FACULTY OF LIFE SCIENCES UNIVERSITY OF COPENHAGEN





Self Evaluation Report 1 Stage one

EAEVE visit 27 September to 1 October 2010

TABLE OF CONTENTS

0.	INTRODUCTION	3
1.	OBJECTIVES	8
2.	ORGANISATION	11
3.	FINANCE	15
4.	CURRICULUM	17
5.	TEACHING, QUALITY AND EVALUATION	35
6.	FACILITIES AND EQUIPMENT	43
7.	ANIMALS AND TEACHING MATERIAL OF ANIMAL ORIGIN	51
8.	LIBRARY AND LEARNING RESOURCES	58
9.	STUDENT ADMISSION AND ENROLMENT	61
10.	ACADEMIC AND SUPPORT STAFF	63
11.	CONTINUING EDUCATION	67
12.	POSTGRADUATE EDUCATION	71
13.	RESEARCH	73
APP Comm	ENDIX 1: Suggestions from the evaluation of the 1972 veterinary curriculum by the Advisory nittee on Veterinary Training in 1989 and the follow-up on the suggestions	76
APP Institu	ENDIX 2: Improvements of the 1994 veterinary curriculum suggested by the Danish Evaluation te (EVA) in 1999	78
APP 2005-	ENDIX 3: Copy of an article in Journal of Veterinary Medical Education describing the curriculum	85
APP	ENDIX 4: Changes made to address the suggestions made by the 2001- EAEVE evaluation	90
APP	ENDIX 5: Area map of Frederiksberg and Taastrup campus	94

 ${\bf 2} \,\mid\, {\sf The}\, {\sf Faculty}\, {\sf of}\, {\sf Life}\, {\sf Sciences}\, ({\sf LIFE})$ University of Copenhagen $\,\mid\, {\sf EAEVE}\, {\sf stage}\, {\sf one}$

0. INTRODUCTION

Please provide an outline of the main features of the history of the Faculty in the period since the last evaluation visit or, if there has not been a previous visit, in the last ten (10) years.

It should cover,

- the main organisational changes
- new regulations relating to teaching
- new buildings or major items of equipment
- main changes to the study programme
- important decisions made by the management of the Faculty, or by the authorities responsible for it
- major problems encountered by the Faculty, whether resolved or not

Introduction

The Veterinary Medicine programme at the Faculty of Life Sciences (LIFE), University of Copenhagen, strives towards being among the best veterinary study programmes in the world by offering a research-based, international cutting-edge level of education using modern educational principles and learning platforms.

In Denmark, undergraduate veterinary education is only offered under the Veterinary Medicine programme at LIFE. Postgraduate veterinary education, e.g. PhD programmes, is also offered by other universities in Denmark.

LIFE has eleven departments. Of these, four departments are mainly involved in veterinary education:

- The Department of Basic Animal and Veterinary Sciences
- The Department of Veterinary Disease Biology
- The Department of Large Animal Sciences
- The Department of Small Animal Clinical Sciences

Thus, the veterinary medicine area is neither organised as a faculty of veterinary medicine nor as a school of veterinary medicine.

The overall mission of the Veterinary Medicine programme at LIFE is to educate highly qualified veterinarians who will be of use to society through the continuous improvement of animal and human health. These veterinarians should have knowledge of basic animal science, disease biology and food safety as well as knowledge of the diagnosis, treatment and prevention of animal diseases.

The commitment to undergraduate education includes the commitment to provide instruction and clinical opportunities for students in a wide variety of domestic species, including both companion and production animals as well as tracking opportunities in biomedicine and in food safety.

In order to ensure the outcome of the programmes, a set of competence profiles has been drawn up which list the academic competences that DVM candidates must have. Additionally, LIFE wants to ensure that it continues to provide veterinary service units of high international standards and of a size necessary to fulfil our educational and research mission.

The most important goals for the Veterinary Medicine programme are:

- to develop world-class teaching and learning in line with recommendations from EAEVE and AVMA
- to be a preferred research partner within the core academic fields of veterinary sciences
- to communicate veterinary research and its importance to health and to the prevention, control, diagnosis and treatment of diseases in animals and humans
- to create an attractive university environment with a view to attracting the best scientific, clinical and technical staff to the Faculty, nationally and internationally
- to further develop the BSc and MSc curricula in line with the Bologna Declaration (EU) and Danish legislation

Historical facts

The Faculty of Life Sciences (LIFE) has its origins in the establishment of a veterinary school in 1773 – the second such school established in Europe. The school was located in Christianshavn, a district of Copenhagen. During the early years, the founder, Peter Christian Abildgaard, ran the school as a private enterprise, but in 1776 the government took over the school and granted a royal charter in 1777.

In 1856, the government acquired farmland in Frederiksberg, near Copenhagen, to build a new university.

Michael Gottlieb Bindesbøll, an important and modernising architect at the time, designed the Frederiksberg Campus of KVL, which was erected from 1856 to 1858.

After 1858, all higher education disciplines within veterinary and agricultural sciences were taught at Frederiksberg at what had become the Royal Veterinary and Agricultural University (KVL).

Today, the campus covers about 16 hectares at Frederiksberg. The Large Animal University Hospital and

a research farm is located in Taastrup, about 15 km west of Copenhagen, which covers about 175 hectares, and an arboretum north of Copenhagen.

The main veterinary clinical buildings at the Frederiksberg Campus were constructed from 1963 to 1976.

After a completely new library was built, an extension and renovation project for the buildings on the Frederiksberg Campus began in 1991.

KVL came under the jurisdiction of the Ministry of Education in 1972 and became a full monofaculty university. Similar to other universities in Denmark, KVL was subject to the Danish University Act (*Universitetsloven*), although KVL enjoyed autonomy for a number of areas. This was established with KVL's Statute of 1992, which also changed the organisational structure, reducing the number of departments from 39 to fourteen. The reorganisation reduced the number of departments related to animal science and veterinary medicine from seventeen to five. The Statute was revised in 1999.

The veterinary curriculum was revised in 1972 and later, in 1987-1988, evaluated by the Advisory Committee on Veterinary Training (ACVT). The main suggestions and KVL's follow-up on these are listed in Appendix 1.

The veterinary curriculum fro 1972 was revised in 1994. The revision aimed at increasing the integration and coordination of veterinary subjects taught in different departments and coordinating the structure of the veterinary programme with other study programmes at KVL. The 1994 curriculum was evaluated by the Danish Evaluation Institute (formerly the Danish Centre for Quality Assurance and Evaluation of Higher Education) in 1998, and the improvements listed in Appendix 2 were suggested.

Main features of the history of the Faculty in the period since the last EAEVE evaluation visit in 2001

Major organisational changes

2004: Departmental structure

In 2004, KVL again reorganised the departmental structure. The number of departments was reduced to eleven with the five mainly veterinary departments being reorganised to the four present departments, i.e.:

- The Department of Basic Animal and Veterinary Sciences
 - Anatomy, Cell biology, Biochemistry, Physiology, Genetics, Animal nutrition
- The Department of Veterinary Disease Biology

- General and special pathology, Microbiology, Parasitology, Immunology, Food hygiene and food safety, Meat inspection, Pharmacology, Toxicology
- The Department of Large Animal Sciences
 - Large animal medicine and surgery, Reproduction, Veterinary jurisprudence, Epidemiology, Herd health, Ethology
- The Department of Small Animal Clinical Sciences
 - Small animal medicine and surgery,
 Exotic pet animals, Clinical pathology,
 Diagnostic imaging

The following departments also contribute to the curriculum:

- The Department of Basic Sciences and Environment
 - o Chemistry, Physics, Statistics
 - The Department of Agriculture and Ecology o Zoology

2005: New Act on Universities (University Act)

In 2005, the Danish University Act was revised significantly, and it followed from the new Act that universities are independent institutions under the public-sector administration and supervised by the Minister for Science, Technology and Innovation.

The new Act also stated that the Board of the University is the highest authority of the university and that the board must comprise a majority of external members with the chair being elected from among its external members.

Rector, deans and heads of department were now to be appointed specifically to the respective positions and could no longer be appointed by way of internal elections.

The new Act also introduced the head of studies, appointed by the dean. In cooperation with the study board, the head of studies must undertake the practical organisation of teaching and tests and other assessment forming part of the exams. The head of studies must approve the problem formulation and submission deadline for the Master's thesis, as well as a plan for the supervision of the student.

2007: Merger with the University of Copenhagen and the Danish Pharmaceutical University

On 1 January 2007, the Royal Veterinary and Agricultural University (KVL) merged with the University of Copenhagen and the Danish Pharmaceutical University and became the Faculty of Life Sciences. Subsequently, the Rector of KVL became Dean of the Faculty.

New buildings and major items of equipment

Buildings

In 2003, KVL began to plan for a gradual increase of the number of veterinary students from 120 per year to 180 per year, with the admission of 186 first-year students from 2006. This necessitated new buildings and remodelling of existing buildings.

Facilities for microscopy (e.g. histology and cell biology), dissections (anatomy), microbiology and poultry diseases were expanded and rebuilt in the existing buildings at Frederiksberg Campus, while parts of the Department of Large Animal Sciences (IPH) moved to Taastrup Campus in February 2008, where the new Large Animal Veterinary Teaching Hospital (LAVTH) is situated. The Department of Small Animal Clinical Sciences will move into renovated facilities at Frederiksberg Campus in 2010/2011.

A new pathoanatomical theatre was built in 2007.

Major items of equipment

2005: Facilities and equipment for histology and cell biology (180 student places)

2005: Diagnostic imaging – CT scanner

2007: Diagnostic imaging – MR scanner

2009: Clinical pathology – interactive computer-based microscopy (35 student places)

Main changes to the study programme

2005: New Act on Universities (University Act) The new Danish University Act dictated that all university study programmes should adapt to the Bologna Declaration in respect of a 3-year (180 ECTS) Bachelor programme and a Master's programme (typically 2 years (120 ECTS), but 2½ years and 150 ECTS for the veterinary MSc programme). The new Act also dictated that a Bachelor thesis (at least 10 ECTS) and a Master's thesis (at least 30 ECTS) should be included in each Bachelor and Master's programme, respectively.

The new University Act also stated that elective courses should be part of the study programmes, and, as concerns the veterinary MSc programme, KVL decided to aggregate the electives into the following differentiations (minor tracks composed of two modules of 9 ECTS and 23 ECTS, respectively): Biomedicine, Production animal health and diseases, Equine diseases, Companion animal diseases and Food safety.

KVL further decided to modulate all curricula from a two semester structure into four 9-week blocks with an interim week, each block consisting of 15 ECTS and courses being adapted to credits of 7.5, 15 and 30 ECTS. The veterinary curriculum was also divided into a BSc and MSc programme and, with some modifications, also adapted to the curriculum modules decided by KVL.

A detailed description of the 2005 veterinary curriculum was presented in the Journal of Veterinary Medical Education, a copy of which is included as Appendix 3.

2007: Ministerial Order on the Grading Scale and Other Forms of Assessment of University Education In 2007, the Ministerial Order on the Grading Scale and Other Forms of Assessment of University Education (Bekendtgørelse om karakterskala og anden bedømmelse ved universitetsuddannelser) dictated that the grading scale be changed from the previous scale (13-point grading scale) to the 7-point grading scale. Further, this Ministerial Order dictated that the rules for the individual study programme must contain precise descriptions of objectives and criteria for assessing the fulfilment of the objectives for the individual subjects/ subject elements which are concluded with a test. This had a significant impact on the individual course descriptions and paved the way for constructive alignment, i.e. alignment between learning objectives, teaching and examination methods.

2007: Act on the accreditation of university study programmes

In 2007, a new Danish Act on the Accreditation Agency for Higher Education (Accreditation Act) (Lov om Akkrediteringsinstitutionen for videregående uddannelser (Akkrediteringsloven)) was adopted by the government. The responsibility for implementing the Act lies with the Ministry of Science, Technology and Innovation. In the Danish accreditation system, the primary aim of the Act is to create a system with a view to ensuring and documenting the quality and relevance of higher education study programmes in the Danish educational institutions. According to the Accreditation Act, the Accreditation Council is the specific unit which makes the decisions regarding accreditation of all higher education study programmes. Decisions are made on the basis of accreditation reports prepared by accreditation operators.

In Denmark, two accreditation operators head the accreditation process and prepare the accreditation reports, which form the basis of the Accreditation Council's decisions.

- For university study programmes under the Ministry of Science, Technology and Innovation, ACE Denmark prepares the accreditation reports.
- For higher education study programmes within the fields covered by the Ministry of Education and the Ministry of Culture, the Danish Evaluation Institute (EVA) prepares the accreditation reports.

Further information can be found at:

http://www.acedenmark.dk/index.php?id=277#c1101. According to the plan prepared by the accreditation operator, the Veterinary Medicine programme is to be nationally accredited in 2013.

2008: Amendment of the procedure to select new veterinary students

In 2008, the Faculty of Life Sciences was granted an exemption from the official regulation on the selection of new students. Accordingly, the Faculty was allowed to select 50% of the new veterinary students based on grades and 50% of the new students based on a specific selection procedure involving multiple choice questions, a personal application and an interview.

2009: Introduction of an elite module in the Production animal health and disease track

In 2008, the Ministry of Science, Technology and Innovation allowed and supported the creation of elite modules. Elite modules should give talented students a possibility to replace ordinary modules in their Master's programme with more demanding and challenging modules of approximately 20-30 ECTS. The Faculty applied for an elite module in Production animal health and disease. The Ministry approved the application, and the elite module was introduced in spring 2009.

2009 (autumn): Faculty of Life Sciences changes the veterinary study programmes

In 2007, the Faculty decided to plan for changing the veterinary study programmes. The reasons for this were to:

- eliminate the problems experienced in the 2005 study programmes (e.g. uneven student work-load, complex course arrangements)
- further adapt to the Faculty's curriculum module structure
- make the veterinary MSc programme an English-speaking programme
- further advance constructive alignment
- include teaching offered by the veterinary department of the Technical University of Denmark
- comply with accreditation standards set by the American Veterinary Medical Association (AVMA)
- comply with the new EAEVE standards, including the Essential Day 1 competences
- further address suggestions made by EAEVE in the 2001 evaluation

The new curriculum is described in detail in Chapter 4. The changes made to address the suggestions made by EAEVE in the 2001 evaluation are presented in Appendix 4.

2009 (autumn): Consultative site visit by the American Veterinary Medical Association (AVMA) The Faculty of Life Sciences has decided to obtain the AVMA accreditation for its veterinary education. A consultative site visit by the AVMA was carried out in September 2009. The outcome of the consultative site visit has lead the Faculty to apply for a full AVMA accreditation in 2011/2012, the main challenge being that the AVMA standard dictates a veterinarian to be dean, which is not possible according to the Danish University Act.

2009 (autumn): Budget reduction at the University of Copenhagen

At the end of 2009, the University of Copenhagen had to reduce its budget by DKK 145 million, and the Faculty of Life Sciences has to cut costs by DKK 25 million. This also affected the four main veterinary departments with dismissals of scientific and technical personnel, cancelling of new positions, postponement of employing new personnel, reduction in running costs and cancelling of activities. The Faculty administration also had to reduce its number of personnel. The effect of this cost cutting on the quality of the teaching is, at present, unknown, but efforts have been made at all levels to minimise the effects of the cost cutting on the teaching under the Veterinary Medicine programme, e.g. by advancing e-learning and having parts of the veterinary courses taught by veterinarians from the Technical University of Denmark.

Challenges encountered by the Faculty

Strengths:

- Dedicated and highly qualified staff
- Highly motivated students based on a high number of qualified applicants for each class every year
- Strong, research-based education
- Unified and broad veterinary study programme incorporating food hygiene and safety and public health
- A central location in the capital of Denmark
- A large clinical case load including a very large percentage of primary cases in companion animals and production animals
- A high degree of acknowledgement by the municipality
- A continuous need for veterinary medicine and education in society

Weaknesses:

- The curriculum is crowded in a complex structure
- Recruitment and retention of faculty for specific veterinary disciplines are difficult
- There are relatively few international students (apart from Swedish students) and faculty
- A lack of halls of residence for international students, which affects international recruitment

Recommendations:

- Strengthening of the recruitment of students with a main interest in production animals and food safety
- Development of recruitment and retention strategies (faculty)
- Strengthening of the cooperation with the Danish Veterinary Association on continuing education
- Strengthening of the recruitment of international students

1. OBJECTIVES

The objectives of veterinary training institutions are to provide adequate, ethical, research-based veterinary training that enables the new graduate to perform as a veterinary surgeon capable of entering all commonly recognised branches of the veterinary profession immediately on graduation or of being capable of performing adequately after a generally accepted period of practical experience. The training must cover the broad requirements for veterinary graduates and comply with EU Directive 2005/36/EC. Veterinary education should be based on scientific grounds and proven experience and provide students with adequate learning opportunities thus laying the basis for life-long learning. Considering that more than 50% of active veterinarians in Europe are engaged in clinical practice, a clinical focus is expected to be maintained during the basic training in veterinary medicine.

In addition the institutions should conduct research, provide postgraduate and specialist training and play a role in continuing veterinary education (see also Stage two).

They should, furthermore, provide services to members of the veterinary profession and the community as a whole.

1.1 Factual information

Major goals and objectives of the University of Copenhagen

The University of Copenhagen, Faculty of Life Sciences' most important contributions to society are outstanding basic research and education of graduates to the highest standard.

All teaching in the University of Copenhagen's study programmes is research-based. Independent research of the highest international quality is absolutely crucial to enable the University of Copenhagen to meet its objective of attracting the best students by consciously striving to make considerable improvements to all of its study programmes.

Consequently, the University of Copenhagen is a proud member of the International Alliance of Research Universities (IARU), which is an alliance between some of the top research universities in the world¹.

The University of Copenhagen is ranked number 8 in Europe according to the <u>Academic Ranking of World</u> <u>Universities (ARWU) 2009</u> published by Shanghai Jiao Tong University. Worldwide, the University of Copenhagen has moved up from number 45 to number 43. The University of Copenhagen once again tops the list of Scandinavian universities.

THE-QS ranking: The University of Copenhagen is the highest ranked Nordic university on the list of the world's best universities according to <u>the 2009 edition of the</u> <u>Times Higher Education-QS World University Rankings.</u> This year, the University of Copenhagen is ranked number 51 worldwide and number 15 in Europe.

Major goals and objectives of the Faculty of Life Sciences (LIFE)

LIFE's mission is to be the leading faculty in Denmark and Scandinavia within veterinary sciences, agricultural sciences and food and nutrition sciences in a strong combination with related basic sciences.

The objectives of the University of Copenhagen, Faculty of Life Sciences are to conduct international cutting-edge research, provide research-based study programmes at all university levels and contribute to technological innovation beneficial to society. LIFE attaches great importance to communicating knowledge to society and to collaborating with government departments, the public and the private sector and to taking on global responsibility, especially regarding developing countries. The Faculty of Life Sciences prepares its strategic objec-

tives biannually. The strategy is developed by the Dean and the Faculty Board following consultation with the central management group (i.e. the heads of department). The strategy is then transformed into 2-year development goals for each department. These goals are set in cooperation between the respective head of department and the Faculty Board. The fulfilment of these goals is then assessed by the Faculty Board after 1 and 2 years.

The current version of the strategy is entitled '*Strategiske* målsætninger for LIFE 2009-2010' (Strategic objectives

¹ IARU partners: University of Copenhagen, the Australian National University, ETH Zurich, National University of Singapore, Peking University, University of California – Berkeley, University of Cambridge, University of Oxford, the University of Tokyo, Yale University.

for LIFE 2009-2010) and according to this the Faculty's strategic objectives are:

LIFE's strategic objectives for the period 2009-2010 must contribute to ensuring that the Faculty can maintain and strengthen its position as one of Europe's leading university environments within food sciences, veterinary sciences and natural resource sciences. The strategy is to be realised in interaction with our employees, students and partners and must support the Faculty's continued work towards a sustainable future for the society that we are a part of.

LIFE must be an attractive and flexible workplace

1. LIFE will continue to provide its employees with a good working environment where there is a connection between Faculty development and employee well-being. There must be a balance between work and leisure, and there must be flexibility in daily life.

2. Delivering on the Faculty campus plan will help create a good environment for the staff's and students' creative and professional fulfilment.

LIFE must conduct life science research in the whole chain from basic research to production, product and consumers

3. LIFE will continue to promote professional and inspiring research leadership and focus on recruitment, employee involvement in decisions and on safeguarding the professional quality.

4. An increased effort in the competition for external funding to support the Faculty's sustainable growth.

<u>LIFE must train more life science graduates who meet</u> <u>society's needs – both in terms of width and elite</u> 5. Life will continue to expand its position as an attractive place to study, through further development of specific courses.

6. The Faculty will continue to be known for its excellent study environment, which supports the recruitment of new students, and will increase its efforts to promote study efficiency in life sciences education.

LIFE must expand its position as a leading partner in relation to the industry and public authorities

7. LIFE will strengthen its cooperation with private and public institutions on research, innovation and education. The Faculty's business strategy must be realised, and plans for increased economic cooperation must be put into practice.

8. The Faculty will increase its activities in research-based public-sector services.

LIFE must contribute significantly to enhancing the profile of the University of Copenhagen, nationally and internationally

9. Life will build on its strong tradition of international cooperation and work diligently to attract foreign staff and students.

10. In areas concerning developing countries, LIFE will use its expertise to be the frontrunner at the University of Copenhagen.

LIFE must continue to focus on cross-cutting professional endeavours

11. Introducing new interdisciplinary initiatives, LIFE will create synergy and cohesion across disciplinary boundaries and research groups, faculties and institutions.

Major goals and objectives for the Veterinary Medicine programme at LIFE

The Veterinary Medicine programme at LIFE plays an important role in the health and well-being of animals and humans by educating the veterinarians of tomorrow, through its research activities and collaboration with its partners, and by providing the highest professional standards and services to the public.

