinary degree.

3 Teaching, learning and assessment

3.1 Programmes are continually evolving to meet the changing demands on veterinary graduates, and, in consequence, teaching, learning and assessment must evolve in parallel with curricula. Each institution must be able to justify its choices in terms of the learning outcomes, and the methods and grading criteria must be made explicit to the students taking the courses.

3.2 Teaching, learning and assessment methods encourage and enable students to develop as independent learners, actively engaged in the process of seeking to understand, thus preparing them for a lifetime of continuing professional development.

3.3 In addition to obtaining the knowledge and skills as outlined in the subject framework, programmes foster development of graduate key skills (eg problem solving, team working, communication). Specific courses on communication skills are evolving in veterinary programmes, but these and other key skills are largely embedded within the curricula to ensure that they are learned in the appropriate context. How they learn these skills are made explicit to students through statements of aims and objectives for each course.

3.4 A variety of teaching and learning approaches are used in UK veterinary programmes. These include formal lectures, practical classes, tutorials, directed self learning and problem-based learning, problem solving exercises, and case-based sessions. Case-based learning is an essential part of clinical and paraclinical training, in which individual students or very small groups take responsibility for clinical cases under appropriate supervision. In order to increase opportunities for hands-on clinical experience, the final year in all UK veterinary programmes is largely lecture-free. Veterinary schools all maintain teaching hospitals and animal units in which a range of clinical and husbandry skills can be taught, learned and assessed.

3.5 During the clinical training period, and also at some earlier stages in the curriculum, the students are allowed to select areas for in-depth study (often referred to as 'electives'), which may be based within the host institution or, increasingly, may involve external placements. Such elective units and other projects within curricula are increasingly used both to encourage students to take responsibility for their own learning, and to enable particular interests to be pursued in depth.

3.6 Thirty eight weeks of extramural study (EMS) form a vital and additional element of all veterinary curricula in the UK. EMS is a series of learning placements integrated with the veterinary programmes enabling students to observe and participate in a wider range of veterinary activities than is possible within any course based solely in a university. EMS is divided into pre-clinical EMS (working in animal related industries) and clinical EMS (working in clinical practice, research or public health placements). Student progress during EMS forms an important part of their overall assessment because the skills that they learn during EMS are examined in clinical rotational assessments.

3.7 Veterinary science requires a range of knowledge, skills and approaches, and veterinarians have important roles to play not only in animal health and welfare but in human health, environmental medicine and biomedical research. Students are encouraged to intercalate to promote the acquisition of knowledge and skills in a broader range of subjects than can be included in a veterinary curriculum. Intercalation occurs within the Honours (level 3) year of an appropriate degree at any stage after the second year of the veterinary course. Such intercalating students pursue a research based project as a major part of their training. In addition, intercalation is an integral part of the Cambridge course and all students spend their third year doing Part II of the Medical and Veterinary Sciences Tripos (or other relevant triposes) for which they are awarded a Bachelor of Arts degree with Honours. Nationally, there are moves to increase the number of students intercalating in the remaining five veterinary schools, and a number of schools have recently introduced a six year course for a proportion of school-leavers where intercalation is built into the offer of a place. Intercalation for an Honours degree not only teaches veterinary undergraduates the importance of research, but broadens their career outlook.

3.8 Veterinary programmes include both formative and summative assessments. Formative assessment plays an essential role in student development by providing feedback on achievements and progress, but may also contribute to summative assessment on which the award is based. Both types of assessment involve a variety of forms to match the diversity of learning outcomes. Assessments will include many (but not necessarily all) of the following:

- essays, reports and dissertations to examine the ability to synthesise an argument concisely and clearly, and to solve problems;
- multiple choice and extended matching item questions to test factual and deeper knowledge across the breadth of the subject area;
- written extramural study case reports and journals, to examine the ability to observe, analyse critically and communicate clearly;
- practical and oral examinations to assess the ability to observe and deduce and apply clinical skills: these may be laboratory-based, case-based or objective structured clinical examinations;
- oral or poster presentations to peers and staff to assess the ability to communicate.

3.9 Assessments take place at defined points in the course, and may also take the form of continuous assessment. Assessment is of cumulative knowledge and understanding. For this reason, students must expect assessments held at any stage to call upon the understanding, knowledge and skills acquired in any part of the course up to that point.

4 Standards

Graduation with a veterinary degree acknowledges high achievement in a lengthy and demanding clinical science course occupying at least five years at university and an additional equivalent of one year undertaking EMS. Therefore, this *Subject benchmark statement* refers to a minimum threshold for the award of the qualification, which is recognised by the RCVS as sufficient for the automatic conferment of Membership. This embraces the practical skills required for the new graduate and the education necessary to promote reflective experiential learning throughout a future professional career, whatever course that may take.