The Veterinary Medicine programme at LIFE strives towards being among the best veterinary study programmes in the world by offering a research-based international cutting-edge level of education. It uses modern educational principles and learning platforms. Instruction in English is offered at MSc level courses where it is meaningful and possible to conduct these studies in English. International collaboration is constantly being developed, and the European Association of Establishments for Veterinary Education (EAEVE) most recently evaluated and approved the programme in 2001.

The most important goals are:

- to develop world-class teaching and learning in line with top international standards laid down by EAEVE and AVMA
- to be a preferred research partner within the core academic fields of veterinary sciences
- to communicate veterinary research and its importance to health and to the prevention, control, diagnosis and treatment of diseases in animals and humans
- to create an attractive university environment with a view to attracting the best scientific, clinical and technical staff to the Faculty, nationally and internationally
- to further develop the BSc and MSc curricula in line with the Bologna Declaration and Danish legislation

The External Veterinary Study Programme Advisory Panel (*Det Veterinære Aftagerpanel*), which consists of veterinarians representing the Danish Veterinary Association and representatives from the public and private sector in Denmark, is associated with the Veterinary Medicine

programme. This panel meets three times a year and is consulted on a regular basis about the evaluation of the outcome of the Veterinary Medicine programme.

Furthermore, each of the veterinary departments has its own Advisory Board, with international and national veterinarians as members. These boards are consulted regarding the assessment of the research and services provided by the departments, including the two veterinary teaching hospitals.

In collaboration with the Danish Veterinary Association, the employment rate of veterinary graduates is followed closely. Traditionally, veterinarians graduating from LIFE are highly valued and have experienced full employment for decades. To respond to the demand from the public and private sector, LIFE has increased its admission of students from 120 per year in 2001-2006 to 180 per year from 2006.

LIFE constructively and carefully utilises the feedback from online student evaluations and from external examiners, evaluation committees and public and private partners and acts on the recommendations received. In their continuous further development of the curriculum, the Director of Veterinary Studies, the Associate Dean for Education and the veterinary departments in particular take into consideration employment rates, evaluations by external examiners and course evaluations .

1.2 Comments

No comments. Major strengths and weaknesses are listed in the previous chapter.

1.3 Suggestions

No further suggestions.

2. ORGANISATION

Veterinary training must take place within institutions of higher education (university, a higher institute providing training recognised as being of an equivalent level, or under the supervision of an university, Directive 2005/36/ EC), formally recognised as such in the respective country, and should be undertaken preferably by a freestanding unit, specifically established for that purpose. If it is undertaken by one or more departments of a parent institution, some of which also have other teaching commitments, the veterinary curriculum must be properly integrated, with effective central veterinary control. The number of veterinarians provided as educators (usually a minimum of 80 individuals working full time in the Faculty) must be high enough to ensure co-ordinated delivery of the teaching programme. Such a programme must be afforded the same recognition, status and autonomy as other professional training programmes in the institution and/or the state.

The organisational structure should make possible an objective evaluation of the quality of the training provided and the skills of the graduates. The training of the graduates should be monitored for quality at the subject and institutional levels, laying the basis for a confident system of quality assurance (see Stage two).

In order to ensure that the veterinary training meets the objectives and requirements of EU Directive 2005/36/EU, the organisational structure should allow input not only from educators and students but also from stakeholders (e.g. members of the profession and from the public) (see also Stage two).

2.1 Facts

Details of the Faculty

Name of the Faculty: Faculty of Life Sciences (LIFE) Address: Bülowsvej 17, 1870 Frederiksberg C, Denmark Telephone: +45 3533 0000 Fax: +45 3533 2079 Website: www.life.ku.dk Email: life@life.ku.dk Title and name of the head of the Faculty: Dean Per Holten-Andersen, MSc, PhD

Address of the university: University of Copenhagen Nørregade 10 PO Box 2177 1017 Copenhagen K Denmark

Details of the competent authority overseeing the Faculty

The University is an independent institution under the public-sector administration and is supervised by the Minister for Science, Technology and Innovation (pursuant to the Danish University Act).

<u>Board</u>

The Board of the University is the highest authority of the University of Copenhagen. The Board answers to the Minister regarding the activities of the University, including the administration of the University's collective resources. The Board has eleven members; six external members appointed by the Board and five members representing and elected from among the students and the academic and non-academic staff. The chairman is chosen among one of the external members.

<u>Rector</u>

The Board appoints the Rector to head the daily management of the University.

<u>Dean</u>

The Dean is appointed by the Rector to head the Faculty.

The Dean manages the main academic area, ensures the interaction between research, study programmes and work conducted for a minister by agreement with the minister concerned. The Dean is also responsible for the quality of study programmes and teaching as well as the cross-disciplinary development of the quality of study programmes, research and work conducted for a minister by agreement.

The Dean performs his tasks in close collaboration with the Faculty Management and by delegating responsibility to the Associate Dean for Research, the Associate Dean for Education, the Faculty Director and the department heads.

Faculty Management

The Dean appoints the Associate Dean for Research, the Associate Dean for Education and the Faculty Director. The Faculty Management consists of these four persons. The Faculty Management meets once a week.

The Dean delegates responsibility to the Faculty Management members in the different areas. The Dean also appoints the department heads. The Dean delegates responsibility and allocates funding to the department heads for the governance of their respective departments.

The positions as Dean, Associate Dean and head of department are filled by a process of application, both from internal and external applicants. The positions are filled with limited tenure.

Associate Dean for Education

The Associate Dean for Education has been delegated the responsibility for approval of the curricula proposed by the Veterinary Study Board and for the quality assurance of the Faculty's study programmes and teaching activities. The Associate Dean for Education undertakes his/her responsibility in an ongoing dialogue with the directors of studies, members of the study boards and with the departments, including the heads of department as well as the chairmen of the Departmental Teaching Committee.

Associate Dean for Research

The Associate Dean for Research has been delegated the responsibility for the general strategic research planning, the PhD programme, the Faculty's industrial and innovation strategy and agreements on work for a minister within the area of responsibility of the Associate Dean for Research.

Faculty Director

The Faulty Director has been delegated the responsibility for the Faculty administration, i.e. Faculty Services, which comprises: Library, Budget Office, Business Affairs, Research and Innovation, HR, Communications, Management Secretariat, Study and Students' Affairs, Building and Operations and IT.

Central Management Forum

The management of the Faculty is coordinated in the Central Management Forum (*CLF*) consisting of the Faculty Management and the department heads. The Central Management Forum meets every second week.

Responsibilities, constitution and function of the main administrative bodies

The academic issues are dealt with in fora consisting of academic staff and students elected for their positions:

Academic Council

The Academic Council is composed of the Dean (ex-officio chairman), representatives of the academic staff, PhD students and BSc/MSc students. The Academic Council of the Faculty is charged with making statements to the Dean on the internal distribution of funds, central strategic research questions and educational issues. The Academic Council awards PhD and doctoral degrees.

Veterinary Study Board

The Veterinary Study Board comprises an equal number

of representatives of the academic staff and students elected by and from among the academic staff and students, respectively. At the Faculty of Life Sciences, the election of the academic staff members takes place in the departments supplying teachers to the study programmes related to the Veterinary Study Board.

The Veterinary Study Board is responsible for the organisation, realisation and development of the study programmes and teaching activities, including:

- ensuring and developing the quality of the study programmes and the teaching activities and following up on evaluations of the study programmes and teaching activities
- producing proposals for curricula and for changes to curricula
- approving plans for the organisation of teaching activities and tests as well as other assessments forming part of the exams
- processing applications for credit transfers, including credits transferred in advance, and exemptions
- making statements on all matters of importance to the study programmes and teaching activities within the area and discussing issues related to the study programmes and teaching activities as presented by the Rector or the person authorised by the Rector to do so

The Veterinary Study Board recommends directors of studies to the Dean subject to recommendations from the departments supplying teachers to the study programmes under the Veterinary Study Board.

Director of Studies

The Director of Studies is appointed by the Dean, cf. above.

Pursuant to the Danish University Act, the Director of Studies "shall, in cooperation with the Veterinary Study Board, undertake the practical organisation of teaching and tests and other assessment forming part of the exams."

At the Faculty, the responsibility of the Director of Studies has been further developed, and it is thus the responsibility of the Director of Studies to:

- enter into dialogue with department heads, the Departmental Teaching Committees and the teachers coordinating courses about the individual study activities and the holding of exams
- organise meetings with external representatives, including both employers and graduates, as part of an annual report to the Veterinary Study Board on the development and status of the study programmes, including recruitment for the study programmes, the supply of graduates as well as external collaboration
- organise evaluations of the study programmes or parts thereof

In addition, it is the responsibility of the director of studies to:

- follow up on problems in respect of teaching activities or on specific complaints about the teaching activities from students following a request by the Veterinary Study Board
- actively contribute to communicating information about the study programmes internally and externally in collaboration with the central units responsible for the dissemination of information work
- have a dialogue with Study and Students' Affairs on the practical organisation of the teaching activities and exams

Education Committee

The Education Committee is chaired by the Associate Dean for Education and comprised of the chairmen and vice-chairmen of all the various study boards at the faculty as well as a student representative from each study programme who is also a member of the Academic Council. The Education Committee handles coordinating and advisory functions vis-à-vis the Faculty Management, in particular the Associate Dean for Education.

It is the responsibility of the Education Committee to provide advice on the organisation, realisation and development of study programmes and teaching activities at an overall and general level, including proposals for new curricula, quality assurance and quality development evaluation of study programmes and teaching activities.

Involvement of the veterinary profession and general public in the running of the Faculty

The veterinary staff is deeply involved in the decisions made at the Faculty with regard to the veterinary issues, including the Veterinary Medicine programme.

The involvement takes place on the Veterinary Study Board (VSN) with a staff member from each of the four veterinary departments and from the Department of Basic Sciences and Environment.

The Associate Dean for Education holds regular meetings with the heads of the veterinary departments and the director of studies. All issues related to finances, the infrastructure or human resources are also dealt with by the Faculty Management as a whole or by the Dean.

The department head is advised by the Departmental Teaching Committee, which has an equal number of representatives of the academic staff and of the students. The committee provides advice on the follow-up on the evaluation of the teaching activities, the courses offered in an academic year and all other issues linked to the teaching in the department.

External representatives are also involved in the running and development of the Faculty. With special focus on the veterinary area, the following can be mentioned:







Figure 2.2: Diagram of the internal administrative structure of the Faculty of LIFE Sciences (councils, committees, departments)

Recruitment Panel

The Recruitment Panel is set up in accordance with the Danish University Act with special focus on the educational area. The members represent areas in which graduates of the Veterinary Medicine programme find work. Several members are veterinarians in important positions. The dialogue with the panel is very important for the development of the study programme and the teaching. The statements from the panel contribute to ensuring that the graduates' competences correspond to the current demand on the labour market.

Advisory Boards

Advisory boards have been set up both at Faculty level and in connection with each department. The Faculty's Advisory Board includes veterinarians, and the veterinary departments' Advisory Boards have a majority of veterinarians, both national and international.

Finally, it should be mentioned that, in cases where considerable changes in the curriculum of the Veterinary Medicine programme are suggested, the proposal goes through a consultation process where all major stakeholders are asked for their opinion on the proposal. Their answers are considered a highly valuable contribution.

2.2 Comments

The existing organisation ensures that the necessary decisions are made within the veterinary area. The Management lays down the financial framework for each department, based on which the departments prepare their research and teaching budgets for two year periods. As members of study boards, the students actively participate in decisions impacting the development of study programmes and teaching, and, through course evaluations and the ongoing dialogue between lecturers and students, all students also have the opportunity to voice their opinion.

2.3 Suggestions

No suggestions.

3. FINANCES

Finances must be adequate to sustain the educational programmes, to allow for adequate research and to meet societal objectives of the Faculty. Universities and national ministries must recognise that veterinary education is more expensive than training in other science-based disciplines, since it includes clinical instruction based on public services (e.g. patient care). It must also be considered that veterinary education has to take place in a research environment and that salaries should be sufficiently high so as to attract and retain highly qualified staff.

The budget must allow the Faculty to:

- Perform adequate research based teaching
- Attract and retain highly qualified academic and support staff to reach, or exceed satisfactory teaching staff/student and teaching staff/support staff ratios.
- Ensure provision and renewal of up-to-date teaching (including IT) facilities, laboratory and clinical equipment (including vehicles for the ambulatory clinics).
- Ensure teaching and clinical training in premises with adequate hygienic and safety standards.
- Ensure adequate intramural clinical training by securing an adequate case load, including emergencies, across animal species and adequate provision of stationary and ambulatory (mobile) clinical services, according to the most recent advances in veterinary medicine.

Bearing in mind the increasing demand for specialist training, funds should be made available for places for both clinical and research postgraduate students in areas in which the Faculty has expertise.

3.1 Facts

3.1.1 General information

The University of Copenhagen receives its basic funding from the Danish Ministry of Science, Technology and Innovation (VTU). The funding covers all basic academic and administrative activities. Part of the funding of the costs of the study programmes is provided to the University according to the documented progress of students (taximeter system). The funding is channelled by the Rector to the faculties according to internal university guidelines. A proportion (70% from 2010) of the funding provided based on student progress is given to the faculties.

At LIFE, the basic funding as well as the funding from the taximeter system is distributed to the central Faculty administration and to the departments through a biyearly budget process, taking into account research and educational activities and the approved development plan of each department. There is no direct link between student activity at the departments and the funding received by the departments, but student activity is an indicator, among others, in the biyearly budget process.

Most of the basic income can be used by the Faculty and the departments as they choose. It is up to the Faculty and the departments to allocate funding to teaching and research activities, but also to choose whether to use the funding on salaries, running costs or equipment. The general infrastructure of LIFE is financed by the Faculty, whereas salaries, running costs and equipment in general are financed by the departments. Housing is financed and paid directly by the University of Copenhagen.

The public funding allocated based on student progress was higher for veterinary students than for any other students until 2006. After a reform of the 'taximeter system', the funding for veterinary students was lowered and is now the same as for other students in the natural sciences, but to compensate for the lower income, the annual basic funding from the Ministry of Science, Technology and Innovation has been increased.

An important part of the funding is the external research funding. Here, the revenues come from multiple sources, e.g. the national research councils, the European Union framework programmes, private foundations and the pharmaceutical, agricultural and food industry.

Following the merger with the University of Copenhagen in 2007, major decisions concerning buildings are made centrally by the University. Ongoing maintenance is decided and financed by the buildings department at LIFE. The veterinary departments cooperate closely with the buildings department concerning maintenance.

There is no particular mechanism for funding major equipment. It is generally up to the departments to fund equipment either from the annual funding or from external funding. In a number of cases, LIFE has supplied funding to purchase equipment.

3.1.2 Information on extra income

LIFE has a rather stable portfolio of external funding. This income is very important for sustaining an attractive research environment. The external funding has been increasing over the past couple of years partly due to a change in the overhead system. The overhead from national research councils and other research funding from the Danish state increased from 20% in 2007, to 35% in 2008 and 44% in 2009. 15% of the increase is associated with a corresponding decrease of the ministries' funding of the housing. The departments at LIFE keep 20% of the overhead, while overhead figures exceeding 20% go to the Faculty which redistributes it to the departments.

Extra income from the clinics, the pharmacy, research animal unit etc. can be used by the departments. Students do not pay tuition fees. Students at 'open university' (non-students participating in courses) pay fees that can be used by the departments.

3.1.3 Overview income (revenue) and expenditure

Table 3.1: Income/revenue (DKKm)

	State (governmer	it)	Income genera Faculty	ted by the	
Year	To university administered outside the Faculty	Direct to Faculty	Income from services provided	Research	Total
2009	178.8	220.9	29.0	72.0	321.9
2008	164.3	206.7	26.7	63.5	296.9
2007	152.2	157.5	22.1	56.4	235.9

Table 3.2: Expenditure

Year	Pay		Total			
	Salaries	Teaching	Research	Clinical	Other ¹⁾	
		support	support	support		
2009	212.1	19.0	66.9	19.3	6.7	324.1
2008	190.1	21.4	61.5	16.9	4.4	294.2
2007	171.8	5.7	30.1	18.3	4.2	230.1

1) Other is costs associated with commercial activities other than the clinics (Research animals, pharmacy etc.).

3.2 Comments

There is no separate veterinary faculty at the University of Copenhagen, so in the figures above 'The Faculty' is an estimate of the 'veterinary share' of the six departments involved in veterinary training. Costs and income have been estimated based on the documented progress of students (veterinary vs. non-veterinary) and on estimates of the proportion of veterinary vs. non-veterinary research at the departments. Income (and costs) administered outside the Faculty is an estimate of the veterinary share of general income/costs at LIFE (administration and buildings department) and an estimate of administrative and building costs (housing) at the University of Copenhagen.

From 2008 LIFE was integrated into the financial system

16 | The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

of the University of Copenhagen. Due to changes in bookkeeping principles after the merger with the University of Copenhagen, figures from 2007 to 2008 cannot be compared directly. The large rise in income and expenditure from 2007 to 2008 is largely associated with the change in overheads mentioned above in combination with changed bookkeeping practices.

The recent (2010) downward adjustment of the budget – which is partly due to the global recession – is expected to elicit a number of minor changes in the learning environment.

External funding for research will increase, and the Danish government has increased the national funding for research based on competitive project evaluations. The Faculty has increased its funding for PhD programmes considerably during the past few years, and currently (2009) around DKK 150 million (EUR 22 million) is allocated annually for PhD programmes, of which 20 stipends a year are reserved for veterinary students.

3.3 Suggestions

No suggestions.

4. CURRICULUM

GENERAL

Veterinary training must comprise at least five years' full-time theoretical and practical study in a University or equivalent higher education establishment. Longer veterinary basic training is a legal decision for the country.

It is imperative to acquire basic knowledge in all fields of veterinary science, particularly in clinical instruction, thus enabling veterinary surgeons to perform all their duties, as stated in Directive 2005/36/EC, Annex V. It is desirable that the students are allowed more advanced training (tracking) in one given field. This can be up to 20% if students meet the day1-competences.

Provided that the curriculum maintains an adequate level of training, faculties can follow the Bologna Declaration by offering a Bachelor's degree prior to finishing the 5-year full-time minimum undergraduate veterinary education, leading to the award of the professional title of Veterinary Surgeon (or equivalent professional title) as regulated by the Directive 2005/36/EC. Graduation after completing this veterinary education is equivalent to a Master's level and, depending on national regulations, this degree may be assigned to the Veterinary Surgeon (or equivalent professional denomination). The title of Veterinary Surgeon is the only professional title provided (Directive 2005/36/EC) after having completed these fulltime studies lasting for at least 5 years.

Acquisition of generic competences such as skills in written and oral communication, problem-solving and professional attitudes at all stages of the curriculum are an important adjunct to practical and clinical skills.

The curriculum (e.g. the distribution of the theoretical and practical training among the various groups of subjects listed in Directive 2005/36/EC) must be acquired in such a manner that the educational aims are met.

Curriculum development is the responsibility of the institution as a whole, and should not be left to individual departments (see also Stage two).

The aims of the curriculum and the learning objectives/ outcomes must be clearly explained to both staff and students (see also Stage two).

These aims must reflect the needs of the profession and of society, and mechanisms must be introduced to ensure this (see also Stage two).

Methods must be established to monitor and, where necessary, amend the curriculum. Faculties should aim towards the quality assurance mechanisms prescribed for Stage two.The instruction provided must include basic clinical training across all common domestic species, e.g., companion animals (dog, cat), equine and the foodproducing animals of the bovine, ovine, caprine, porcine, avian and farmed fish species. In cases where the Faculty cannot give adequate hands-on teaching in a species, arrangements should be made for students to learn this at another Faculty (freedom of learning – ECTS principle).

The breakdown of the theoretical and practical courses between the various groups of subjects must be balanced and co-ordinated so that the students may acquire the knowledge, skills and experience mentioned in these guidelines. Practical training (particularly clinical training) requires the active participation of students under appropriate staff supervision in adequate ratios.

Extra-mural practical training may form part of a fulltime veterinary course as long as it is supervised by the institution concerned and does not exceed six months of the total academic five-year training period (Directive 2005/36/EC). Extra-mural training is complementary, and can not be used to replace training by the Faculty, but can be used to supplement the basic intramural training provided by the institution.

All students must have acquired "day-one" competences by the time they graduate (see Annex IV), including general academic and professional attributes and attributes towards professional development as well as pertinent practical -generic and clinical- skills.

Provisions should be made for those undergraduate students who want to gain specific experience in research.

STUDY PROGRAMME

In meeting Directive 2005/36/EC, the core veterinary medicine curriculum eventually leading to the award of the title veterinary surgeon must include at least the subjects in the groups listed below.

Basic Subjects

Instruction in basic subjects, (physics, chemistry, animal biology, plant biology, biomathematics) may be given as part of, or in association with, other disciplines of the veterinary course. They could also advantageously be taken prior to entry to the veterinary course. These subjects should provide a solid background in chemical, physical and biological sciences, with the objective of preparing students for the subjects to be taught later in the veterinary curriculum.

Basic Sciences

Instruction in basic sciences must provide students with an understanding of the fundamental biological principles and mechanisms underlying animal health, disease and therapy, from the molecular and cellular level to the level of the organ, the whole animal and animal populations. This includes an understanding of the biological basis of normal structure and function, the mechanisms governing homeostasis, the physiopathology of organ systems and the biological and pharmacological evidence-based mechanisms, by which disordered states may be returned to normal.

The teaching must also cover the biology of agents that cause and transmit diseases from animal to animal and from animal to man, the transmission mechanisms and the mechanisms by which animals defend themselves against infectious agents and how these mechanisms can be induced.

The basic sciences must include:

- Anatomy (including histology and embryology),
- Physiology,
- Biochemistry,
- Genetics,
- Pharmacology, and pharmacy,
- Toxicology (including environmental pollution),
- Microbiology (including virology, bacteriology and mycology),
- Immunology,
- Epidemiology (including scientific and technical information and documentation methods),
- Professional ethics.

Clinical Sciences

The course of instruction in the basic sciences (pre- and para-clinical subjects) should have laid the necessary groundwork on which to build clinical knowledge and skills.

Propaedeutic training, as listed in the Annex V.4 of Directive2005/36/EC, must provide the skills required to examine the patient or analyse the case, collect the clinical and laboratory data as the fundamental basis for a diagnostic and therapeutic plan for the case.

Intramural clinical training must be provided so all students receive a common clinical grounding, encompassing all species and disciplines, in accordance with the Directive 2005/36/EC, Annex V, and adequately enable veterinary surgeons to perform basic clinical duties in all species, if required (see the list of essential competences required at graduation, the so-called "day-one skills" in Annex IV. The time allotted for training in clinical sciences should account for at least 40% of the entire curriculum. This does not preclude the acquisition of additional knowledge in selected areas for which there is less demand as considered in the Directive 2005/36/EC.

Extramural clinical training and exposure to patient-driven clinical services are, albeit encouraged, only to be considered supplementary to the intramural clinical instruction provided by the Faculty, with equal consideration to teaching hospital (stationary) clinics or ambulatory (mobile) clinical services, which should remain the core of the intramural clinical instruction.

The clinical sciences must include:

- Obstetrics,
- Pathology (including pathological anatomy),
- Parasitology,
- Clinical medicine and surgery (including anaesthetics);
- Clinical lectures on the various domestic animals, poultry and other animal species;
- Preventive medicine,
- Radiology, (diagnostic imaging)
- Reproduction and reproduction disorders,
- Veterinary state medicine and public health,
- Veterinary legislation and forensic medicine,
- Therapeutics,
- Propaedeutics.

The above subjects are general subjects. Faculties should ensure that students are exposed to all major areas of clinical specialisation.

Animal Production

Food producing animals

Animal Production is the broad term used to describe the entire discipline of breeding, rearing and disposal of food-producing animals and their products by sale, slaughter for food or as waste. Tuition must cover the major food-producing species (cattle, sheep and/or goat, pigs, poultry, rabbits, and equine) and one example of a farmed fish species. Knowledge of animal production in its broad sense is essential for the veterinarian in order that changes in normal behaviour and management can be detected, animals can be handled safely, treatment can be given in an appropriate manner and appropriate recommendations can be made for prophylactics and care.

The training must be oriented towards the application of prophylactics and clinical treatment on individual and herd basis, preventive veterinary medicine (e.g. herd health) and management of epidemic diseases, reproductive management, housing of animals and feeding regimes. The training provided should allow veterinarians to derive proper data for food chain information and possible risks to human health.

Training must familiarise students with the normal methods for the disposal or recycling of animal waste and the common requirements for ethical, environmentally-sound and hygienic disposal of the bodies of companion animals and the carcasses of food-producing animals.

Training must provide adequate knowledge on animal welfare issues, covering rearing and holding on-farm until slaughter.

Knowledge of the economics of animal rearing enterprises and their place in the rural economy is required to make informed decisions about disease control and euthanasia.

The importance of genetics in animal breeding and trade as well as for disease resistance should be understood.

Theoretical and practical training must cover the broad requirements of the individual member states.

Theoretical instruction should be accompanied by practicals which provide the confidence to handle major domestic animal species safely and the ability to carry out basic tasks in animal management, breeding and rearing.

The animal production subjects must include:

- Animal production (the domestic food-producing animal species in society and the economy)
- Animal nutrition (nutrition and feeding of food-producing species)
- Agronomy (cropping, grazing and land use in relation to food-producing animal species)
- Rural economics (animals as a business and their importance in the countryside)
- Animal husbandry (housing, management and reproductive management systems, including artificial reproduction techniques, e.g. artificial insemination, multiple ovulation and embryo transfer).
- Veterinary hygiene (farm layout, drainage, cleaning, disinfection and bio-security)
- Animal ethology and protection (behaviour, social organisation in animal populations and common welfare issues, including behavioural disorders and their remediation)

Non food producing animals

Relevant and appropriate considerations of the above (section 4.2.4.1) principles should also be applied to the major non food producing animals like the dog and cat.

Veterinary Food Hygiene/Public Health

The training must ensure that each student understands the fundamentals of veterinary public health, food science and modern food technology, the scientific basis of the relationship between food and human health, and the factors underlying the quality of hygiene (of food and the environment).

Directive 2005/36/EC, Annex V.4, 5.4.1, requires therefore adequate knowledge of the hygiene and technology involved in the production, manufacture and putting into production of animal foodstuffs or foodstuffs of animal origin. It further requires adequate knowledge of the laws, regulations and administrative provisions relating to the production of such foodstuffs. Veterinary public health/Food hygiene education for veterinarians must therefore ensure that, on graduation, they can be trained by the Competent Authority (CA) to carry out the audits described in the appropriate food hygiene regulations.

Study programmes should therefore build on a sound knowledge in the field of veterinary public health/food hygiene so that students would:

- know how to carry out ante-mortem inspection on farm or in the abattoir and assess the welfare of the animals concerned.
- be familiar with veterinary public health and the respective legal regulations.
- understand post-mortem inspection and possess basic practical skills within the food production business and inspection requirements.
- understand the importance of risk-based monitoring of the processes (HACCP concept). These tasks require a sound knowledge of the pathology, microbiology, parasitology, pharmacology and toxicology of food animals, of epidemiology and of the legal requirements, allowing them to ensure public health and report back along the food chain to the farmer and to the Competent Authority.
- interpret the information returned by the Food Business Operator to the farm so as to benefit production, animal welfare and public health.
- acquire an acceptable knowledge of the principles of Food Hygiene Legislation at EUlevel and in the individual state.

The veterinary food hygiene/public health subjects must include:

- Inspection and control of animal foodstuffs or foodstuffs of animal origin and of the respective feedstuff production units,
- Food hygiene and technology,
- Food science including legislation,
- Practical work (including practical work in places where slaughtering and processing of foodstuffs takes place).
- The course of instruction must cover subjects necessary to prepare the graduate to perform effectively not only in the traditional veterinary practice, but also in other common professional roles. Undergraduates must receive broad information on the different opportunities of post-graduate training and specialisation.

Professional Knowledge

Professional knowledge subjects must include:

- Practice management
- Veterinary certification and report writing
- Career planning and opportunities

4.1. Factual information

The Veterinary Medicine programme is governed by the Danish University Act² and Ministerial Orders on BSc and MSc programmes³, ⁴. Pursuant to these, all university study programmes must be divided into a BSc programme (3 years) and an MSc programme (2½ years for veterinary medicine) as described by the Bologna Declaration. Furthermore, a set of general academic criteria for knowledge, skills and competences obtained under BSc and MSc programmes are described in the Act and the Ministerial Orders.

Having completed the veterinary BSc and MSc programmes in accordance with the Bologna Declaration, the student is, according to Danish law, eligible for:

- Enrolment on a PhD programme, since the student has obtained a solid foundation of scientific knowledge and skills and is able to understand, retrieve, handle and critically evaluate scientific data and literature.
- The Danish and EU veterinary authorisation, since the student has obtained the EAEVE Day 1 competences needed to start a career as an official veterinarian and/or practising veterinarian.

The entire veterinary curriculum thus comprises 5½ years, equivalent to 330 ECTS, i.e. 60 ECTS per year. According to the general curriculum policy of the University of Copenhagen, the veterinary curriculum year is modulated into four 9-week blocks with an interim week. Each block consists of 15 ECTS, and courses are adapted to ECTS of 7.5, 15 and 30 ECTS, where applicable.

Management of the veterinary curriculum

LIFE has the freedom to change the curriculum within the framework of the Danish University Act and EU legislation. The general University of Copenhagen course structure and educational objectives must also be taken into consideration.

All changes of course content are subject to the approval of the Veterinary Study Board, and major curriculum changes also to the Dean's approval (see Figure 4.1).

The Dean decides on the resources allocated to the individual departments and approves the overall curriculum through the Associate Dean for Education. The decisions on the curriculum and on educational resources made by the Dean are based on the recommendation from the Director of Veterinary Studies, the Veterinary Study Board

- 2 Consolidation Act (LBK) no. 1368 of 7 December 2007
- 3 Ministerial Order (BEK) no. 338 of 6 May 2004
- 4 Ministerial Order (BEK) no. 1402 of 14 December 2009
- 20 | The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

and the relevant heads of department.

The Director of Veterinary Studies is the chief coordinating officer for the study programme with responsibility for the strategic development and coordination of the curriculum. The Director of Veterinary Studies reports to the Associate Dean for Education.

The Veterinary Study Board (VSN) makes decisions on the content and form of the individual courses and proposes changes to the curriculum. It also evaluates the courses and the veterinary programme on the basis of the compulsory student evaluations. The Veterinary Study Board is composed of academic staff from all departments involved in the veterinary BSc and MSc programmes as well as both BSc and MSc students. The director of studies is appointed member of the Veterinary Study Board.

The department head must ensure the quality and interaction between the research and education of the department and, in consultancy with the Veterinary Study Board and the director of studies, the department head must follow-up on evaluations of study programmes and teaching.

Each department has a Departmental Teaching Committee consisting of an equal number of members of the academic staff and the students. The Departmental Teaching Committee plans, coordinates and evaluates the courses and teaching specific to the department.

A Course Coordinator from the academic staff is appointed to each course. This person has the academic and practical responsibility for the course, including the processing of students' evaluations and recommendations for course changes.



Figure 4.1: Management flow for the veterinary curriculum

Full arrows indicate the formal executive pathway and dashed arrows the curriculum management pathway. Square boxes indicate executive bodies, rhombuses academic bodies with academic decision-making power, and parables advisory and coordinating bodies.

4.1.1 Power of subjects and types of training

Power of subjects

An overview of the curriculum is shown in Figure 4.2. The following description concerns the new 2009 curriculum which gradually replaces the old 2005 curriculum.

The core courses of the veterinary curriculum comprise the majority of both the BSc and MSc programmes. In the veterinary BSc programme, 150 ECTS concern compulsory courses, while 30 ECTS concern electives. However, to be admitted into the veterinary MSc programme, the student must select four specific elective veterinary BSc courses (see Figure 4.2). In the veterinary MSc programme, 26.5 ECTS concern electives. The electives have been combined into four tracking programmes ('differentiations'), i.e. 'Advanced companion animal', 'Equine clinic', 'Biomedicine' and 'Herd health and veterinary public health'. Students taking the latter tracking may choose between a Herd Health profile and a Veterinary Public Health profile within the course. For students not wanting to follow one of the four tracking programmes, it is possible to design their own tracking programme, e.g. by following other veterinary courses at foreign universities and/or participating in veterinary trainee services. Alternative university courses must be approved by the Veterinary Study Board, and a veterinary trainee service programme must be supervised by relevant Faculty staff.

All tracking programmes qualify the student for the common Danish and EU Veterinary Licence.

Types of training

The curriculum provides considerable didactic variety for our students, e.g. lectures, seminars, self-directed learning and desk-based and laboratory practical exercises, non-clinical practical exercises, clinical practical exercises and clinical work. Furthermore, within the specific courses, the practical learning is often structured as project-based learning, case-based learning, e-learning or blended learning sessions.

Table 4.1a shows the distribution of curriculum hours for the compulsory courses, including the BSc and MSc thesis work. Tables 4.1b, c, d, e and f show the total curriculum hours for students attending the respective tracking programmes.

Definition of types of training

We have followed the EAEVE definitions of the didactic categories of theoretical and practical training5, except for self-directed learning.

According to the EAEVE definition, self-directed learning constitutes sessions of individual students making use of defined teaching material provided by the Faculty. E-learning is given as an example. This definition may also include regular course preparation on the basis of recommended texts, course notes etc., which we do not regard as self-directed learning, but ordinary course preparation. We regard self-directed learning to be different from a student's ordinary preparation for a course. According to the comprehensive textbook on learning theory6, one of the goals in self-directed learning is that the learner should be able to plan, carry out and evaluate his/her own learning (Merriam et al., 2007, p. 107). Thus, self-directed learning contains a process in which the learner takes the initiative to diagnose his/her learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies and evaluate learning outcomes. This is different from ordinary teaching/learning where persons other than the learner have defined learning goals, identified resources for learning and evaluate the learning outcomes. In our veterinary curriculum, self-directed learning is best presented in the BSc thesis and the MSc thesis; setups which adhere to the principles of self-directed learning concept as concerns the evaluation of learning outcomes. However, similar types of self-directed projectbased learning also take place within other courses, e.g. the Veterinary Introduction course, the Herd health and veterinary public health course and some of the elective tracking courses.

4.1.2 Undergraduate curriculum

Core subject progression and integration

The *core programme* provides a background in common medical principles and treatment of animal diseases in a combination of a discipline and organ system-based curriculum.

The curriculum offers an integrated progression of basic subjects, basic and clinical sciences, animal production and food safety courses. Examples:

- Chemistry and biochemistry are integrated into one Chemistry-Biochemistry course within the first block of year 1.
- Biophysics is integrated into the Anatomy-Physiology I course within blocks 2-3 of year 1.
- Clinical aspects of anatomy are taught as part of the courses in Veterinary Imaging and Large and Small Animal Clinics within the first blocks of the MSc programme (year 4).
- Biostatistics is taught as an integrated part of a common Biostatistics and Epidemiology course in block 3 of year 2.
- Ethology and assessment of animal behaviour are integrated with veterinary jurisprudence in

⁵ EAEVE SOP ANNEX III, page 45.

Merriam, S.B., Caffarella, R.S. and Baumgartner, L.M: Self-directed learning. In: Learning in Adulthood.
 A comprehensive guide, 3rd ed., Jossey-Bass, San Francisco, USA, 2007, pp. 105-129.

two courses in the final blocks of the BSc and MSc programmes, respectively.

 The 'stable to table' concept is combined with the integrated BSc and MSc courses Herd health and veterinary public health and Practical herd health consultancy and meat inspection, respectively.

See also the curriculum digest plan in Figure 4.2.

The core programme of the first three years provides the scientific knowledge necessary for the student to launch an intensive study of animal health and diseases. Core courses develop the specific anatomical, cell biological, physiological, pathophysiological, pharmacological and clinical principles necessary to understand normal and abnormal structure and function and their relation to the clinical manifestations, diagnosis, treatment, management and prevention of disease.

The fourth year and the first semester of the fifth year are devoted to core courses that teach skills in medicine

and surgery and to elective courses on the diagnosis and treatment of important diseases of the major domestic species, many of which are taught using a problemoriented approach. Clinical experience is an integral part of veterinary medical education. Emergency services are also provided. In clinics, students take patient histories, learn the art and science of diagnosis and make recommendations for treatment or referral to other services for further evaluation as well as participate actively in case management and client communication. All of these activities are performed under the supervision of Faculty staff who are specialists in their field. The herd health programme is conducted by regular, clinical and adjunct faculty in conjunction with private farms and businesses on Zealand.

The second semester of the fifth year and the final year, i.e. the first semester of the sixth year, are dedicated to one of the four elective tracking courses, the MSc thesis and the final course in veterinary jurisprudence and animal welfare assessment.

Year/ veterinary programme	Block	Cou	irses								
	1	Veterinary introductory course (7.5 ECTS)	Veterinary chemistry and biochemistry (7.5 ECTS)								
Year 1 BSc	2	Cell biology, general histology and genetics (15 ECTS)	Veterinary anatomy and physiology 1 (15 ECTS)								
	4	Veterinary anatomy and	physiology 2 (15 ECTS)								
	1	Immunology, general pathology and pathophysiology (15 ECTS)									
	2	Pharmacology, toxicology and pharmacy (7.5 ECTS)									
Year 2 BSc	3	Biostatistics and epidemiology (7.5 ECTS)	Infection microbiology (15 ECTS)								
	4	Nutrition and breeding (7.5 ECTS)	Microbial food safety (7.5 ECTS)								
	1	Consistent allowers and assultant diseases (15 ECTC)	Basic clinical theory, small animals (7.5 ECTS)								
Maria 2 DCa	2	- Special pathology and poultry diseases (15 EC15)	Basic clinical theory, large animals (7.5 ECTS)								
Year 3 BSC	3	Herd health and public health (7.5 ECTS)	Veterinary paraclinics – 1 (7.5 ECTS)								
	4	Veterinary jurisprudence and ethology (5 ECTS)	BSc project (10 ECTS)								
	1	Small animal modicing surgery and reproduction (1E ECTS)	Large animal medicine, surgery and reproduction (15 ECTS)								
	2										
Year 4 MSc	3	Practical herd health consultancy and meat inspection (7.5 ECTS)	Veterinary paraclinics 2 (7.5 ECTS)								
	4	Veterinary imaging (7.5 ECTS)	Emergency, obstetrics, critical care, clinical anaesthesiology (7.5 ECTS)								
	1	Large animal general cl	inical practice (15 ECTS)								
	2	Small animal general cli	inical practice (15 ECTS)								
Year 5 MSc	3	Differentiation courses (26.5 ECTS):									
	4	 Equine clinic Advanced companion animals Herd health and veterinary public health Biomedicine 	Veterinary jurisprudence and assessment of animal welfare (3.5 ECTS)								
Year 6 MSc	2	MSc thesis (30 ECTS)									

Figure 4.2: Overview of the veterinary BSc and MSc curriculum 2009 Legends: BSc courses (grey) are elective, but compulsory for students enrolling on the veterinary MSc programme. Courses surrounded by arrows rotate within the four blocks involved.

BSc and MSc thesis

The BSc project (10 ECTS) and the MSc thesis (30 ECTS) take, as their didactic/pedagogical basis, a project-based approach, thus favouring self-directed accommodative and divergent learning. The BSc thesis is primarily based on literature studies, while the MSc thesis must contain an experimental part. This helps the students to obtain the necessary qualifications to independently maintain and develop their scientific and professional competences and qualifications by identifying, describing and solving or handling complex veterinary problems across the veterinary curriculum. The thesis work is also regarded as a necessary basis for lifelong learning.

Curriculum hours

The total curriculum hours within core courses and elective courses are shown in Tables 4.1, 4.2, 4.3 and 4.4. The tables have been delineated from the individual curriculum 2009 courses7 in order to fulfil the EAEVE reporting requirements, i.e. the training hours within all courses have been individually allocated according to the EU-listed veterinary subjects and the types of training defined by EAEVE (for definitions of types of training, see above).

Table 4.1a shows an overview of the total curriculum hours which must be taken by all students graduating with a degree in veterinary medicine and thus includes BSc and MSc thesis work but excludes tracking courses. The additional Tables 4.1b, c, d, e and f show the total curriculum hours for students engaged in the different tracking programmes.

7 See details of curriculum 2009 course hours in Appendix 5.

Table 4.1a: Training	hours and workload	within the compulsor	y veterinary curriculum
----------------------	--------------------	----------------------	-------------------------

	Hours of trai	Hours of training										
	Theoretical t	raining		Supervised	practical trair	ning]	-		
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical animal work	Clinical work	Other	Total training hours	Course preparation	Total student workloa		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)					
1st	301	16	50	246	136	0	26	775	874	1,649		
2nd	294	0	19	384	4	0	34	735	912	1,647		
3rd*	298	0	0	464	96	23	24	904	749	1,653		
4th	282	39	80	67	108	431	21	1,028	653	1,681		
5th#	20	0	6	7	0	528	12	573	278	851		
6th¤	0	0	550	91	91	91	2	825	0	825		
Total	1,195	55	705	1,259	435	1,073	119	4,840	3,465	8,305		

* Including BSc thesis, 10 ECTS, # Excluding elective tracking course, 26.5 ECTS, p Including MSc thesis, 30 ECTS

Table 4.1b: Curriculum hours in years 5 and 6 and for the full programme for students following the Advanced companion animal tracking programme^a

	Hours of trai	ning								
	Theoretical t	Theoretical training			Supervised practical training			10	Ę	
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical ani- mal work	Clinical work	Other	Total training hour	Course preparati	Total student workload
	(A)	(B)	(C)	(D)	(E)	(F)	(G)			
5th#	20	0	6	37	0	958	12	1,033	568	1,601
6th¤	0	0	550	91 91	91	2	825	0	825	
Full*	1,195	55	705	1,289	435	1,503	119	5,300	3,755	9,055

a Course hours for the specific tracking programme are shown in Table 4.3, # Including compulsory course ¤ Including MSc thesis, 30 ECTS, * Including years 1 to 4

Table 4.1c: Curriculum hours in years 5 and 6 and for the full programme for students following the Equine clinic tracking programmea

	Hours of train	ning								
	Theoretical tr	Theoretical training			Supervised practical training					
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical animal work	Clinical work	Other	Total training hours	Course preparatio	Total student workload
	(A)	(B)	(C)	(D)	(E)	(F)	(G)			
5th#	20	137	6	77	0	926	113	1,279	370	1,649
6th¤	0	0	550	91	91	91	2	825	0	825
Full*	1,195	192	705	1,329	435	1,471	220	5,546	3,557	9,103

a Course hours for the specific tracking programme are shown in Table 4.3, # Including compulsory course ¤ Including MSc thesis, 30 ECTS, * Including years 1 to 6

Table 4.1d: Curriculum hours in years 5 and 6 and for the full programme for students following the Biomedicine tracking programmea

	Hours of tra	aining								
	Theoretical	training		Supervised	Supervised practical training			ş	5	
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical animal work	Clinical work	Other	Total training hou	Course preparati	Total student workload
	(A)	(B)	(C)	(D)	(E)	(F)	(G)			
5th#	154	22	61	159	0	688	59	1,143	438	1,581
6th¤	0	0	550	91	91	91	2	825	0	825
Full*	1,329	77	760	1,411	435	1,233	166	5,410	3,625	9,035

a Course hours for the specific tracking programme are shown in Table 4.3, # Including compulsory course ¤ Including MSc thesis, 30 ECTS, * Including years 1 to 6

 Table 4.1e: Curriculum hours in years 5 and 6 and for the full programme for students following the Herd

 health and veterinary public health tracking programme with a Heard Health profilea

	Hours of tra									
	Theoretical	training		Supervised	Supervised practical training			v.	ы	
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical ani- mal work	Clinical work	Other	Total training hour	Course preparati	Total student workload
	(A)	(B)	(C)	(D)	(E)	(F)	(G)			
5th#	20	75	380	7	15	544	99	1,140	440	1,580
6th¤	0	0	550	91	91	91	2	825	0	825
Full*	1,195	130	1,079	1,259	450	1,089	206	5,407	3,627	9,034

a Course hours for the specific tracking programme are shown in Table 4.3, # Including compulsory course ¤ Including MSc thesis, 30 ECTS, * Including years 1 to 6

Table 4.1f: Curriculum hours in years 5 and 6 and for the full programme for students following the Herc
health and veterinary public health tracking programme with a Public Health profilea

	Hours of tra	ining								
	Theoretical	training		Supervised practical training				Ś	5	
Year	Lectures	Seminars	Self-directed learning	Laboratory and desk-based work	Non-clinical ani- mal work	Clinical work	Other	Total training hour	Course preparati	Total student workload
	(A)	(B)	(C)	(D)	(E)	(F)	(G)			
5th#	20	75	380	7	25	534	99	1,140	440	1,580
6th¤	0	0	550	91	91	91	2	825	0	825
Full*	1.195	130	1.079	1,259	460	1.079	206	5,407	3.627	9.034

a Course hours for the specific tracking programme are shown in Table 4.3, # Including compulsory course ¤ Including MSc thesis, 30 ECTS, * Including Year 1 to 6

Table 4.2: Core course curriculum hours allocated to EU-listed subjects

The curriculum hours have been extracted from the individual core courses, excluding the BSc and MSc thesis work, and summarised in order the fit into the EU-listed subject categories and the EAEVE categories of types of training⁸.