As emphasised throughout this statement, an integrated understanding of the biological and other sciences that underpin and advance clinical veterinary practice is fundamental to all veterinary curricula. Clinical skills and knowledge build upon a scientific foundation equivalent to that obtained from a biosciences undergraduate course. Thus graduates must:

- have a comprehensive understanding of the basic sciences allied to veterinary medicine, knowledge of the key principles in biological science relevant to the clinical sciences, and the ability to locate, search and summarise primary and secondary sources for further information, as their professional obligations require;
- have demonstrated competence in a range of biological and clinical techniques, including collection, analysis and critical interpretation of data; and communicate the scientific aspects of their work in a way appropriate to an audience;
- be able to construct reasoned arguments to support their actions and positions on the ethical and social impact of veterinary science and the allied biosciences.

Using this honours level foundation in biosciences, graduates must also demonstrate a systematic understanding, knowledge and critical awareness of the application of these principles to veterinary clinical science.

The minimum threshold for the award explicitly includes the clinical and professional skills and knowledge outlined in the RCVS document *Essential Competences Required of the New Veterinary Graduate* (Appendix 2) in order that graduates can register as members of the RCVS, giving the holder the right to practise veterinary medicine and surgery in the UK and European Union. These and other clinical and professional attributes, including the ability to take personal responsibility and exercise initiative in unpredictable and complex situations, are set out in sections 2.3 and 2.4 of this document, and, although essential for graduation, are not repeated here.

Such clinical and professional skills should be developed in an intellectually challenging scientific context, such that the graduate can apply these principles, skills and techniques in novel situations. The ability to tackle and solve problems is essential for graduation. In particular the new graduate must be able to:

- collect and analyse patient data from a variety of sources, and synthesise such information to gain answers;
- deal with complex issues (for example weighing welfare, economics, animal and public health demands, sometimes in emotionally charged situations), make informed and reliable judgements, in a professional manner, even in the absence of complete data;
- move between different cognitive modes ranging from pattern recognition and rapid decision making to more reflective problem solving;
- communicate their views, advice and decisions clearly to both specialist and non-specialist audiences.

5 Personal development

Veterinary programmes recognise the constantly changing nature of professional life, and the need for veterinary graduates to stay abreast of scientific, medical, veterinary and technological advances. Elements within veterinary curricula encourage a particular knowledge, or set of skills, in a speciality, and an awareness of issues at the forefront of that discipline. The new graduate should be capable of:

- obtaining information from a variety of sources, including the use of new technology;
- discriminating between reliable sources and information of a lower quality;
- maintaining a broad and up-to-date knowledge and understanding of basic biological and clinical sciences, the social and legal context of professional practice;
- adding to and developing their practical skills to embrace new technologies, and new approaches to diagnosis and therapy.

Graduates require a knowledgeable, mature and compassionate approach to dealing with domestic animals, their owners and keepers, in the interests of animal health and welfare, as well as a clear recognition of the importance of animals in public health. They require the ability to conduct all their affairs with integrity and in a professional manner which meets the high expectations of society.

Appendix 1

Membership of the group

Ms Freda Andrews	Observer and Head of Education at the Royal College of Veterinary Surgeons
Professor David Bennett	University of Glasgow
Dr Malcolm Bennett	University of Liverpool
Professor Philip Duffus (chair)	University of Bristol
Dr Richard Evans	University of Cambridge
Mr Andrew Jeffries	University of Cambridge
Mr Jim Kelly	University of Edinburgh
Professor Stephen May	Royal Veterinary College
Mr John Mould	University of Glasgow
Dr Susan Rhind	University of Edinburgh
Dr Frank Taylor	University of Bristol
Dr Camille Vaillant	University of Liverpool
Dr Philip Watson	Royal Veterinary College

Appendix 2 (RCVS Draft, as at October 2001)

Essential competences required of the new veterinary graduate

'Day One' skills

A1 General professional skills and attributes

The new veterinary graduate should be able to:

A1.1 communicate effectively with clients, the lay public, professional colleagues and responsible authorities; listen effectively and respond sympathetically to clients and others, using language in a form appropriate to the audience and the context;

A1.2 prepare clear case reports and maintain patient records in a form satisfactory to colleagues and understandable by the public;

A1.3 work effectively as a member of a multi-disciplinary team in the delivery of services to clients;

A1.4 be aware of the ethical responsibilities of the veterinary surgeon in relation to individual patient care and client relations, and also more generally in the community in relation to their possible impact on the environment and society as a whole;

A1.5 be aware of the economic and emotional climate in which the veterinary surgeon operates, and respond appropriately to the influence of such pressures;

A1.6 be willing to use one's professional capabilities to contribute as far as possible to the advancement of veterinary knowledge in order to benefit veterinary practice and further improve the quality of animal care and public health;

A1.7 have an elementary knowledge of the organisation and management of a veterinary practice, including:

- awareness of own and employer's responsibilities in relation to employment and health and safety legislation, and the position relating to lay staff and public liability;
- awareness of how fees are calculated and invoices drawn up, and the importance of following the practice's systems for record keeping and book-keeping, including computer records and case reports;
- ability to use information technology effectively to communicate, share, collect, manipulate and analyse information;
- importance of complying with professional standards and policies of the practice;

A1.8 understand the need and professional obligation for a commitment to continuing education and training, and professional development, throughout one's professional life;

A1.9 conduct oneself in a professional manner with regard to the veterinary surgeon's professional and legal responsibilities and understand and apply the ethical codes as set out in the RCVS *Guide to Professional Conduct*;

A1.10 be able to cope with uncertainty and adapt to change;

A1.11 develop a capacity for self-audit and willingness to participate in the peer-review process;

A1.12 be aware of personal limitations, and demonstrate awareness of when and from where to seek professional advice, assistance and support.