	Subject	Theoretical training			Supervised practical training						
		Lectures	Seminars	Self-directed learning	Lab. and desk-based work	Non-clinical animal work	Clinical training	Other	Total teaching load	Course preparation	Total student workload
		А	В	с	D	E	F	G			1
1.	Basic subjects										
	a) Physics	8	0	0	10	0	0	2	20	40	60
	b) Chemistry	28	0	20	20	0	0	2	70	92	162
	c) Animal biology	20	0	0	0	11	0	3	34	52	86
	d) Plant biology	0	0	0	0	0	0	0	0	0	0
	e) Biomathematics	22	0	0	36	0	0	2.5	61	64	125
	1- Total number of hours	78	0	20	66	11	0	9.5	185	248	433
2.	Basic sciences										
	a) Anatomy	92	0	11	114	137	0	8.6	362	246	608
	b) Physiology	80	0	6	57	15	0	6.5	165	261	426
	c) Biochemistry, cellular and mo- lecular biology	42	0	4	21	0	0	3	70	112	182
	d) Genetics	50	0	0	44	0	0	3.6	97	146	243
	e) Pharmacology and pharmacy	50	0	0	54	0	0	5	107	140	247
	f) Toxicology	10	0	0	28	0	0	2	38	36	74
	g) Microbiology	74	0	0	92	20	0	9	195	194	389
	h) Immunology	21	0	0	20	0	0	2	43	95	138
	i) Epidemiology	14	0	0	24	0	0	2	40	42	82
	j) Professional ethics	17	5	20	8	0	0	1	51	35	86
	2- Total number of hours	449	5	41	462	172	0	43	1,168	1,307	2,474

⁸ See also Appendix 5 for details on the distribution of hours within the individual courses in the 2009 curriculum.

Table 4.2, continued

	Subject	Theoretical training Supervised practical training									
		Lectures	Seminars	Self-directed learning	Lab. and desk- based work	Non-clinical animal work	Clinical training	Other	Total teaching load	Course preparation	Total student workload
		Α	В	с	D	E	F	G			
3.	Clinical sciences	10	0	0	0	0	27	1	10	40	0.4
	a) Obstetrics	18	0	0	0	0	27	1	46	48	94
	b) Pathology	57	0	5	84	83	1	9	239	364	603
	c) Parasitology	30	0	0	30	0	0	4	64	70	134
	d) Clinical medicine	143	18	0	0	0	280	7	448	350	798
	e) Clinical lectures on various domestic animal, poultry and other animal species	64	0	2	17	11	6	4	98	148	246
	f) Surgery	111	19.5	0	10	5	317	9	472	316	788
	g) Preventive medicine	10	0	8	0	6	6	1	31	26	57
	h) Diagnostic imaging	9	0	44	0	0	111	4	168	0	168
	i) Field veterinary medicine	0	0	0	0	0	0	0	0		0
	j) Reproduction and repro- ductive disorders	20	11	0	7	0	98	4	140	85	225
	k) Veterinary state medicine and public health	6	0	2	2	2	4	1	17	19	36
	l) Veterinary legislation and forensic medicine	21	10	3	20	0	0	4	58	40	98
	m) Therapeutics	8	0	0	20	0	0	0	28	14	42
	n) Propaedeutics	12	4.5	0	39	31	130	2.5	219	112	331
	3- Total number of hours	509	63	64	229	138	980	51	2,027	1,592	3,619

Table 4.2, continued

	Subject Theoretical training Supervised practical training										
		Lectures	Seminars	Self-directed learning	Lab. and desk- based work	Non-clinical animal work	Clinical training	Other	Total teaching load	Course preparation	Total student workload
		А	В	с	D	E	F	G	1	1	
4.	Animal production	r	1			1	1	1			
	a) Animal production	8	10	0	6	0	0	0	24	14	38
	b) Animal nutrition	34	0	0	28	0	0	6	68	69	137
	c) Agronomy	0	0	0	0	0	0	<1	0		0
	d) Rural economics	6	0	0	2	0	0	<1	8	9	17
	e) Animal husbandry	4	0	0	1	0	0	<1	5	6	11
	f) Veterinary hygiene	3	0	0	2	0	0	<1	5	6	11
	g) Animal ethology and protection	29	10	3	38	0	0	4	84	39	123
	4- Total number of hours	84	20	3	77	0	0	11	195	143	338
5.	Food hygiene/ public health a) Inspection and control of animal foodstuffs or foodstuffs of animal origin and the respective feedstuff production unit	3	0	8	8	0	4	1	24	10	34
	b) Food hygiene and technology	35	0	14	21	0	0	2	72	98	170
	c) Food science including legislation	12	0	4	9	0	0	1	26	29	55
	d) Practical work	2	0	0	23	24	0	0	49	5	54
	5- Total number of hours	52	0	26	61	24	4	4	171	142	312
6.	Professional knowledge	·						·			
	a) Practice management	5	0	0	0	0	0	<1	5	9	14
	b) Professional ethics	22	4	21	8	0	0	1	56	50	98
	and report writing	3	0	0	0	0	0	<1	3	4	7
	d) Veterinary legislation	4	1	0	1	0	0	0	6	3	9
	e) Career planning and opportunities	5	2	0	2	0	0	0	9	2	11
	6- Total number of hours	39	7	21	11	0	0	1	79	67	139

Subje	ct	Theoretical training Supervised practical training									
		Lectures	Seminars	Self-directed learning	Lab. and desk- based work	Non-clinical animal work	Clinical training	Other	Total teaching load	Course preparation	Total student workload
		Α	В	С	D	E	F	G			
Advanced companion animal		0	0	0	30	0	430	0	480	290	750
Equine clinic		0	68	0	70	0	398	101	637	92	729
Biomedicine		134	22	55	152	0	160	47	570	160	730
Herd health and veter.	Herd health profile	0	75	374	0	15	16	87	567	162	729
public health	Public health profile	0	75	374	0	25	6	87	567	162	729

Table 4.3: Curriculum hours of elective tracking programmes allocated to types of training

Table 4.4: Curriculum hours* in subjects not listed in Tables 4.2 or 4.3 to be taken by each student, including diploma work (final graduation thesis or final graduation work)

Subject	Theoretical training			Supervised pra	Other	Total		
	Lectures	Seminars	Self-directed learning	Lab. and desk- based work	Non-clinical ani- mal work	Clinical training	Other	Total teaching load
	Α	В	с	D	E	F	G	
BSc thesis	0	0	270	5		1	276	
MSc thesis	0	0	550	273		2	825	

*Estimated average distribution between self-directed learning and experimental training.

4.1.3. Further information on the curriculum

Curriculum changes

The curriculum described was implemented in September 2009. The revision was initiated in October 2007 and based on the curriculum from 2005, which, as mentioned above, will be gradually phased out, and the first veterinary MSc students will thus graduate under the 2009 curriculum in 2015. Further comments on the changes will be provided below under *Comments*.

Individual transitional curricula are and will be prepared on an ongoing basis for students who were initially enrolled under the 2005 curriculum but who have to switch to the 2009 curriculum due to protracted study progress.

Compulsory parts of the curriculum

Students must pass all compulsory courses. In general, lectures, seminars and desk-based practical exercises are voluntary, while all clinical and the vast majority of non-clinical practical exercises are compulsory, i.e. more than 80% attendance is required. An attendance list is commonly used as verification of attendance. In some courses, student attendance and participation are measured based on the student's activity in the learning management system. Varying methods are in use for making up for absences.

Elective tracking programme

In the veterinary MSc programme, 26.5 ECTS concern electives. As mentioned above, the electives have been combined into the four tracking programmes: Advanced companion animal, Equine clinic, Herd health and veterinary public health, and Biomedicine. All students must enrol on a tracking programme. However, students may design their own tracking programme, e.g. by taking other veterinary courses at foreign universities and/or involving themselves in a veterinary trainee service. Foreign university courses must be approved by the Veterinary Study Board, and a veterinary trainee service programme must be supervised by relevant Faculty staff.

The tracking programmes have a maximum number of students (see below). Students are selected for admission into the specific tracking programmes on the basis of their wishes and average BSc grade. However, if students engage themselves in extramural veterinary trainee work (e.g. clinical practice, diagnostic laboratory, official food safety unit or biomedical industry) for a 3-week period as a minimum, in summer courses at foreign universities during holidays or in university student affairs during the BSc studies, they increase the calculated grade used in the selection process for admission into the different tracking programmes.

The purpose of the clinical tracking courses in Advanced companion animal and Equine clinic is to further educate the students towards traditional small animal and equine veterinary practice, respectively. The maximum student numbers in the two programmes are 45 and 25, respectively.

The Herd health and veterinary public health course integrates the fields of the herd health management and the public health, thus supporting the 'stable to table' concept. Learning is mostly project-based, and students may thus choose a Herd Health or Veterinary Public Health course profile. The course aims at expanding the students' knowledge, skills and competences essential for working as large animal veterinary practitioner (production animals) and official veterinarian. The maximum student number is 75.

The Biomedicine tracking programme has been established in order to prepare veterinary MSc students for the job opportunities within biomedical research and in the industry. The course introduces students to biomedical research and methodologies with focus on the use of laboratory animals in product development. The maximum student number is 35.

Clinical exercises prior to clinical rotations

All students participate in clinical or propaedeutic exercises prior to their clinical rotations, starting with the core course 'Basic clinical theory, large animals' in the first semester of year 3 and continuing with the small and large animal medicine, surgery and reproduction courses in the first semester of year 4 (see Figure 4.2). Within the courses, students rotate in groups 1-36 between the following practical exercises:

- Large animal basic clinical theory: Basic lameness examination (1.5 days), handling and restraining horses and cattle (1.5 days), principles of hoof care (2 days) in groups of 22 students.
- Small animal medicine, surgery and reproduction:

Clinical propaedeutics (15 days), surgical techniques (10 days) in groups of 36 students.

Large animal medicine, surgery and

reproduction:

Clinical propaedeutics (15 days), surgical techniques (10 days) in groups of 36 students.

Clinical course rotations

Clinical rotations are carried out at two levels:

- Level 1. All MSc students circulate in groups of 45 or 22/23 persons between the repeated clinical/paraclinical courses in the second semester (i.e. blocks 3, 4) of year 4 and the first semester (i.e. blocks 1, 2) of year 5 (see Figure 4.2).
 Level 2. Within the clinical core and elective MSc courses, the students circulate
 - MSc courses, the students circulate in small teams in course-specific clinical rotation programmes (see below).

During the clinical rotations, the students are closely supervised by the veterinary teaching staff. Necropsies of relevant cases from students' clinical rotations are demonstrated in collaboration with the pathology department as an integrated part of the rotations. Examples:

Core courses

- Large animal general clinical practice course: Clinical rotation in internal medicine (2 weeks), surgery (2 weeks), production animal clinic (2 weeks) and reproduction (2 weeks). Team size of 15 students.
- Small animal general clinical practice course: Clinical rotation in general medicine (3 weeks), basic and elective surgery (3 weeks), electives (including dermatology, exotics, rehabilitation and clinical nutrition) (1 week) and self-study including e-learning modules (2 weeks). Team size: 15 students.

Elective tracking courses

 Advanced companion animal: Clinical rotation programme encompassing internal medicine (2 weeks), specialty services (cardiology/oncology/neurology/ophthalmology (2 weeks), emergency critical care (2 weeks), orthopaedic surgery (2 weeks), soft tissue surgery (2 weeks), anaesthesia (1 week), clinical pathology (1 week), veterinary imaging (1 week) and elective/extramural clinics/services (3 weeks). Team size: 2-4 students.

• Equine clinic:

Clinical rotation programme covering internal medicine (4 weeks), surgery (4 weeks), field service (4 weeks), reproduction (2 weeks) and extramural equine practice (2 weeks). Team size: 1-5 students.

 Herd health and veterinary public health: Clinical diagnostic work/clinical preventive medicine (5 days on cattle farms, 5 days on pig

farms). Team size: 4-5 students. Up to an additional 6 weeks of extramural production animal practice is possible if chosen by individual students.

 Biomedicine: Clinical lab animal programme covering genetics/ breeding/genetic modifications (1 week), microbiology/immunology (0.5 weeks), basic handling and minor procedures in lab animals, anaesthesia and surgery (1.5 weeks), in vivo pharmacology/toxicology (2 weeks), clinical medicine/pathology (1 week). Team size: 6 students.

<u>Emergency and hospitalisation activities</u> At the Large Animal Veterinary Hospital, the students have primary patient responsibility and are involved in all aspects of patient management for hospitalised patients. Furthermore, they can take part in the out of hour's emergency service.

For the Equine clinic tracking programme, students have primary patient responsibility and are involved in all aspects of patient management for hospitalised patients. Furthermore, they take part in emergency/critical care for both primary and referred emergency cases. The students are also involved in the out of hour's emergency service. During the foaling season, a special rotation programme is arranged.

At the Small Animal Veterinary Hospital, the students have primary patient responsibility and are involved in all aspects of patient management for hospitalised patients. For the Advanced companion animal tracking programme, a special rotation in emergency/critical care covers both primary and referred emergency cases. The students are involved in both the daytime emergency rotation and the out of hour's emergency service.

Activities in the mobile clinic (field service) Mobile clinical practice is not a part of the compulsory clinical training. However, students can take part in the mobile clinic in the out of hour's emergency service. In the Equine clinic tracking programme, the students have 4 weeks in the mobile practice.

4.1.4 Extramural work

No compulsory extramural clinical work is included in the curriculum. However, as BSc students increase their calculated grade used in the selection process for admission into the different tracking programmes, a large part of the students engage themselves in veterinary trainee service for 3 or more weeks during the summer holidays. The hands-on practical training in meat inspection and food safety inspection in the second semester of year 4/ the first semester of year 5 (see Figure 4.2) is outsourced to the Danish Meat Trade College (see Chapter 4.1.5 below).

The elective tracking course on Equine clinic includes, in its clinical rotation programme, one week of extramural equine practice. In the other clinical tracking programmes, extramural clinical work may be incorporated into the course programme by individual students, i.e. Advanced companion animal (up to 3 weeks), Herd health and veterinary public health – Herd Health profile (up to 6 weeks).

Furthermore, MSc students may, with approval from a clinical veterinary supervisor, compile their own special tracking programme based on extramural work. The assessment is based on a project report.

Students attending the tracking course in Herd health and veterinary public health must undertake visits to slaughterhouses (1-2 days) and food administration units (1-2 days) during the course period.

4.1.5 Specific information on the practical training in food hygiene

The practical teaching in meat and food hygiene inspection (training in meat inspection procedures, HACCP and sanitation) is outsourced to the Danish Meat Trade College in Roskilde. The course consists of the following elements:

- Training in practical meat inspection at slaughterhouses
 - Swine slaughterhouse at the Danish Meat Trade College, Roskilde (45 km from Frederiksberg Campus in the direction of Taastrup Campus). Group size: 6 students, one teaching veterinarian per group, duration: 8 hours.
 - Private cattle slaughterhouse in Slangerup (24 km from Roskilde/Frederiksberg Campus). Group size: 12 students. One teaching veterinarian per group, duration: 8 hours.
- Danish meat inspection coding (diagnostic codes) based on slaughterhouse material (4 hours). Group size: 12 students. One teaching veterinarian per group.
- Practical inspection of food hygiene, HACCP and animals followed by report preparation (duration: 8 hours of supervised practical training, 8 hours of selfdirected study, incl. report writing. Group size: 12 students. One teaching veterinarian per group.

4.1.6 Ratios

Table 4.5: General indicators of types of training (delineated from Tables 4.1a-f)

	otal core programme training, incl. nesis work	otal training, incl. Advanced com-	anion animal tracking progr.	otal training, incl. quine clinic tracking programme	Total training Herd health public health programme Public health	g, incl. and vet. n tracking Herd health	otal training, incl. iomedicine tracking programme	EAEVE guidelines					
		-	<u>u</u>		profile	profile							
Ratio R6													
Total theoretical training (A+B+C), hours	1,955	1,9	955	2,092	2,404	2,404	2,166						
Total supervised practical training (D+E+F), hours	2,766	3,2	226	3,234	2,797	2,797	3,078						
Denominator of (A+B+C) / (D+E+F), as 1 / denominator	1.41	1.65		1.55	1.16	1.16	1.42	0.51-0.36					
Ratio R7													
Total clinical work (F), hours	1,073	1,5	503	1,471	1,079	1,089	1,233						
Lab work and desk-based work (D) + non-clinical animal work (E), hours	1,694	1,7	724	1,764	1,719	1,709	1,846	1					
Denominator of F / (D+E), as 1 / denominator	1.58	1.	15	1.20	1.59	1.57	1.50	1.88-2.21					
Ratio R8 (self-directed learning includes project and thesis work, but excludes course preparation)													
Self-directed learning(C), hours	70)5	705	705	1,079	1,079	760						
Total teaching load (A+B+C+D+E+F+G), hours	4,8	340	5,300	5,546	5,407	5,407	5,410						
Denominator of C / (A+B+C+D+E+F+G), as 1/ denominator	6.87		7.52	7.87	5.01	501	7.12	0.51-7.87					
Indicator of student workload (total cours hours = 1 ECTS)	se preparation	hours accord	ing to course	descriptions b	based on the a	assumption tha	it 27,5 total s	tudent work					
Total teaching load (A+B+C+D+E+F+G),	10	240	5 300	5 5/6	5 /07	5 407	5 / 10						
Course preparation as allocated in the course descriptions of the curriculum, hours	3,4	165	3,755	3,557	3,627	3,627	3,625						
Denominator of teaching load / course preparation, 1 / denominator	0.	72	0.71	0.64	0.67	0.67	0.67						

Table 4.6: Indicators of training in food hygiene/public health*

	Core programme training, excl. BSc and MSc thesis work	Total training, incl. Herd health and vet. public health tracking programme – Public health profile	EAEVE guidelines
Ratio R9			
Total compulsory training load in food hygiene/public health (X), hours	171	471	
Total compulsory training load (Y), hours	3,740	4,307	
Denominator of X/Y, as 1/ denominator	21.94	9.15	Still open
Ratio R10			
Total compulsory training load in food hygiene/public health (X), hours	171	471	
Total compulsory extramural work within Veterinary Inspection (Z), hours	68	143	
Denominator of X/Z, as 1 / denominator	0.40	0.30	Still open

*Hours are delineated from Table 4.2, grp. 5 'Food hygiene/public health'.

4.2 Comments

4.2.1 Preparation of the graduate for the various parts of the veterinary profession

The curriculum exposes students to all aspects of veterinary medicine, and this broad-based coverage is its primary strength.

The Faculty's location in the metropolitan area surrounded by a rural environment provides a good caseload that includes all major domestic species. Thus, students graduate with clinical competence in most areas of small and large animal practice of relevance to Danish veterinarians.

The tracking opportunities in Advanced companion animal, Equine clinic, Herd health and veterinary public health, and Biomedicine are generally welcomed by students and teachers. The tracking programmes were introduced into the Danish veterinary curriculum in order to meet the increasingly complex and specialised work requirements within the traditional fields of veterinary work and in response to the increasing job opportunities within research and the biomedical field.

With the revised curriculum (2009), the teaching in herd health and animal welfare assessment has been strengthened in the core courses. Thus, all students graduating have the essential knowledge and competences needed to start a career as official veterinarians and modern farm veterinarians for the Danish pig, dairy and poultry industry.

The curriculum provides considerable didactic variety (lectures, practical exercises, clinical practical exercises, project-based learning, case-based learning, e-learning, skills laboratory) for our students.

The new 2009 curriculum emphasises learning by practical training and hands-on experience in relation to theoretical lecturing. Particularly the clinical work has been boosted in order to meet the AVMA demands, so all students have more than 1,000 hours of clinical work training within the core programme, which corresponds to a full year (60 ECTS) of student work when including the time needed for course preparation.

4.2.2 The curriculum structure

The veterinary undergraduate curriculum has a two-tier structure according to the principles of the Bologna Process.

The further modulation of the new 2009 curriculum into the block structure used by the University of Copenhagen (i.e. four blocks or 'quarters' of 9 weeks, i.e. two in each semester of the year) provides a flexible platform for students wishing to undertake extramural trainee service or take alternative courses at other universities or faculties. However, the tight block structure in combination with many compulsory courses and practical exercises and the high educational workload puts constant pressure on the veterinary students. The consequences of absence from the studies, even for a relatively short period of 2-3 weeks in a row, accumulate on the one or two courses taught during this period; hence, the student may have problems catching up after an absence.

As concerns the teaching, the block structure dictating course volumes of either 7.5, 15 or 30 ECTS has promoted the integration of courses. Furthermore, the curriculum revision process of integrating and adapting subjects to the new course structure has also addressed and regulated the formerly uneven distribution of the teaching and learning load in the old 2005 curriculum. On the other hand, the rigid course structure makes it difficult to fit new courses into the curriculum without reducing the volume of others.

4.2.3 Major developments in the curriculum, now and in the near future

Recent curriculum developments

The veterinary curriculum as formulated in 1994 was evaluated by EAEVE in 2001.

A potential Category 1 deficiency, which may be a reason for EAEVE not to approve the curriculum, was identified. The deficiency was that participation in clinical teaching was not mandatory. This deficiency was instantly corrected so that, since 2001, students must be present at least 80% of the time in the practical clinical teaching in order to pass. The veterinary programme was therefore approved by EAEVE.

The EAEVE evaluation in 2001 also suggested potential areas where the curriculum could be improved. Actions were taken to improve the curriculum as listed in Appendix 4.

In 2005, the Royal Veterinary and Agricultural University (now LIFE) implemented an educational reform where the course structure was changed from the traditional semester structure to the new block structure.

In September 2009, the new revised veterinary curriculum was implemented as described above. This revision was initiated in 2007 for the following reasons:

- To include new EAEVE Day 1 competences in the veterinary curriculum and course descriptions
- To fulfil the standards set by AVMA
- To align the veterinary courses to the overall course structure at the Faculty, i.e. courses of either 7.5, 15 or 30 ECTS

To secure a minimum of 1-year clinical hands-on work (i.e. a total of 60 ECTS) and compliance with the EAEVE

guidelines⁹ stating that "The time allotted for training in clinical sciences should account for at least 40% of the entire curriculum"

• To further improve the curriculum as suggested by EAEVE in 2001 (see Appendix 4)

Future curriculum developments

LIFE has as a strategic goal for the internationalisation of all MSc programmes, which implies that the veterinary MSc programme is to be taught in English by September 2012. Excluded from this plan are all courses or areas of educational activities that involve client contact and specific Danish legislation. However, special arrangements will be made for English-speaking foreign students in respect of these courses. Detailed planning of the courses is in progress.

The veterinary curriculum is very packed. The ratio between teaching load and course preparation (in hours) defined in the curriculum reveals that, on average, the veterinary student has 45 minutes of preparation time for each 60 minutes of teaching. This is a reflection of less time for preparation in relation to practical training and clinical work and more time in relation to the theoretical courses. This makes the introduction of new subjects impossible without equivalent elimination of an existing subject(s).

As mentioned earlier, the basic subjects such as physics, chemistry and animal biology have been integrated into basic veterinary science courses in order to make room for an updated veterinary curriculum. Plant biology and agronomy were abolished as independent subjects in the veterinary curriculum decades ago in order to make room for more specific veterinary subject areas. Thus, plant biology and agronomy have been totally integrated into animal production and nutrition subjects, food and foodstuff hygiene and technology, toxicology, pharmacology, clinical medicine and therapeutics¹⁰ etc. and are only touched upon when relevant for specific veterinary knowledge and understanding.

4.2.4 Local conditions or circumstances that might influence the ratios in 4.1.6

In order to comply with the EAEVE recommendations and AVMA requirements for clinical training, the practical training, particularly clinical hands-on work, has been significantly augmented in the new veterinary curriculum. In 2001, compulsory clinical hands-on work added up to 414 training hours¹¹ compared to 1,064 hours in today's curriculum. The increase in practical training has significantly influenced the ratio between practical and theoretical training (i.e. ratio R6; denominator = 1.4). Hence the R6 ratio (denominator) for the present curriculum is higher than the ECOVE recommendations (i.e. R6 denominator = 0.51-0.36). However, we regard the high amount of clinical work as a strength in our curriculum.

Our definition of self-directed learning, which limits this didactic category to specific thesis and project work, also influences the R6 ratio significantly. Calculation of the R6 ratio in accordance with the EAEVE definition of self-directed learning, i.e. including course preparation as part of the theoretical training/self-directed learning, would alter the R6 ratio (denominator) to 0.51. The relatively large number of clinical work hours also influences the ratio between clinical work and other practical training (i.e. ratio R7; denominator = 1.6), which lies just outside the ECOVE recommendations (i.e. 1.88-2.21).

Self-directed learning is valued very highly in the 2009 veterinary curriculum despite the fact that the ratio between the type of training and total theoretical training (i.e. ratio R8; denominator = 7.59) lies at the upper limit of the ECOVE recommendations (i.e. 0.51-7.87). Again, this ratio is greatly influenced by the definition of selfdirected learning. E-learning material used by students as preparation for practical training sessions, e.g. anatomical dissections, physiological laboratory exercises and practical propaedeutic training, is regarded as part of their course preparation and not self-directed learning as recommended in the EAEVE definition¹².

4.2.5 Mobile clinic (field practice)

Compulsory field practice has been excluded from the core programme¹³ in 2010. The purpose of this change in the hands-on clinical teaching is optimisation and adjustment to the current budgetary situation at the Large Animal Hospital. The core 2005 curriculum includes 4 weeks of hands-on clinical training in the hospital in large animals. We are convinced that we can offer the students more effective clinical training by practicing at the hospital using the referred cases as well as the teaching animals.

In the mobile clinic, a considerable part of the time is spent on transport from one animal owner to another.

12 EAEVE SOP ANNEX III, page 45.

⁹ EAEVE SOP Annex 1, item 1.4.

¹⁰ None of the respective course coordinators allocated teaching hours for plant biology and agronomy during the SER1 work process of extracting information for Table 4.2 from the integrated curriculum course descriptions.

¹¹ EAEVE self-evaluation report, 2001.

¹³ Core programme for the MSc curriculum 2005, which will be taught until the new 2009 curriculum takes over in relation to the MSc programme in 2012.

Furthermore, considering the maximum number of students (180) attending the clinical large animal core course in 2010 and onwards, the days that each student will be able to join the field practice will be limited. Therefore, it has been decided to focus the hands-on teaching within the large animal clinical core course on hospitalised animals.

4.2.6. The Elite-Module in the veterinary curriculum: Animal health research and health promotion

The veterinary curriculum has been temporary expanded with an experimental, elective Elite Master Course (22,5 ECTS) in Animal health research and health promotion, based on extra-ordinary government funding from 2010 to 2013. The elite course is 1 of 8 at the Copenhagen University. It is open for Danish and foreign veterinary MSc-students that are selected on the basis of a formal application and BSc-grades. For Danish veterinary students participating in the course, it substitutes the major part of an ordinary tracking programme.

The aim of the elite-course is focused on research based education, i.e. 'to move from teaching students to 'adopt the best veterinary practices' to 'make them learn to develop best veterinary practices'. The ability to develop practices (including knowledge) becomes more and more important in a society undergoing dramatic changes, especially with respect to access to information and decreasing respect for authorities. That is, there is an increasing need for the veterinarian to collect, manage, analyze (quantitatively and qualitatively) information/data in the local context (herd, practice, organization, ...) to provide context-specific knowledge. This process is basically scientific research.

Detailed course description can be found at: http://www.kursusinfo.life.ku.dk/Kurser/300074.aspx.

4.3 Suggestions

The 2009 curriculum was implemented one year ago. The first year of the new BSc curriculum has not yet been fully evaluated. Adjustments of the curriculum and courses will take place gradually as evaluations are made and eventual problems are recognised, but otherwise the new curriculum should be allowed full implementation before new major changes are introduced.

However, at this point, the following curriculum issues need attention in the near future.

- The very packed and integrated curriculum leaves little room for new subjects and results in a very high teaching load that may be a threat to students' study progression.
 - A possible solution to this dilemma lies in

further reduction of the basic subjects such as physics and chemistry in line with the reduction of plant biology and agronomy, as students admitted into the veterinary BSc programme already have specific (high) qualifications within these subjects at A and B levels from upper secondary school.

The organisation of the Danish meat inspection system is undergoing fundamental changes. The role of official veterinarians is changing from a high degree of practical meat inspection work to a main focus on supervision and audit of a risk-based meat inspection carried out by official auxiliaries and slaughterhouse personnel, and supervision and inspection of food safety (e.g. HACCP and sanitation) and animal welfare at slaughterhouses and other food processing plants. These changes will be reflected in future adjustments of the veterinary curriculum with due respect to the EU legislation.

As mentioned above, there is no compulsory large animal mobile practice within the present veterinary curriculum. Students generally participate in field practice work during summer holidays, e.g. in order to enhance their gualifying grades for admission into a specific tracking programme (see *Elective tracking programme* above), and/or as a part of their clinical tracking programme, e.g. Equine clinic and Herd Health programme (see Extramural work above). The lack of compulsory exposure to ambulatory practice within the large animal core courses is only a possible matter of concern in relation to the clinical teaching within single patient-driven services, e.g. horse practice, some aspects of cattle and small ruminant practice and general practice management. Teaching in practical herd health consultancy/ production animal medicine includes teaching sessions at large cattle and pig farms, which ensures exposure to the clinical aspects of this veterinary field. However, the student exposure to single animal-driven clinical services, including aspects of practice management within horse and ruminant practices, is valuable. Therefore, the integration of a short compulsory extramural field practice period into the rotation programme of the large animal clinical core course is under consideration. This must be organised in collaboration with the Danish Veterinary Association in order to ensure the guality of the extramural practice work. Furthermore, the high guality of the extramural training would, to some extent, compensate for the future relative depletion of student exposure to food producing animals that is a likely consequence of the increasing number of students who will graduate from the MSc programme within the next few years (see also Chapter 7: Patient flow and Ratios.)

^{34 |} The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

5. TEACHING, QUALITY AND EVALUATION

BASIC SUBJECTS and SCIENCES

One of the major objectives is the acquisition of problem-solving skills. To this end, the instruction must cover the methods of acquiring, documenting and analysing scientific and technical data.

Practical training must serve to familiarise students with subjects studied in theoretical courses and to give them some insight into how scientific knowledge might be acquired. Practical training does not mean simply observing the teacher during demonstrations. Acquisition of generic problem-solving skills is required.

CLINICAL SCIENCES

Clinical instruction must take place in groups that are small enough to ensure hands-on experience for all.

Students' problem solving and clinical skills should be developed through their full involvement in case management under suitable supervision. The mere observation of others practising veterinary medicine and surgery is not acceptable. The instruction provided must include basic clinical training across the common domestic species. Effective monitoring systems are to be provided in cases where the Faculty cannot give hands-on teaching in a species and the student must learn this at another institution.

Time-tabled lectures should be excluded from a substantial proportion of the clinical course as they may clash with students' case management activities.

Those responsible for theoretical clinical training must also be involved in the practical side dealt with in the institution's clinics.

The advancement of knowledge is a task involving all members of the profession. Therefore, interaction between students and clinical researchers working in the clinical field should be arranged in order to stimulate students' interest in research.

ANIMAL PRODUCTION

Those teaching the theory of animal production subjects should also be involved in practical training with the major domestic animal species. Teaching should reflect the species balance and management systems of the country. For food producing animas, practical work should be farm-casebased as much as possible.

Practical extramural courses should be encouraged as long as adequate supervision is in force.

VETERINARY FOOD HYGIENE /PUBLIC HEALTH

Practical training must familiarise students with the concepts of Food Business audit especially with regard to food of animal origin at various stages in the food chain, particularly in slaughterhouses. Students should develop Day-1 competences in the interpretation of food chain information, ante-mortem inspection and post-mortem inspection and be capable of being trained as official veterinarians by the Competent Authority. The training must take place in groups that are small enough to ensure that all students are able to gain hands-on experience.

It should also give students the opportunity to monitor units involved in the production, processing, distribution and consumption of foodstuffs.

Extramural instruction in the training in veterinary public health and food hygiene may be used so long as it is properly supervised.

ESSENTIAL COMPETENCES AT GRADUATION (DAY ONE SKILLS)

Students must be provided with clear learning objectives for each of the essential competences at graduation (day one skills) listed in Annex IV.

THE TEACHING AND LEARNING ENVIRONMENT

The academic environment must be conducive to learning of the students and the didactic and pedagogic development of the teaching staff (see also Stage two).

MONITORING AND ASSESSMENT Of students (see also Stage two)

Student performance must be assessed regularly. Written, project and practical work, generic competences such as professional attitudes, communication skills, problem-solving abilities must all be evaluated with equal emphasis to practical and clinical skills. Evidence must be produced that students meet day one competences. Evaluation methods must be known and understood by the students.

Whenever possible, the use of external examiners/observers should be made.

Results of assessment must be documented properly.

Of teachers and instruction

A system must be available to allow students to evaluate teacher performance and teaching.

Students must be able to participate in the development of the curriculum in general.

STUDENT WELFARE

Adequate measures should be taken to minimize the risk of zoonotic diseases as much as possible (e.g. vaccination against rabies)

The establishment must provide or have a right of access to a system of routine and special guidance for students,

especially those with social problems or those having difficulties with their studies.

The guidance programme should also cover future career development and/or job selection.

5.1 Factual information

5.1.1 The teaching programme

5.1.1.1 Coordination and evaluation of teaching and courses

Coordination of teaching and curriculum assessment is a continuous process at LIFE with formal and informal aspects.

The formal organisation ensures the essential interaction between:

- Research and education
- Quality of study programmes and teaching within and across departments
- Quality of study programmes and teaching within and across veterinary subject areas

In cooperation with the Veterinary Study Board, the director of studies has the coordinating responsibility for the curriculum. As appointed member of the Veterinary Study Board, the director of studies undertakes the role as coordinating officer of teaching and educational assessments between the veterinary departments (see also Figure 4.1).

The Veterinary Study Board's decision-making power in respect of academic matters ensures the organisation, realisation and development of educational and teaching activities as well as the coordination across departments by:

- Targeting the quality of study programmes and teaching by assessing, approving and proposing adjustments to courses
- Follow-up on the regular evaluations of study programmes and teaching
- Proposing curriculum adjustments and changes
- Approving the organisation of teaching and assessments forming part of the exams
- Making statements on all matters of importance to study programmes and teaching
- Discussing issues related to study programmes and teaching as presented by the Rector or the person authorised by the Rector to do so

The head of department must ensure the quality and interaction between the research and education of the department within the present resource framework. In consultancy with the Veterinary Study Board and the director of studies, the head of department must followup on evaluations of study programmes and teaching. Students play a central role in the coordination and assessment of the curriculum as the direct targets and beneficiaries of education and learning. Their evaluation and influence on study programmes and teaching is ensured by:

- Formal student representation in the decisionmaking and coordinating educational bodies, e.g. the Veterinary Study Board and the Departmental Teaching Committees
- The compulsory student evaluations of course content, coordination and teaching

The formal course evaluation process is described below (see Chapter 5.1.4).

Outside these formal aspects of curriculum coordination and evaluation, students are free to contact all members of the Veterinary Study Board, the Administration, the director of studies, the heads of department and individual lecturers. Furthermore, the Faculty Management and director of studies have frequent meetings with student organisations where educational matters are discussed. Finally, students are asked to participate in various ad hoc working groups concerning study programmes and teaching.

5.1.1.2 Pedagogical strategies at LIFE

Lecturers have the freedom to choose their own didactic methods within the University of Copenhagen course structure and the individual course descriptions. However, by law¹⁴, a constructive alignment of teaching methods, learning goals and exam methods must exist. As mentioned earlier, the teaching at LIFE is organised in 4 blocks per year. Each block is of 9 weeks' duration. This study structure gives students the opportunity to absorb themselves in their studies, and it gives lecturers the opportunity to use different kinds of teaching methods. Apart from traditional lecturing, there is a long tradition at LIFE for using case study methods, problem-based learning and other activities which ensure active involvement of students and enhance their learning. LIFE complies with the international recommendations for university pedagogical practice by formulating learning outcomes for each course offered at LIFE. John Biggs' model of constructive alignment and structure of intended learning outcomes is used for this.

All lecturers and students at LIFE must use the learning management system called 'Absalon'. The system is used in traditional courses with face-to-face teaching as course message board and file and media server for uploaded course materials. However, the learning

¹⁴ Ministerial Order on Criteria for the Relevance and Quality of University Study Programmes and on Procedures for Approval of University Study Programmes (Bekendtgørelse om kriterier for universitetsuddannelsers relevans og kvalitet og om sagsgangen ved godkendelse af universitetsuddannelser), L 1402 2009.
management system is also used for blended learning and distance learning sessions. One example of such use is the courses 'Basic Clinical Surgery Methodology', 'Clinic and Pathology: Small Animal Clinic' and 'Anatomy and Physiology I and II', where lecturers upload PowerPoint presentations with speak and educational instruction videos to Absalon. These learning resources are used by students both as compulsory preparation prior to participation in practical exercises and for revising after exercises and lecturing. Other examples of structured interactive e-learning are e-learning sessions in clinical pathology and physiology. A third example is the ten successive internet-based tests that are part of the Anatomy and Physiology I and II courses.

The IT Learning Center at LIFE provides courses on elearning and use of e-learning software and actively supports and supervises departments and individual lecturers on pedagogical design and practical setup of interactive computer-assisted learning within courses.

5.1.1.3 Textbooks, course note materials and e-learning

In all courses that include theoretical aspects, textbooks play an important role in the students' course preparation. All course descriptions contain a reference list of textbook materials on which the course syllabus is based. For some courses, the theoretical exam requirements are linked specifically to certain textbook material. Course notes (e.g. PowerPoint handouts, compendia, exercises) uploaded to the Absalon system feature in nearly all courses in conjunction with lectures, seminars and practical exercises. Furthermore, supplementary audio-visual material (e.g. videos of demonstrations and non-clinical/clinical practical exercises, PowerPoint presentations with speak, audio files) is used in an increasing number of courses. These materials are also distributed to and downloaded by the students through Absalon.

5.1.1.4 Extramural teaching arrangements

Extramural teaching arrangements are organised by the departments or the course coordinator at the different departments in order to support undergraduate teaching within the veterinary curriculum.

The Departments of Large Animal Sciences, Small Animal Clinical Sciences and Veterinary Disease Biology and their respective course coordinating staff have established the following contractual arrangements with farms, veterinary practices and slaughterhouse companies:

Farms:

- The dairy herd Assendrup (240 cows) has signed a contract on teaching, MSc projects and research cooperation
- The dairy herd Gjorslev (310 cows) is providing teaching access to more than 180 students per year
- The farrow-to-finish herd Askelygaard (500 sows) has signed an agreement regarding teaching access for more than 180 students per year. LIFE is providing

herd health assistance in cooperation with the recognised, specialised, private pig practice Ø-Vet

 Private owners of aquaculture, mink, poultry, pig and cattle enterprises are providing herd access and herd health data for all students in the core course in Basic Clinical Practice, Large Animals, the elective courses on Herd Health and Food Safety and for selected MSc projects.

Veterinary practices:

- The recognised, specialised dairy practice InnoVet-Ko is providing herd health data and assists in demonstrations of practical herd health management in selected herds for all students in the core course General Clinical Practice, Large Animals
- The recognised, specialised, private pig practice Ø-Vet (eight vets) is providing herd health data and assists in demonstrations of practical herd health management in selected herds for all students in the core course General Clinical Practice, Large Animals
- Specialised cattle and pig practices are providing assistance for student case and research projects on herd health in the elective tracking courses on Herd Health and Food Safety and for selected MSc projects.
- Approved specialised private practices employing at least one veterinarian specialised in companion animals and possibly in a subspecialty such as dermatology, ophthalmology, internal medicine or surgery provide elective clinical service training for students involved in the Small Animal differentiation. These students can choose between a 2-week in-house or a 2-week extramural clinical service during the elective tracking course.

Slaughterhouses and food handling companies:

- The Danish Meat Trade College in Roskilde has signed a contract on teaching students attending the core course on meat inspection. At its teaching slaughterhouse and food processing facilities, the Danish Meat Trade College provides training in practical meat inspection and implementation and audit of HACCP, SSOP and animal welfare.
- Various slaughterhouses and food handling shops and companies provide access to their production and sales facilities for students attending the elective tracking course on Food Safety.

5.1.1.5 General learning objectives underlying the veterinary curriculum and how these are ensured The veterinary curriculum at LIFE strives towards being among the best veterinary study programmes in the world by offering a research-based international cutting-edge level of education using modern educational principles and learning platforms. Instruction in English will be offered at MSc level courses from 2012 where it is meaningful and possible to conduct these studies in English. International collaboration is being developed, aiming to

facilitate student exchange.

The primary educational goals for the Veterinary Medicine programme at LIFE are:

- To develop world-class teaching and learning in line with recommendations from EAEVE and AVMA
- To further develop the BSc and MSc curricula in line with the Bologna Declaration (EU) and Danish legislation
- To ensure research-based education
- To create an attractive university environment with a view to attracting the best scientific, clinical and technical staff to the Faculty, nationally and internationally

The European Association of Establishments for Veterinary Education (EAEVE) evaluated and approved the programme in 2001. The 2009 curriculum is based on this approval and further adjusted in line with EAEVE and AVMA recommendations and, of course, the relevant Danish and EU legislation and the common educational strategy of the University of Copenhagen.

We evaluate the progress in meeting the mission in the following way:

- By applying for accreditation from ACE Denmark
- By applying for evaluation and accreditation from EAEVE
- By applying for accreditation from AVMA
- By assessing the number of research programmes and other research activities carried out in collaboration with relevant academic and private partners
- By assessing the number of postgraduate courses offered by the Faculty; by assessing the number of participants in and contributions to postgraduate courses, conferences, congresses; by assessing the number of peer-reviewed publications; by assessing the associated impact factors; and by assessing the number of participants in activities directed towards users and society in general
- By assessing the number of international applications for academic positions
- By assessing the extent of natural staff loss
- By assessing the number of applicants to academic and technical positions

5.1.1.6 Assessment of Day 1 competences

The Day 1 competences are embedded directly in the course descriptions of the 2009 curriculum as central learning objectives. Thus, passing all compulsory courses ensures that the student most possibly has acquired the required knowledge and skills, though some competences such as "be willing to use one's professional capabilities..." and "understand the need and professional obligation..." are difficult to check within a normal curricular framework.