(***Commentary***: *This last item is considered to be one of the most important, and should guide all new veterinary graduates when undertaking their professional duties. Veterinary surgeons undertaking procedures on patients must at all stages in their careers be fully competent in their performance, or be under the close supervision of those so competent. When in doubt, the new veterinary graduate must seek professional support and in the interests of animal and human health, should not attempt to undertake complex procedures unsupervised.*)

B1 Underpinning knowledge and understanding

The new veterinary graduate will need to have acquired a thorough knowledge and understanding of the following:

B1.1 the sciences on which the activities of veterinary surgeons are based;

B1.2 research methods and the contribution of basic and applied research to all aspects of veterinary science;

B1.2 how to evaluate evidence;

B1.3 the structure and functions of healthy animals, and all aspects of their husbandry;

B1.4 the aetiology, pathogenesis, clinical signs, diagnosis and treatment of the common diseases and disorders that occur in the common domestic species in the UK;

B1.5 legislation relating to the welfare (including transport) of animals and notifiable diseases;

B1.6 medicines legislation and guidelines on responsible use of medicines;

B1.7 the principles of disease prevention and the promotion of health and welfare;

B1.8 veterinary public health issues including zoonoses.

C1 Practical competences

The new veterinary graduate should be able to undertake the following:

C1.1 obtain an accurate and relevant history of the individual animal or animal group, and its/their environment;

C1.2 handle and restrain an animal safely and humanely, and instruct others in performing these techniques;

C1.3 perform a complete clinical examination;

C1.4 attend all species in an emergency and perform basic first aid;

***Commentary**: problems to be handled for any species include first aid management of haemorrhage, wounds, breathing difficulties, eye and ear injuries, unconsciousness, clinical deterioration, burns, tissue damage, internal organ damage and cardiac arrest. First aid to be applied includes bandaging, cleaning, immobilising limbs, resuscitation procedures, haemorrhage control.*

C1.5 assess correctly the nutritional status of an animal and be able to advise the client on principles of husbandry and feeding;

***Commentary**: this applies to commonly presented cases and would not, for example, be expected to include advanced nutritional advice for complex cases, eg high performance horses, high yielding diary cows, certain exotic or zoological species.*

C1.6 collect, preserve and transport samples, perform standard laboratory tests, and interpret the results of those generated in-house, as well as those generated by other laboratories;

***Commentary**: new graduates are expected to have a working knowledge of tests to be undertaken include conditions relating to infectious and contagious diseases; alimentary system; respiratory system; circulatory system; urinary system; nervous system; endocrine system; mucucutaneous system; musculoskeletal system; trauma; poisoning; obstetrics; paediatrics; parturition; reproduction.*

C1.7 use radiographic, ultrasonic, and other technical equipment which can be used as a diagnostic aid, safely and in accordance with current regulations;

C1.8 follow correct procedures after diagnosing notifiable, reportable and zoonotic diseases;

C1.9 know and apply the RCVS twelve Principles of Certification correctly;

C1.10 access the appropriate sources of data on licensed medicines; prescribe and dispense medicines correctly and responsibly in accordance with relevant legislation and ensure that medicines and waste are safely stored and/or disposed of;

C1.11 correctly apply principles of sterilisation of surgical equipment;

C1.12 correctly apply principles of aseptic surgery;

C1.13 safely perform sedation, general and regional anaesthesia, implement chemical methods of restraint, and assess and control pain;

C1.14 advise on, and administer appropriate treatment;

***Commentary**: the new veterinary surgeon must always seek professional advice and support if presented with a case beyond his or her immediate capability - see item A.12.*

C1.15 recognise when euthanasia is necessary and perform it humanely, using an appropriate method, whilst showing sensitivity to the feelings of owners and others, and with due regard to the safety of those present; advise on disposal of the carcase;

C1.16 perform a basic gross post mortem examination, record details, sample tissues, store and transport them;

C1.17 perform ante mortem inspection of animals destined for the food chain and correctly identify conditions affecting the quality and safety of products of animal origin;

C1.18 assess and implement basic health and welfare records (and production records where appropriate);

C1.19 advise on, and carry out preventive and prophylactic programmes appropriate to the species and commensurate with accepted animal health, welfare and public health standards, seeking advice and assistance where necessary from professional colleagues;

C1.20 minimise the risks of contamination, cross infection and accumulation of pathogens in the veterinary premises and in the field.