Besides the competence development and assessment embedded in the curriculum, knowledge of the Day 1 competences of graduates and students is collected at LIFE by way of the following activities:

- Survey of graduating seniors and alumni on educational preparedness, achievement of Day 1 skills and employment satisfaction. The first survey is to be established in autumn 2010 in collaboration with the Danish Veterinary Association. The alumni survey will be repeated every fourth year.
- External Veterinary Advisory Panel consisting of eight members representing the veterinary profession in industry, private practices and governmental agencies. Established in 2007, the panel meets with the Associate Dean for Education, the director of studies, the chairman of the Veterinary Study Board and the department heads and others twice a year. The panel is a consultative body and works as a forum for systematic dialogue between employers of veterinary graduates from LIFE and/or users of LIFE's continuing education offered. It is a very valuable panel, which provides highly useful feedback to the Faculty. The recommendations of the panel are given careful consideration.
- Veterinary departmental advisory boards with international and national veterinarians as members. These boards meet once or twice a year and are consulted regarding the assessment of the study programmes, research and services provided by the departments, including the two veterinary teaching hospitals.
- The Veterinary Study Board constructively and carefully utilises the feedback from online student evaluations, external examiners, evaluation committees, the above-mentioned advisory boards and panels of public and private partners and acts on the recommendations received.
- The Director of Veterinary Studies, the Associate Dean for Education and the veterinary departments in particular take into consideration employment rates, evaluations by external examiners and course evaluations in their continuous further development of the curriculum towards fulfilling the EAEVE Day 1 competences.

5.1.2 Teaching environment

5.1.2.1 Staff development facilities, particularly in relation to teaching skills

All the general staff development facilities of the University of Copenhagen are available to staff at LIFE. This includes courses and training at University pedagogical and didactic centres and departments.

Examples:

 Department of Science Education, Faculty of Science (e.g. Higher Education Teaching and Teaching Practice Programme for assistant professors and postdocs)

- IT Learning Center, LIFE (e.g. courses on e-learning, use of the learning management system, supervision and help for staff wanting to establish web-based learning)
- Centre for Internationalisation and Parallel Language Use, Faculty of Humanities (e.g. language courses, English language certification)
- Centre for Academic Writing, Faculty of Humanities (e.g. Academic Writing, Oral Presentation and Communication)

In addition to the university staff development facilities, LIFE offers a range of courses and training, e.g. project management, communication and presentation skills and e-learning didactics and tools via the HR department, the IT Learning Center and the Library.

Educational courses provided by LIFE departments and its centres are generally free of charge for LIFE staff and financed centrally via the Faculty budget.

5.1.2.2 Measures taken to improve the quality of teaching and of learning opportunities Pedagogical measures at employment PhD students must attend a 2.5 ECTS course in Introduction to University Pedagogy at the Department of Science Education at the Faculty of Science as a part of their PhD programme.

Assistant professors and postdocs at the Faculty of Science, the Faculty of Life Sciences and the Faculty of Pharmaceutical Sciences at the University of Copenhagen attend the pedagogical 'Higher Education Teaching and Teaching Practice Programme' (Adjunktpædagogikum). This is a compulsory educational training programme for assistant professors, who must complete this course within the first couple of years of their employment in order to qualify for the position. Postdocs are also encouraged to participate in the programme. The learning objectives of the Higher Education Teaching and Teaching Practice Programme is to qualify young lecturers at natural science departments to prepare, implement and evaluate a teaching programme in a manner that best supports student learning in relation to the formulated learning objectives for the respective subjects. Furthermore, it is a goal that the participants can contribute to developing the curriculum of the subject at the Faculty. The course consists of (i) a practical part where the lecturer receives pedagogical supervision of his or her own teaching from senior colleagues, and establishes a teaching portfolio and (ii) a theoretical part containing two courses: A course in Introduction to University Pedagogy and a course in University Science Teaching and Learning. The total workload of the programme is equivalent to 10 ECTS.

Academics applying for positions as associate professor and professor must document teaching experience and possess pedagogical competences equivalent to those obtained in the Higher Education Teaching and Teaching Practice Programme (see above). If this is not the case, new senior academic staff is urged to attend appropriate pedagogical and didactic courses, and probationary employment may be instituted for new associate professors until adequate educational competences are achieved. Finances for the pedagogical courses for PhD students, postdocs and assistant professors are provided by LIFE. This course budget amounts to approximately DKK 1 million per year (≈ EUR 135,000) for the Faculty.

Recurrent pedagogical measures

Teaching performances of individual lecturers are assessed and graded regularly via the routine course evaluation procedures (see Chapter 5.1.4). On the personal level, teaching performance is discussed and reviewed in line with reviews of research activities, social behaviour and well-being etc., as part of the yearly departmental appraisal interviews. On this basis, plans for personal development of teaching skills and competences are established for each academic staff member, e.g. participation in didactic and pedagogical courses and workshops, language courses etc.

Individual courses are generally financed by the departments or by the Strategic Educational Fund at LIFE which has a budget of DKK 1 million per year (\approx EUR 135,000).

Other pedagogical measures

On a yearly basis, an educational workshop is organised for the members of LIFE's Study Boards. Furthermore, the Veterinary Study Board also organises a yearly educational workshop for all course coordinating staff under the veterinary curriculum.

All foreign staff members are offered Danish courses. All teaching staff in the veterinary MSc programme may attend English courses in conjunction with the English teaching certification programme.

5.1.2.3 Reward for teaching excellence (e.g.

accelerated promotion, prizes etc.)

The 'Golden Bull Award' (*Den Gyldne Tyr*) is presented once a year by a student jury at LIFE to 'The Lecturer of the Year'. A similar award, 'The Harald of the Year' (Årets Harald), is awarded at the University of Copenhagen among all lecturers at all faculties.

5.1.3 Exam system

A series of Danish Ministerial Orders¹⁵ on exams, grading and the use of external examiners in university study programmes regulates the student assessment system, e.g.:

 Exams at Danish institutions of higher education are handled not only by the lecturer, but also by an internal or external examiner. One third of the exams (calculated as the sum of course ECTS divided by total

¹⁵ Ministerial Orders no. 867, 19 August 2004 and no. 231, 22 March 2006.

curriculum ECTS) must include an external examiner approved by the Ministry of Science, Technology and Innovation. BSc and MSc theses must be assessed by an external examiner.

- The examiners are responsible for assuring the same standard for all exams and thus their quality.
- The exam method must reflect the course content and type of training.
- Exams can be (i) oral, written or practical, (ii) course and seminar attendance and practical training, (iii) continuous assessment based on performance during a course or (iiii) combinations of the above.
- Students have a maximum of three exam attempts. But in unusual circumstances, the University may allow two additional attempts. Such decisions are made by the Veterinary Study Board on the basis of individual student requests.
- Grading can be either pass/fail or based on a 7-point grading scale equivalent to the ECTS 7-point letter scale (which corresponds to the US grading system). The pass/fail grading may be used, as a maximum, in one third of the courses, and the 7-point grading scale must be used, as a minimum, in two-thirds of the courses in the BSc or MSc programmes, respectively (i.e. calculated as the sum of course ECTS divided by total curriculum ECTS).

The veterinary curriculum comprises all the exam methods mentioned above, e.g. written papers and multiple choice tests (i.e. written or web-based), project reports and presentations, oral exams, practical tests, clinical exams, competence-based weekly or monthly assessment of students' progress in meeting the course requirements and portfolios. Course attendance (minimum 80%) is used in practical teaching modules in combination with the exam methods mentioned above. The exam method is described in the individual course plans and must be approved by the Veterinary Study Board. External examiners are used in five of eighteen veterinary BSc courses, including the BSc thesis (adding up to 62.5 ECTS of 180 ECTS) and in three of ten MSc core courses, including the MSc thesis (adding up to75 ECTS of 150 ECTS), respectively.

Exams are generally held in the weeks free of teaching, i.e. for ordinary exams, the last week of the blocks, and for re-exams, within the interim weeks.

Veterinary BSc students must pass all first-year course exams within 2 years from the date of enrolment and must complete the BSc programme within 5 years from the date of enrolment. MSc students must complete the MSc programme within 5 years. Furthermore, all BSc and MSc students enrolled from 2009 and onwards must show a progress of study equivalent to 30 ECTS within a 2-year period.

Only veterinary BSc graduates who have taken the elective courses in Small and Large Animal Basic Clinical Theory, Veterinary Paraclinics 1 and Herd Health and Veterinary Public Health (or BSc graduates with equivalent degrees) qualify for enrolment on the Danish veterinary MSc programme. However, veterinary BSc students are allowed to follow MSc courses prior to enrolment if they lack less than 20 ECTS of the BSc curriculum.

There are generally no compulsory prerequisite courses within the BSc and MSc programmes, respectively.

5.1.4 Evaluation of teaching and learning

At LIFE, the following formal procedure concerning course evaluation and coordination is active:

- Each course is evaluated by the students using an electronic survey at the end of the course. This evaluation concerns evaluation of didactics, lecturers, student preparedness, student workload, student's appreciation of the relevance of what has been learned and suggestions for course improvements. It is the task of the course coordinator to set up the evaluation in the LIFE learning management system, encourage the students to carry out evaluations and to take action on specific problems identified by the evaluation. For courses running over two blocks, a midway evaluation must be conducted.
- Twice a year, the Departmental Teaching Committee of each department discusses the evaluations and associated comments made by the respective course coordinators. The Departmental Teaching Committee categorises the courses as A (none or minor details to be improved), B (moderate to major details to be improved) and C (critical – major details to be improved). For courses categorised as 'C', the course coordinator must provide detailed plans for improvement. The Departmental Teaching Committee follows up on improvement plans.
- At least once a year, the director of studies holds an informal plenary discussion and evaluation of educational matters related to the BSc and MSc programmes with students representing years (classes)
 1 to 5 and the chairman of the Veterinary Student Organisation.
- Every second year, the director of studies prepares a report concerning the veterinary BSc and MSc programme, respectively. This report includes the mission, vision and follow-up from previous years, critical points/issues from the preceding year and suggestions for future initiatives and/or corrections. The report is discussed by the Veterinary Study Board and in the Faculty Education Committee headed by the Associate Dean for Education.
- Each year, the Veterinary Study Board assesses the curriculum and its courses. The president of the Danish Veterinary Association has been invited to participate in these meetings. The Veterinary Study Board makes decisions on changes of curriculum and course plans, including exam forms, content and teaching.

As mentioned above (see Chapter 5.1.1.1), students play a central role in the evaluation of and follow-up on teaching and learning. Students' evaluations of courses and teaching are the primary direct source of information on these matters, and formal student representation in the decision-making and coordinating educational bodies ensures follow-up action.

Faculty lecturers are evaluated externally as part of the compulsory pedagogical education (see Chapter 5.1.2.1), and, as a consequence of the MSc programme being taught in English from 2012, faculty will be certified in English in order to teach in the MSc programme. The English certification is carried out by the Centre for Internationalisation and Parallel Language Use, Faculty of Humanities, University of Copenhagen (http://cip.ku.dk/english/).

5.1.5 Student welfare

Safety measures and regulations

The Faculty as well as the departments follow the strict safety measures and regulations required by Danish legislation. Students are covered by the same legislation as all university employees. The safety measures in all relevant areas (e.g. laboratories, dissection and post-mortem halls and isolation facilities) are in accordance with the Danish safety legislation. Each department has appointed safety supervisors among the academic as well as the technical staff. All relevant protocols for safety procedures are posted in the respective facilities for safety and educational purposes, and students are instructed in safety procedures prior to their work in such areas.

Student Services

There are several service areas for veterinary students around Frederiksberg Campus and Taastrup Campus:

- Two student cafeterias at Frederiksberg Campus and one cafeteria at Taastrup Campus
- One student café run by members of the student union at Frederiksberg Campus
- One student bar run by the different academic student unions, including the veterinary student union, at Frederiksberg Campus
- One Faculty Library with several study areas
- One common Student Services Centre at Frederiksberg Campus with two administrative employees and twelve students advisers, including five veterinary student advisers
- One bookshop at Frederiksberg Campus
- Wireless Internet access at both Frederiksberg Campus and Taastrup Campus, and many study rooms at both campuses
- Rooms for students to sleep in while on night shift at the Large Animal Veterinary Teaching Hospital (LAVTH), Taastrup

At LIFE, the Student Services office is responsible for

study and career guidance services for students. The guidance services include:

Social or study problems

Four student advisors are specifically dedicated to helping students within veterinary medicine. They go through a thorough internal training programme as well as a 1-week course focusing on communication skills and methods and ethics in guidance (offered by the Ministry of Education). The student advisors can help students in relation to the planning of their studies, how they can improve their study techniques and prepare for exams as well as other study-related issues. The student advisors are also qualified to discuss matters of a more personal nature. However, they are well aware that they are not psychologists, and they refer the students to various psychological services, if relevant.

Specific pedagogical support is a possibility for students with some sort of disability, e.g. dyslexia, The process of applying for support starts at Student Services where qualified staff deals specifically with these issues.

Project support for students who need help concerning the structure, process, planning, writing and finding the focus for their BSc project or MSc thesis.

Career guidance

Career guidance is provided by the study and careers advisors, including advice on internships, studies abroad and career opportunities as well as feedback on cover letters and CVs.

JobLab LIFE is a 10-day career skills development course that MSc students at LIFE can choose to take part in. The course focuses on cover letters, CVs, the job interview, project management, networking, contact to employers etc.

Innovation and entrepreneurship: advice and information about possibilities of starting own company.

5.2 Comments

The electronic student course evaluation constitutes a fundamental basis of the course and teaching evaluation procedures at LIFE. With the change in 2008 to the new University learning management system 'Absalon', course evaluation response rates dropped significantly to below 30% in some courses. In the former learning management system at LIFE, students were automatically reminded of the course evaluation every time they logged on to the system. The Absalon learning management system does not at the moment offer similar possibilities for automatic reminders. It is the responsibility of the course coordinator to send out reminders to the students at the end of each course. However, a single reminder at the end of the course has proved inefficient, and additional action must be taken in order to improve the response rates for the specific courses (see below).

5.3 Suggestions

In order to assure adequate evaluation response rates from students, an automatic reminder possibility must be established within the Absalon learning management system. Moreover, course coordinating staff must be urged to motivate students to carry out the evaluations by including former evaluation results and subsequent improvement actions in the course introduction lecture in order to make it clear to the students that their evaluations matter.

6. FACILITIES AND EQUIPMENT

The site, buildings and its equipment should be conducive to teaching and adequate for the number of students enrolled.

Buildings, for both basic and specialist facilities must be adequate and suited to the teaching programme.

Health and safety standards must be conscientiously observed, as should the requirements of acceptable laboratory practice.

The practical side of animal production must be taught on the institution's own farms or on farms to which it has access, to sufficiently small groups of students, thereby allowing hands-on experience for all.

Adequate and hygienic facilities for the humane treatment of animals must be available, including provisions for hospitalisation, for operative surgery and recovery from anaesthesia, for exercise and the isolation of infectious cases.

The clinical and hospital buildings must be up-to-date, clean and well maintained, and should be at least as adequate as those available in the private sector in the individual states.

The diagnostic, medical and surgical equipment provided must promote state-of-the-art practice of veterinary medicine and surgery.

Institutions must have a mobile/ambulatory clinic for farm animals or equivalent facilities so that students can practise field veterinary medicine under expert supervision.

Where practical training involves the use by the institution of material obtained from slaughterhouses and unfit for human consumption, vehicles and facilities must be properly adapted, maintained and operated to ensure the safety of students and staff and to prevent the spread of infectious agents.

6.1 Factual information

6.1.1 Premises in general

LIFE covers a total area of 290 hectares (716 acres): 17 hectares (42 acres) at Frederiksberg Campus, 220 hectares (543 acres) at Taastrup Campus (20 km or 12 miles west of Copenhagen) and 32 hectares (87 acres) at Hørsholm Campus (20 km or 12 miles north of Copenhagen). Parts of the Department of Large Animal Sciences moved to Taastrup Campus in February 2008, where the new Large Animal Veterinary Teaching Hospital (LAVTH) is situated. LIFE has four research farms at the Taastrup Campus as well. LIFE's total office space is 132,000 sq m (1.4 million sq ft), which is distributed on 80 tenancies and five main addresses.

The Veterinary Medicine programme at LIFE is mainly carried out by four veterinary departments, which are situated in different facilities and buildings at Frederiksberg Campus and at Taastrup Campus.

The Department of Small Animal Clinical Sciences, including the Small Animal Veterinary Teaching Hospital, and the Department of Large Animal Sciences, including the Large Animal Veterinary Teaching Hospital, were separated in spring 2008. Two out 5 groups within the Department of Large Animal Sciences moved to Taastrup, and the Department of Small Animal Clinical Sciences will move into new/renovated facilities at Frederiksberg Campus in 2010-11.

The **Department of Small Animal Clinical Sciences** (*Institut for Mindre Husdyrs Sygdomme*) is located in a building complex in the north-western part of the old Frederiksberg Campus area (see Appendix 5). The building complex contains the Small Animal Veterinary Teaching Hospital, the Central Laboratory for Clinical Pathology, Diagnostic Imaging, lecture rooms and departmental offices. Veterinary clinical services, teaching, research and administration are the main functions of the building complex.

The **Department of Large Animal Sciences** (*Institut for Produktionsdyr og Heste*) is located partly in a new building complex at Taastrup Campus (see Appendix 5) and partly at Frederiksberg Campus. The Taastrup buildings house the Large Animal Veterinary Teaching Hospital (equine hospital, teaching units, laboratories, mobile practice), teaching and research facilities for large animal medicine and surgery, and reproduction and departmental offices. The main part of the research and teaching within reproduction, ethology, animal breeding, epidemiology, bioethics and animal husbandry is still located at Frederiksberg Campus.

The Department of Basic Animal and Veterinary Sciences (Institut for Basal Husdyr- og

Veterinærvidenskab) is located in a building complex placed in the middle of the old Frederiksberg Campus area (see Appendix 5). The building complex houses teaching (including anatomy dissection halls, research and support facilities). The department's main functions are research, teaching and services within basic and applied veterinary and animal sciences and biotechnology.

The Department of Veterinary Disease Biology

(Institut for Veterinær Sygdomsbiologi) is located in building complexes in the north-eastern part of the Frederiksberg Campus area (see Appendix 5). The building complex houses a veterinary pharmacy (primarily for internal use), pathology teaching theatres, microbiology laboratories, laboratory animal units, lecture rooms and departmental office s. The main functions of the department are research and teaching within veterinary pathobiology, biomedicine and food hygiene and safety.

The area map in Appendix 5 indicates the principal facilities of the Faculty and describes the distance and travel time to off-campus facilities. The distance between Frederiksberg Campus and Taastrup Campus is approximately 20 km (12 miles). LIFE provides internal shuttle buses for students and staff every day; twice in the morning, at noon and once in the afternoon. The travelling time is approximately 40 minutes. See Appendix 5 for area maps of Frederiksberg Campus and Taastrup Campus.

Service areas for students (e.g. lounges, cafeterias etc.)

There are several service areas for veterinary students around Frederiksberg Campus and Taastrup Campus:

- Two student cafeterias at Frederiksberg Campus and one cafeteria at Taastrup Campus
- One student café run by the student union at Frederiksberg Campus
- One student bar run by the different academic student unions, including the veterinary student union, at Frederiksberg Campus
- One Faculty Library with several study areas
- One common Student Services Centre at Frederiksberg Campus with two administrative mployees and 12 students advisers, including five veterinary student advisers
- One bookshop at Frederiksberg Campus
- Wireless Internet access (*Eduroam*) at both
 Frederiksberg Campus and Taastrup Campus, and many study rooms at both campuses
- Rooms for students to sleep in while on night shift at the Large Animal Veterinary Teaching Hospital, Taastrup

Safety measures and regulations

The Faculty as well as the departments follow the strict safety measures and regulations required by Danish legislation. Students are covered by the same legislation as staff. The safety measures in all relevant areas (e.g. laboratories, dissection and post-mortem halls and isolation facilities) are in accordance with the Danish safety legislation. Each department has appointed safety supervisors among the academic as well as the technical staff. All relevant protocols for safety procedures are posted in the respective facilities for safety and educational purposes, and students are instructed in safety procedures prior to their work in such areas.

6.1.2 Premises used for clinics and hospitalisation

LIFE has modern hospital facilities for both large and small animals, and the total number of places available for hospitalisation can be seen in Table 6.1.

Table 6.1: Places available for hospitalisation of

animals to be accommodated			
	Species	No. of places	
	Cattle	21	
	Horses	58	
5	Cos all supping anto		

	Cattle	21	
Regular hospitalisation	Horses	58	
	Small ruminants	8	
	Pigs		
	Dogs	61	
	Cats	30	
	Other ¹⁾	10	
Isolation	Farm animals and horses	4	
	Small animals	6	
Tacinties	Other ¹⁾		

1) Exotics: small caged mammals, caged birds and reptiles

The **Small Animal Veterinary Teaching Hospital** is a well-maintained and well-equipped facility that is currently undergoing major renovation and expansion, which will double its floor space. This expansion will be effective late 2010/early 2011 and will provide the increased number of students admitted into the veterinary programme with state-of-the-art clinical facilities.

The Small Animal Veterinary Teaching Hospital includes a large reception area with an information shop, where specially formulated diets and a selection of items for animals are available. Currently, there are eight clinical examination rooms for the first-opinion community practice (including dermatology and exotics). For the specialty services (internal medicine, soft tissue surgery, orthopaedic surgery and neurology), two clinical examination rooms and a hospital treatment room area (ten tables) are available in addition to specialised rooms for cardiology (3D ultrasound, colour doppler and ECG), oncology (chemotherapy treatment) and ophthalmology (darkroom). Upon the completion of the hospital building, there will be ten clinical examination rooms for community practice and ten examination rooms for specialty services. The Small Animal Veterinary Teaching Hospital has a state-of-the-art intensive care unit (ICU) located in the centre of the hospital and close to the student laboratory, which contains emergency/cage side laboratory equipment (acid/base, haematology and standard clinical chemistry). For surgical procedures, the Small Animal Veterinary Teaching Hospital accommodates a preparation room in connection with five fully-equipped separate surgical theatres, and there are additional rooms specially equipped for dentistry (including digital dental X-ray) and endoscopy. To accommodate the patients, there are six normal wards for hospitalised

dogs and two smaller wards for hospitalised cats. The cat wards are completely separated from the dog wards and connected through a cat-only examination room. Additionally, there is an isolation ward which is separated from the other wards and contains its own examination room. The diagnostic imaging unit is integrated within the hospital and includes digital X-ray, fluoroscopy, advanced ultrasound, CT, MRI and scintigraphy. The Central Laboratory for Clinical Pathology is located in the same building complex as the Small Animal Veterinary Teaching Hospital, making specialised laboratory work readily available (especially important for the haemostasis research performed by the department). Finally, a cold storage room is available for containing cadavers for next-day autopsies.

The Large Animal Veterinary Teaching Hospital at

Taastrup Campus used to be a part of the same building complex as the Small Animal Veterinary Teaching Hospital at Frederiksberg Campus. In February 2008, the new Large Animal Veterinary Teaching Hospital in Taastrup opened. The Large Animal Veterinary Teaching Hospital is designed to provide the increased number of students admitted into the veterinary programme with state-of-the-art clinical facilities.

The Large Animal Veterinary Teaching Hospital includes six examination rooms, all fully equipped with stocks, each room designated for a primary function (emergency examination, X-ray, scanning, endoscopy and reproduction), two separate, fully-equipped surgical theatres offering advanced anaesthesia monitoring, and each theatre having two recovery rooms, ICU for approximately fifteen horses, possibility for handling horses in slings, a distribution pharmacy, an emergency/out-of-hours laboratory (acid/base equipment and standard clinical chemistry) etc. In proximity to the equine hospital, stable facilities for an additional 31 horses are available in four sections as is a separate room for treadmill examination and a well-equipped smithy. The equine isolation unit is equipped with a separate examination room and three stalls.

The Teaching Unit houses animals purchased by the Large Animal Veterinary Teaching Hospital for teaching purposes (the use of which is subject to Danish legislation regarding research animals) and ruminant patients. It provides space for a permanent number of approximately ten horses and sixteen cows and calves, but the area is multifunctional as the stalls are used according to the present need for teaching.

Yearly, the Large Animal Veterinary Teaching Hospital purchases approximately 75 cattle and 150 pigs. In addition, 100 calves are purchased for embryotomy.

The mobile practice is situated in a building with no other animals. Rooms for morning rounds, offices, garage for two cars (each car accommodating four students) and storage rooms are provided.

A cold storage room for cadavers (necropsies performed at Frederiksberg) are available at the Large Animal Veterinary Teaching Hospital.

6.1.3 Premises for animals

Facilities for maintenance of teaching and research animals

The Department of Veterinary Disease Biology houses the 'campus stables', which are used for the maintenance of teaching and research animals, and the Department of Basic Animal and Veterinary Sciences houses a fur animal facility for research, educational and demonstration purposes. The campus stables are situated at both Frederiksberg Campus and Taastrup Campus.

The Taastrup site contains three large stables for large animals. Furthermore, there is one new building with laboratory facilities, including a centrifuge, weight for analysis, -20 °C freezers and other traditional laboratory equipment. There are several temporary offices available, and a lecture room for 24 persons.

The Frederiksberg site contains four small, old stables and one new state-of-the-art building for animal studies with infectious agents. There is a surgical facility which is used for both teaching and research purposes. The facility has equipment for three surgical tables with full simultaneous monitoring. Specific equipment available for large laboratory animal teaching includes one flow map machine for intravascular flow monitoring, one C bow for X-ray as well as three boxes with equipment for cognitive and electrophysiological testing of pigs. An underground rodent facility contains three small separate rooms for mice, rats, gerbils etc. The facility contains a small laboratory and equipment for behavioural, cognitive and preferential testing and electronic tracking of rodents, such as maze tests, skinner boxes and displays for preference tests. There is a separate teaching rodent laboratory for 24 persons, including, among other things, state-of-the-art microsurgery equipment for twelve persons.

The Department of Small Animal Clinical Sciences has large outdoor enclosures as well as wards for the maintenance and housing of dogs and cats used for teaching purposes. The nine dogs belonging to the department live at home with private families when they are not participating in the instruction of students. Cats for teaching purposes are owned by private breeders who bring them in on the days when the instructional course requires them. The facilities of the Department of Large Animal Sciences for teaching animals at the Large Animal Veterinary Teaching Hospital are described in Chapter 6.1.2. In addition to traditional teaching, the department has access to comprehensive health and production data from several nearby pig farms and cattle facilities used for both teaching and research.

6.1.4 Premises used for theoretical, practical and supervised teaching

The total area of the four veterinary departments is 35,500 sq m (380,000 sq ft), which is used for research and teaching. Included in this area are stables, clinics, classrooms, laboratories and offices. The total area of the auditoriums at LIFE is 4,000 sq m (43,000 sq ft), corresponding to 36 auditoriums, which are used by all students at LIFE, including veterinary students.

The total number of premises for clinical work and student training, lecturing, group work and practical work can be seen in Tables 6.2, 6.3, 6.4 and 6.5, respectively.

Table 6.2: Premises for clinical work and student training

Small animals	No. of consulting rooms	11
	No. of surgical suites	5
Equine and food	No. of examination areas	10
animals	No. of surgical suites	2
Other ¹⁾	No. of examination tables in the Small	32
	Animal Veterinary Teaching Hospital	

1 At the Department of Basic Animal and Veterinary Sciences, undergraduate students (MSc thesis students) are included in the practical/clinical work in cardiovascular research projects. They participate in dog examinations and in laboratory work (blood and tissue analysis). Two to six veterinary MSc students per year do their theses in relation to the cardiovascular research project.

Hall	No. of places
3-11	96
3-12	96
3-13	144
3-14	144
3-20	70
3-21	70
4-02	24
4-03	24
8-01	24
8-02	48
1-15	60
2-01	102
2-02	126
3-01	293
3-02	215
3-03	136
3-04	143
3-06	48
3-07	30
3-08	30
1-01	145
1-03	32
1-11	32
1-12	60
1-13	60
1-14	60
1-16	30
1-02 (IT)	21
1-17 (IT)	17
1-18 (IT)	25
2-03	30
3-05	17
A1-34.21(A303)	28
A1-34.22(L303)	28
IMHS – 1	90
IMHS – 2	40
IMHS – 3	40
IMHS – 4	25
IPH – 1	80
IPH – 2	40
IPH – 3	40
IPH – 4	40
IVS – 1	125
IJØ (zoology hall)	40

IMHS: Department of Small Animal Clinical Sciences IPH: Department of Large Animal Sciences IVS: Department of Veterinary Disease Biology IJØ: Department of Agriculture and Ecology

Table 6.4: Premises for group work (number of rooms which can be used for supervised group work)

Group room	No. of places
1.01	14
1.02	8
1.03	8
1.04	8
1.05	8
1.06	8
1.07	8
1.08	8
1.09	14
1.10	8
1.11	8
1.12	14
12	4
13	4
14	4
15	4
16	2/4
17	2/4
18	2/4
19	2/4
20	4
21	4
22	4
23	4
24	4
25	4
26	2/4
27	2/4
28	2/4
29	2/4
D302	4
E302	4
D304	8
E304	14
G304	6
1304	8
K304	8
A306	8
L306	8
IMHS – 1*	10
IMHS – 2	10
IMHS – 3	10
IMHS – 4	10
IVS – 1	18
IVS – 2	12
IVS – 3	3
IVS – 4	30
IVS – 5	10
IVS – 6	20
	~

IMHS: Department of Small Animal Clinical Sciences *All group rooms at the Department of Small Animal Clinical Sciences are under construction and will be ready in 2011.

IVS: Department of Veterinary Disease Biology

Table 6.5: Premises for practical work (number of
laboratories for practical work by students)

Laboratory	No. of places
IMHS – 1	30
IMHS – 2	10
IPH (A115)	16
IGM – 1 (D15)	20
IGM – 2 (G15)	20
IGM – 3 (G20)	20
IVS – 1	60
IVS – 2	60
IVS – 3	25
IVS – 4	10
IVS – 5	30
IVS – 6	10
IVS – 7	24
IVS – 8	8
IJØ	50
IBHV (1-05-A018)	20
IBHV (1-04-2-V202)	95
IBHV (1-04-2-E202)	95
IBHV (1-04-A01)	20
IBHV (1-61-B12)	18

IMHS: Department of Small Animal Clinical Sciences IPH: Department of Large Animal Sciences IGM: Department of Basic Sciences and Environment IVS: Department of Veterinary Disease Biology IJØ: Department of Agriculture and Ecology IBHV: Department of Basic Animal and Veterinary Sciences

The **Department of Small Animal Clinical Sciences has teaching facilities** integrated within the hospital facilities.

Teaching laboratories: The department has a new clinical pathology laboratory that can accommodate 30 students, with a microscope for each student. Instructors can interact electronically with individual students or many students, and the students can interact electronically with the instructor as well as with other students. The teaching hospital is equipped with a student laboratory in which students can examine skin scrapings, cytologies, blood smears, faecal and urine samples as well as do basic blood analyses (after-hours laboratory).

Facilities for clinical teaching: The department has a specially designed, combined pre-clinical skills laboratory (surgical skills/clinical examination) that can accommodate 30-40 students. In the division of bioimaging, there are two teaching rooms which can accommodate fifteen students each and are fully equipped with digital viewing screens.

Teaching rooms: one large auditorium (seating for 90 students), two medium size auditoriums (seating for 30-40 students) and one small auditorium (seating for twenty students), which also function as clinical rounds

rooms. All of these rooms are fully equipped with AV facilities.

The Department of Basic Animal and Veterinary

Sciences has a histology hall, a dissection hall and two wet laboratories and one dry laboratory with capacity for 20-30 students as described below.

Anatomy: Gross anatomical demonstrations and dissections are conducted in a dissection hall (1-04-A01) constructed and equipped for 190 students and their lecturers/supervisors. A separate building for preparation of dissection material and for topographical anatomical practices is available. The dissection hall is constructed for maximum safety for the students and teaching staff as well as for serving optimum teaching functions. The airflow is from the ceiling towards the floor and is aimed at removing eventual toxic vapours. The construction is based on extensive measurements of minimally allowed concentrations of formalin. At the start of the course, the students are informed about the safety regulations.

Practical histology teaching is performed in two adjacent histology classrooms (1-04-2-V202 and E202), each equipped with microscopes for 95 students. The rooms are audiovisually connected in order to allow for one instructor to present specimens to all students in one session. Supervisors can interact electronically with individual students or many students, and the students can interact electronically with the supervisor as well as with other students.

Biochemistry and physiology: The laboratory (1-05-A018) is equipped for experimental laboratory work (biochemistry, molecular biology and physiology), and all the facilities, including laboratory furniture, plumbing, ventilation and hoods, are approved by the Danish authorities.

Parentage testing: One laboratory (1-61-B12) where six bench spaces have been established, each for a group of three students (a total of eighteen students). Two lab-flex laminar flow benches are available.

In addition, the department has 38 well-equipped, upto-date research laboratories for molecular genetic, nutrition, bioinformatics and cell biology research. The department furthermore has facilities for indirect calorimetry, transmission electron microscopy and electrophysiological and bioimaging research of live cells.

The **Department of Veterinary Disease Biology** has

three teaching laboratories, a pathology teaching theatre for large animals and companion animals, a pathology teaching room for poultry and teaching rooms for experimental animal science. These are briefly described below.

Teaching laboratories: The two main teaching laboratories are located in building 1-20. They can each

accommodate 60 students in laboratory-based exercises. They are equipped with twenty teaching light microscopes each, in addition to a number of loop microscopes and a few specially equipped microscopes (dark field microscopy and the like). The laboratories are built to allow students to handle infectious agents (class 2 safety level) and genetically manipulated microorganisms (class 1). Complete sets of molecular biology equipment (centrifuges, pipettes, electrophoresis equipment) are available for teaching. The laboratories are used to train students in practical bacteriology, clinical pathology, immunology, parasitology and virology. In addition to the two large teaching laboratories, a smaller laboratory exists in building 1-35 for up to 24 students. This laboratory is also used for infectious substances and for students handling genetically modified organisms (class 1). It is primarily used for postgraduate courses and small courses for other degree programmes.

Main pathology teaching theatre: This facility is housed in a modern building (from 2001), which contains two state-of-the-art necropsy rooms and a laboratory for histology. Next to and included in the largest necropsy room is an auditorium with 120 seats overlooking the room. Both necropsy rooms are well-equipped for simultaneous necropsy of 2-3 large animals (e.g. horses and cattle) and 2-4 small animals (e.g. dogs and cats). In connection with the necropsy facilities, there are two cold rooms, rooms for photographic procedures, modern washing and biosecurity facilities for staff and students and support rooms. The laboratory for histology includes equipment appropriate for conventional and fluorescence microscopy, processing of cryostate sections and research histology/immunohistochemistry. However, this is not used for basic training of students in histopathology. In addition, there is a professional video link from the teaching theatre to the Large Animal Veterinary Teaching Hospital in Taastrup, which makes it possible for students and faculty in Taastrup to communicate with pathologists and to follow the necropsy of animals at Frederiksberg Campus.

Poultry pathology teaching room: The newly built poultry necropsy room fits groups of twenty students. It is equipped with standard facilities for necropsy of birds, microscopes, cool room and cleaning/biosecurity facilities for students and lecturers.

In addition, the department has 90 equipped research laboratories for molecular bacteriology, virology, parasitology, immunology, general and veterinary pathology, pharmacology and toxicology, respectively.

The **Department of Large Animal Sciences** has teaching facilities at both campuses, comprising a total of two large teaching laboratories, six teaching rooms for theoretical teaching and one large auditorium (seating 80 students), where direct transmission from the pathology

theatre at Frederiksberg Campus is shown on large plasma screens.

Teaching laboratories: The department has teaching laboratories at both Frederiksberg Campus and Taastrup Campus. The Taastrup Campus features a new teaching laboratory with 25 workstations, each equipped with standard laboratory equipment for haematology, faecal analysis and cytology, including microscopes and access to in-lab broadband transmission screens. All procedures available for student practical exercises are described in an in-house technical manual. The other teaching lab used by Obstetrics and Reproduction is situated at Frederiksberg Campus (possibly to be moved in 2010 or 2011). It accommodates eighteen students for laboratory-based semen exercises. It is equipped with eight bright field microscopes with phase contrast and heating plates and one similar teaching microscope for four students connected to a monitor. The laboratory is used for teaching basic semen studies and has all the equipment necessary for this purpose.

Facilities for clinical teaching: At the Teaching Unit at Taastrup Campus, three specially designed teaching rooms are available. One large multipurpose room for different clinical teaching situations: four moveable stocks are available (gynaecology in mares), facilities for up to eight pigs in inhalation anaesthesia). Two other rooms at the Large Animal Veterinary Teaching Hospital are equipped with stocks and are used for teaching general clinical examination, embryotomy etc.

Teaching rooms: At Taastrup Campus, three rooms accommodating a maximum of 40 students are fully equipped with beamers, PCs etc. One large auditorium with 80 seats is also available; this room is fully equipped with all AV facilities and additionally contains the two screens used for direct transmission from the pathology theatre at Frederiksberg Campus. At Frederiksberg Campus, three additional rooms are available for teaching (for approx. twelve, twenty and 40 students, respectively) in close proximity to the staff offices. Each of these rooms is fully equipped with beamers etc.

6.1.5 Diagnostic laboratories and clinical support services

Diagnostic laboratories

The Central Laboratory (C-lab) for Clinical Pathology is located in the same building complex as the Small Animal Veterinary Teaching Hospital. It is equipped with state-of-the-art diagnostic equipment. Cutting-edge equipment for research and clinical investigations within the fields of hemostasis and inflammation is available. The C-lab is currently establishing a biobank, which will provide biobank services for the entire University of Copenhagen. Furthermore, emergency/cage side laboratory equipment (acid/base, haematology and standard clinical chemistry) is present within the hospital.

Activities relating to diagnostic work: **Parentage testing and species identification** at the Department of Basic Animal and Veterinary Sciences:

The work involved is conducted in three different laboratories:

- DNA is extracted from blood and/or tissues, and PCR reactions for the analysis in question are set up (B 203)
- 2. PCR is run in a PTC-20 apparatus from MJ-Research
- 3. PCR reactions are run on an ABI Prism 3130 xl Genetic Analyzer

Central clinical support services

Clinical pathology, anaesthesia and diagnostic imaging services are organised within the Department of Small Animal Clinical Sciences. Clinical pathology is affiliated with the section for Internal Medicine and Clinical Pathology. Likewise, diagnostic imaging and anaesthesia are affiliated with the section for Surgery and Diagnostic Imaging. Microbiology and pathology services are provided for by the Department of Veterinary Disease Biology.

6.1.6 Slaughterhouse facilities

The faculty has access to:

- A training and research (swine) slaughterhouse at the Danish Meat Trade College (DMTC). This is located in Roskilde, 34 km from the Faculty (Frederiksberg Campus). The slaughterhouse slaughters 240 pigs per week.
- Cattle (and lamb) slaughterhouse located in Slangerup, 24 km from the Faculty. 40-50 cattle per week (and 8,000 lambs per year).

6.1.7 Foodstuff processing unit

The students on the Food Safety track visit the regional food control units and join them in their inspections of food businesses, including foodstuff processing units.

6.1.8 Waste management

At all departments, waste is managed according to current European and Danish legislation.

Cadavers from the veterinary teaching hospitals are either sent to the Department of Veterinary Disease Biology for autopsy, or they are collected in special, sealed plastic bags collected for incineration by an approved company. Formalin-fixated tissue is placed in yellow bags and collected by the central technical department of LIFE. The central technical department brings the bags to the waste incineration plant 'Amagerforbrændingen' as 'hospital waste'. The large containers are emptied by a firm called DAKA, and the small animals (dogs and cats) are collected by a firm called Renoflex. All the waste is disposed of through incineration.

Medical waste, such as waste from chemotherapy treatment, is collected separately and processed according to the applicable legislation. Needles and sharps are collected in special hard-plastic yellow containers, which are sealed when full and processed following a standard protocol for 'Biological Hazard'.

Biological waste such as waste from microbiological laboratories is collected and inactivated. Liquid waste is sterilised by autoclaving at 121 °C, while solid waste is delivered for disposal.

6.1.9 Future changes

The expansion of the Small Animal Veterinary Teaching Hospital, which will increase its capacity by 100%, will be finalised in early 2011. The Department of Large Animal Sciences plans to build a riding hall. Facilities for laboratory animals, including surgical theatres for large animals (pigs), are planned by the Department of Veterinary Disease Biology. Refurbishment of the GMO laboratory (stem cells and embryos) at the Department of Large Animal Science is planned. A radiation unit for cancer treatment at the Department of Small Animal Clinical Sciences is planned.

An expansion of the research and teaching facilities related to the Department of Large Animal Sciences in Taastrup is being considered.

Following these analyses and decisions, there are possibilities for expanding both equipment and facilities for research and teaching at Frederiksberg Campus.

6.2 Comments

In general, we are satisfied with our campus facilities. Despite the excellent campus facilities, however, there is a temporary lack of large auditoriums as well as smaller rooms for group work, due to the increased intake of veterinary students. Campus service is aware of the challenges and is trying to identify the problems. Generally, the maintenance of the buildings and equipment is sufficient.

6.3 Suggestions

We suggest that identifying the needs for sufficient lecturing halls and laboratories is given the highest priority. In the analyses, the future needs and organisation (i.e. increased e-learning/blended learning) should be considered.

7. ANIMALS AND TEACHING MATERIAL OF ANIMAL ORIGIN

The farm(s) where veterinary field training is performed should contain the major animal species relevant to veterinary practice in the individual state. Farm facilities and equipment should be up-to-date, and at least as good as those available in the private sector of the countries concerned. The farm should be a model of animal welfare for the profession and the students.

Adequate clinical material including all the major species relevant to veterinary practice in the state concerned must be made available to the students.

The clinical material should be varied, providing experience in routine and complex cases.

The clinical services must have access to appropriate diagnostic support.

Clinical and hospital facilities should operate day and night for most of the year, i.e. like a normal practice.

The clinical department(s) must maintain close links with the pathology and other diagnostic services so that students can follow cases where animals die of natural causes or are euthanized, and conduct post-mortem examinations. If necessary, pathology material should also be obtained from outside the institution to enhance the learning experience.

An adequate data retrieval system must be available so that case studies can be undertaken.

The Faculty must ensure that the students are exposed to an adequate supply of teaching material in the veterinary public health (including food hygiene) areas.

7.1 Factual information

7.1.1 Anatomy

The material for gross anatomy as well as histology is derived from cattle, pigs, horses, sheep, goats, dogs and cats. A dissection course based on fixed foxes/dogs supplemented with fresh material from horse limbs is conducted. Approaching the exam, our anatomy teaching includes a specialised course on situs viscerum where students are taught topographic anatomy on a variety of cadavers and loose organ specimens. Likewise, whole cadavers and fresh/fixed specimens are used for the practical-written exam.

Cattle, pig, goat, sheep and horse organs are obtained from local slaughterhouses. Further, this material is

supplemented with foxes, cattle, goats, horses and pigs that are bought and euthanised at the campus and, in part, subsequently perfusion-fixed in formaldehyde. Dog cadavers for formaldehyde fixation or fresh use are obtained from private practices.

Table 7.1: Materia	al used in	practical	anatomical
training			

		Cadavers	Specimens
Deg/fey	2008	34	20
Dogriox	2009	34	20
Ruminant	2008	33	430
Kuminant	2009	33	430
Fauine	2008	2	183
Equine	2009	2	183
Other	2008	31 (pigs)	150 (pigs)
Other	2009	31 (pigs)	150 (pigs)

7.1.2 Pathology

Table 7.2: Number of necropsies over the past 3 years

Consist	Number of necropsies			Average	
species	Year 2009	Year 2008	Year 2007	per year	
Food-producing animals¤					
Cattle	78	78	108		
Small ruminants	12	14	21	224	
Pigs	154	79	125		
Other farm animals					
Equine	157	144	141	147	
Poultry*	1120	1120	1120	1175	
Rabbits	8	2	6	1125	
Companion animals/exotic					
Dogs	79	62	42	126	
Cats	30	36	22	120	
Exotics	59	26	23		

n addition to the whole-body necropsies listed in Table 7.2, organs and pathological specimens are obtained from both cattle and pig slaughterhouses once weekly.
* All students at the core curriculum do at least 8 poultry necropsies each during their practical training course in poultry diseases. In 2009 and 2008, approximately 140 students per year attended the course, i.e. 8 poultry * 140 = 1,120 necropsies.

7.1.3 Animal production

a) On the site of the institution:

For the course in nutrition approximately 4 cattle, 20 pigs, 5 horses, 3 layers and one sheep housed at the animal facility Rørrendegård are demonstrated to the veterinary students. Furthermore the Large Animal Clinic has a small herd of sheep (5 animals).

b) On other sites to which the institution has access: A herd visit (cattle + pigs) is carried out for demonstration purposes in the course on Animal Genetics Training in herd health subjects in private farms in cooperation with practising veterinarians. Farrow-to-finish pig farms are supplied by the pig practice Ø-vet that services approximately 500 herds within driving distance of Copenhagen. Dairy herds are supplied by specialised cattle practices and mixed practices on Zealand. Herd visits with students are carried out approximately 40 times a year. The dairy herd Assendrup has signed a contract with LIFE, providing access to students and researchers e.g. for master thesis projects.

7.1.4 Food hygiene/public health

As part of the meat inspection course, students have hands-on experience with 60 pigs a day, four days a week. At least one slaughterhouse visit is organised for demonstration purposes for the Food Safety specialisation.

7.1.5 Consultations and patient-flow services

7.1.5.1 Consultation

The clinical consultations/rotations at the Large Animal Veterinary Teaching Hospital consist of in-house hospital activities on referred patients (equine and production animals) and a mobile practice functioning as a common general animal practice (large and small animals).

At the Small Animal Veterinary Teaching Hospital, the clinical consultations/rotations consist of in-house training in the community practice and specialised training on referred patients.

At both the Large Animal Veterinary Teaching Hospital and the Small Animal Veterinary Teaching Hospital, students are encouraged to participate in emergency/outof-hours services, and furthermore students are encouraged to do a few weeks in private practice during their rotations in the equine or small animal specialisations.

7.1.5.2 Patient flow

Table 7.3: Number of cases: a) received for consul-
tation, and b) hospitalised in the Faculty clinics, in
the past three years

	Number of cases						
Species	20)09	20	08	20	07	Average
	а	b	а	b	а	b	per year
Food producing animals							
Bovine	180	0	167	0	200	0	
Ovine, caprine	19	0	21	0	37	0	
Porcine	1	0	0	0	0	0	211
Other farm animals	8	0	0	0	2	0	
Poultry	0	0	0	0	0	0	
Rabbits	0	0	0	0	0	0	
Equine	1060		1250		1016		1019
Companion animals/exotics							
Canine	7962	1929	7290	1671	6937	1794	
Feline	2334	775	2780	921	2658	852	10685ª/
Exotics (caged Birds, caged pet mammals, reptiles)	643	131	702	138	749	128	2780 ^b

a) Average of animals received for consultation b) Average of animals hospitalised in the Faculty clinics In addition to the number of cases listed in Table 7.3, dogs are also examined in cardiovascular research projects together with students at the Department of Basic Animal and Veterinary Sciences. The numbers of these consultative cases are: 2007: n =191; 2008: n = 325; 2009: n = 395.

The major trends are towards an increase in equine patients whether in the Large Animal Veterinary Teaching Hospital or the mobile practice. Fewer production animals are seen in hospital surroundings, due to a change towards most clinical work being done on farms as part of herd visits.

The number of small animal patients has generally been increasing during the past 5 years. The number of canine patients has increased by 18%, and the number of feline patients has increased by 12% since 2004. The Small Animal Veterinary Teaching Hospital's increased intake of patients has occurred in order to meet the demands of increased class sizes and the need for more patients. The case load contains fewer caged birds, which is mainly due to the fact that the hospital no longer has a veterinarian with expertise in avian species.

Generally, a trend analysis indicates a slight drop in the number of days of hospitalisation per hospitalised patient. This is partly due to improved logistics within in the Small Animal Veterinary Teaching Hospital and its services, and partly due to improved and more effective treatment regimes being an important part of the teaching procedures.

7.1.6 Vehicles for animal transport

The Large Animal Veterinary Teaching Hospital and the Small Animal Veterinary Teaching Hospital have arrangements with private companies.

7.1.7 On-call emergency service

The Large Animal Veterinary Teaching Hospital (including the mobile practice) runs a 24-hour emergency service. Between midnight and 8.00 this is an on-call service (2 senior members, one of these a surgeon and one an animal technician). An animal technician is present at all times at the hospital.

The Small Animal Veterinary Teaching Hospital runs a 24hour emergency service. However, staff is only present between 8.00 and 24.00 where the service is covered by both a veterinarian and a veterinary technician. In the period from midnight until 8.00 a senior staff member and a veterinary technician are on call and are within a 30-minute travel time of the hospital

7.1.8 On-farm teaching and outside patient care

7.1.8.1 Ambulatory (mobile) clinic

Table 7.4a: Number of cases seen by the ambulatory (mobile clinics) in the past three years

Spacias	Number o	Number of patients			
species	2009	2008	2007	per year	
Food-producing animals					
Cattle	99	81	90		
Small ruminants	127	103	13	199*	
Pigs	25	46	12		
Other farm animals ^o	1369	3230	0]	
Poultry Number of animals	248	75	Missing	162	
Rabbits (no. of production units)#	0	0	0		
Equine	1746	1780	1820	1782	
Other	85	130	Missing	108	

¤ Blue-tongue vaccination of large and small ruminants.* Blue-tongue data are excluded from average.

There is no commercial production of rabbits for consumption in Denmark. Rabbits are either companion animals or laboratory animals.

The mobile practice has two vehicles, each seating four students. On normal weekdays, the practice is open 8.00-16.00, and emergency service is provided for own clients 24/7, 365. One car is reserved for year 4

differentiation students, and students are able to volunteer for the other. In non-teaching periods, four places are offered on a voluntary basis to students (using an electronic booking system). During emergency opening hours students participating in the voluntary emergency duty work along with the veterinarian on duty.

7.1.8.2 Other on-farm services and outside teaching

J	, i i i i i i i i i i i i i i i i i i i			
Species	Numbe	Average		
species	2009	2008	2007	per year
Food-producing animals				
Cattle	1024	1024	1024	
Small ruminants	250	250	250	5604
Pigs	4280	4280	4280	
Other farm animals incl. poultry	50	50	50	
Equine	70	70	70	70
Other	0	0	0	0

Table 7.4b: Number of patients seen on outsid
teaching in the past three years

7.1.9 Other information

Animals available for intramural clinical training

The Large Animal Veterinary Teaching Hospital maintains 8-12 normal horses (mares) for teaching purposes, these horses are used for palpation, training handling and clinical examinations and for gynaecological examinations.

Normal cattle are bought for teaching purposes, including pregnant cows for demonstration of caesarean sections for groups of 15 students. The cows are used for training in clinical examinations, and some of these cows are finally used for surgical training. Calves are purchased for fetotomy exercises (5 days with 1 calf per 5 students).

The Teaching Unit houses a smaller number of referred ruminant patients, these patients represent chronic cases and surgical ones (e.g. displacements and obstetrical conditions). Production animals are treated free of charge, and often transport is paid by Large Animal Veterinary Teaching Hospital. Groups of students (23) carry out four herd visits per student (2 cattle facilities, 2 pig facilities) as part of the core course, adding up to approximately 32 herd visits a year. At these visits, students gain access to a large number of normal as well as clinically diseased animals.

Pregnant sows are purchased for exercises in rectal palpation and pregnancy diagnosis, and three students attend when the caesarean section of each sow is demonstrated. During the course, each student is taught how to perform gynaecological examinations of mares and andrological examinations of stallions on live animals. Students selecting the equine track are exposed to much more hands-on experience with respect to palpation and ultrasound evaluation of mares (3 hours every other day for 2 weeks). In reproduction and obstetrics, students visit a cattle slaughterhouse processing 1,200-1,600 dairy cows per year where they train rectal palpation followed by inspection of the organs from the slaughtered cows.

The Small Animal Veterinary Teaching Hospital maintains a visiting corps of normal, healthy dogs owned by the clinic and a visiting corps of healthy cats to help students train their basic non-invasive physical examination skills.

The case load of referred equine patients is generated mainly from the islands of Zealand and Funen but also from the Jutland peninsula and comprises second-opinion cases, specialist cases and emergencies. The referral services include internal medicine, soft tissue surgery, orthopaedics, poor-performance syndrome, neurology and ophthalmology. The mobile practice services firstopinion cases (normal as well as clinically diseased horses) in the proximity (radius of 40 km) of the Large Animal Veterinary Teaching Hospital and generates referrals for the equine hospital. At present, the equine hospital and the mobile practice can fulfil the need for equine cases for both the core and tracking curricula. Both the Large Animal Veterinary Teaching Hospital and the mobile practice run an emergency service that is open 365 days a year.

The case load of normal and clinically diseased patients at the Small Animal Veterinary Teaching Hospital is generated from its relatively large community practice as well as from its referral and emergency services. The primary practice covers both general medicine and surgery, including dermatology, exotics, dentistry and elective surgeries. The referral services include internal medicine, soft tissue surgery, orthopaedics, cardiology, neurology, oncology and ophthalmology. The emergency service is open 365 days a year. The case load is comprised of firstopinion companion animal cases, emergencies, and secondary and tertiary referral cases in addition to wellness and routine healthcare visits and routine surgeries. More than 270 practices throughout Denmark refer patients to the Small Animal Veterinary Teaching Hospital. Currently, the Small Animal Veterinary Teaching Hospital can fulfil the need for patients/clinical cases in both the core and tracking curricula.

As part of the curriculum, students are in contact with animals and patients in the following rotations:

- *Basic clinical theory large animals.* The goal is to provide students with basic knowledge of handling large animals in a safe and secure way
- Large and small animal medicine, surgery and reproduction
 - o Clinical examination: This course provides

students with profound hands-on knowledge of the clinical examination of horses, cows, calves, small ruminants, pigs, dogs, cats and exotics. Each student participates in on-farm training in two herds (horses and calves) – a total of 16 herd visits.

 Surgery: The pre-clinical skills lab incorporates the use of a unique approach to the teaching of clinical and surgical skills using e-learning, video demonstrations, phantoms and role play to enhance the students' learning platform and thereby their confidence and clinical skills prior to entering the clinical rotations in the hospital. One main focus is to teach students to monitor a patient during anaesthesia, to work within the rules of aseptics and to gain knowledge of haemostasis, tissue handling, suture techniques and materials.

Large and small animal general clinical practice: Students rotate between:

- Internal medicine/community practice rotation: Students participate in all aspects of the handling of the animals, and they are responsible for diagnosis, treatment and care of the patients at the Large Animal Veterinary Teaching Hospital or attending the first-opinion community practice (Small Animal Veterinary Teaching Hospital).
- Surgical rotation: Students are responsible for the pre-operative work-up on surgical patients including participation in selective surgical procedures. Students do diagnostic work-up on lameness cases.
- Production animal rotation: This rotation is divided into 1) Single-patient management and 2) Herd health. For the single-patient management rotation, students carry out the daily treatments and diagnosis of the production animals at the Large Animal Veterinary Teaching Hospital and participate in one small ruminant herd visit as well as one visit to a dairy herd where e.g. dehorning is trained in practice. The herd health rotation focuses on herd-related problems at cattle farms and pig farms.
- Reproduction rotation: In reproduction and obstetrics, there is access to a cattle slaughterhouse processing 1,200-1,600 dairy cows per year, 10-15% of which have different reproductive abnormalities (cystic ovaries, pyometra etc) and even more have other non-reproductive abnormalities (leg, udder etc.).
- Anaesthetic rotation: The students are responsible for induction and maintaining anaesthesia in surgical patients.
- Trackings: Students choose between:
 - Herd health tracking: Students rotate between clinical diagnostic work, clinical preventive medicine and up to an additional 6 weeks of extramural production animal practice. This is taught at a specialist level.

- *Equine tracking:* Students rotate between internal medicine, surgery, reproduction and mobile practice. This is taught at a specialist level.
- Small animal tracking: Students rotate between internal medicine, orthopaedics, soft tissue surgery, emergency, oncology, cardiology, neurology and ophthalmology. This is taught at a specialist level.

Animals available for farm/veterinary field training

Herd health based teaching in dairy cattle

During the 'cattle' week, each group of students (22-25 students per group) visit two commercial dairy farms for a whole day. Farm 1 has 240 milking cows and heifers, Farm 2 has 150 milking cows and heifers. Farm 1 operates with four robotic milking units; farm 2 has a side-byside milking parlour. Students have access to all cattle on the farms. During each farm visit all animals at risk are examined, which are freshly calved cows, cows before dry-off and newborn calves less than 2 weeks of age. Random samples of 20 animals per group or all animals within a group (if less than 20 animals) are examined, i.e. milking cows, dry cows and young stock. Three to four students work together in a small group. In total, approximately 28 animals at risk and 100 other animals are examined at each visit. Since there are 8 cattle weeks a year, a total of $(28 + 100) \times 8 = 1,024$ animals are examined by students every year.

Herd health based teaching in pigs

During the 'pig' week, each group of students (22-25 students per group) visits two conventional pig herds for 4-5 hours. Herd 1 (94250) has 450 sows, 1,600 piglets/ growers and 340 finishers. Herd 2 (75254) has 465 sows, 1,700 piglets/growers and 700 finishers. At the visits 3-6 students work together in groups. During the first herd visit (day 1), about 35 primarily younger animals are closely examined, and thorough clinical journals are filled in. Subsequently, all these animals are euthanised and autopsied (day 2). During the second herd visit ('advisory visit' on day 4), prevalence studies are performed, and about 500 animals in all age groups are inspected. If indicated, a few animals may be subjected to a more thorough examination. The visit is completed by the students writing an 'advisory visit report' (day 5) describing general conditions in the herd (inventory, feed, management, animal welfare, compliance with legislation etc.), clinical findings (prevalence) – focusing on problem areas, assessment of herd production data (provided) and medical usage and finally some recommendations for the herd owner. Since there are 8 pig weeks per year, a total of $(35 + 500) \times 8 = 4,280$ animals are examined by students every year.

Herd health based teaching in poultry

Teaching in poultry diseases at the veterinary core curriculum is based on theoretical lectures and 8 days practical necropsy of poultry received from miscellaneous broiler and egg layer production farms in Denmark. In groups of 20-23, each student perform a minimum of one poultry necropsy per day during the 8 day course. Results of the necropsies are presented in plenum.

Additionally, students (groups of 20-30 students) at the Heard Health and Public Health tracking programmes visit two poultry farm, i.e. one egg-layer farm and one broiler farm. At each farm, students are presented with production and economical data and feed, herd health, animal welfare and bio-security information. Futhermore, students perform clinical examination and on-site necropsies on a number of birds (at least two birds per student). The collected information is subsequently evaluated and discussed with teacher and farmer.

Diagnostic support

The Large Animal Veterinary Teaching Hospital is a wellrun facility offering animals, staff and students optimum new facilities and good equipment. The Small Animal Veterinary Teaching Hospital is a well-maintained and well-equipped facility. The Central Laboratory for Clinical Pathology and the Imaging Service are closely linked to both hospitals. The Division of Microbiology analyses samples for both hospitals, and necropsies of relevant cases from the students' clinical rotations are demonstrated in collaboration with the Division of Pathology.

Data retrieval system ("Vetvision")

Electronic patient records are accessible throughout both hospitals and can be projected on large screens in the rounds rooms and lecture rooms. Vetvision is capable of archiving a comprehensive patient record, the quality of which depends upon those responsible for data entry (students, technical support staff and clinicians). Individual comprehensive patient records (medical as well as financial) are safely stored and can be retrieved quickly and easily. It is also capable of generating discharge letters to referring veterinarians. A fully paperless electronic medical record system has not yet been implemented. Results from microbiology, cytology and the central clinical pathology laboratory are entered online in the electronic patient records. Results from pathology and external diagnostic services are archived in paper format, but are expected to become fully electronic in the near future. Diagnostic images are archived in an open source PACS, which at the moment does not interface with the electronic patient records. The Large Animal Veterinary Teaching Hospital uses the same electronic patient record system as the Small Animal Veterinary Teaching Hospital, but is still using a paper form for the daily medical record, which includes history and physical examination findings, patient orders and progress notes, diagnostic laboratory results, consultations reports, procedure and surgery reports, discharge summaries/clients instructions.

7.1.10 Ratios

Table 7.5: Animals available for clinical training (in the clinics of the Faculty or seen through the Ambulatory clinic) as ratio to the number of students graduated in 2009

D 11.	No. of students graduating annually ^{a)} =	121 =	1	Denominator	EAEVE- guidel ines
K II:	No. of food-producing animals Seen at the faculty $^{\mbox{\tiny 1)}}$	211	1.74	1.74	2.47-1.73
	No. of students graduating annually ^{a)}	121	1 =	Denominator	
R 12:	No. of individual food-animal consultations outside the Faculty ²⁾	5803 3)	48.0	48.0 ^{b)}	2.56-1.02
P 13-	No. of students graduating annually ^{a)}	121 -	1	Denominator	
K 13.	Number of heard health visits 3^{3}	48	0.40	0.40	0.20-0.09
R 14.	No. of students graduating annually ^{a)}	121 –	1	Denominator	
K 14.	No. of equine cases ¹⁾	1019	25	8.4	1.78-0.92
D 45.	No. of students graduating annually ^{a)}	101	1	Denominator	
K ID:	No. of poultry/rabbit cases $^{2)}$	121 = 168	1.4	1.4	0.58-0.37
	No. of students graduating annually ^{a)}	121 =	1	Denominator	
R 16 :	No. of companion animals ¹⁾ seen at Faculty	10.685	88.3	88.3	48.74-37.94
	No. of students graduating annually ^{a)}	see 7 1 9		Denominator	
R 17:	Herd health No. of poultry flocks seen teaching in poultry	JCC 7.1.J.			0.07-0.02

a) Students graduated in 2009; b) Including number of animals for herd health based teaching. 1) table 7.3, average; 2)Tables 7.4a and 7.4b, average; 3) See 7.1.9 4) See 7.1.8.2

Table 7.6: Animals available for necropsy

D 40	No. of students graduating annually ^{a)} 121		1	Denominator	EAEVE - Gudielines
K 18:	No. necropsies food producing 371 animals + equine	=	3.1	_3.1_	0.75-0.46
				Denominator	
R 19:	No. of students graduating annually ^{a)} 121 =	_	1		
	No. poultry/rabbits ¹⁾ 1125	5	9.3	_9.3_	0.26-0.12
				Denominator	
R 20:	No. of students graduating annually ^{a)} 121	ı _	1		
	No. necropsies companion animals ¹⁾ 126	=	1.0	_1.0_	1.26-0.89

a) Students graduated in 2009; 1) Table 7.2, average

7.1.11 Other species

The aquatic pathobiology has permanent contact to a sufficient number (n=10) fish aquaculture enterprises for student visits.

7.2 Comments

The services offered and patient numbers of the Small Animal and Equine hospitals are expected to remain stable in the future. With the building of the new small animal hospital, there may be a small increase in patient numbers. However, there is no need or intention to make radical changes to the service range for the coming years. The production animal service aims to slightly expand its present operation area to secure the patient base.

7.3 Suggestions

The production animal service would is constantly working to maintain a sufficient number of farms and patients for teaching, but this has proven difficult.

Poultry herd visits are not highly prioritised in the veterinary curriculum because nationally there is only a need for one veterinarian specialised in poultry diseases every 15 years.

The production of rabbits for consumption is relatively small in Denmark, and therefore students are not subjected to this animal production form.

8. LIBRARY AND LEARNING RESOURCES

The Library and related services must help to meet the institution's objectives and lend support to basic training, research and postgraduate studies.

To this end, the Library must offer a comprehensive and up-to-date range of books and journals. Its opening hours, regulations and loan arrangements must facilitate self-learning. The institution must provide an adequate number of places for private study in the library or elsewhere on site. The Library must be professionally managed, have good working relationships with other libraries in the area, and provide modern on-line communication facilities for use by staff, students and researchers. In institutions where departmental libraries are available, the main library should have documentation on the material held in the other libraries.

The Faculty must provide audiovisual and information technology facilities meeting the needs of establishment.

8.1 & 8.2 Factual information and comments

The library at Faculty of Life Sciences, University of Copenhagen, gives users access to more than 50 million full-text journal articles. As the library has become part of the University of Copenhagen library organisation CULIS, the library has increased the scope and retrievability of the digital full-text information made available to the Faculty's users, i.e. scientists and students.

The local support and counselling of users in the library building remains in focus, unaffected by the merger with CULIS. The building is quite new, but blends beautifully with the old classic campus.

The core library user groups are scientists and students at the Faculty of Life Sciences. Furthermore, the library grants public access to its collections, including walk-in access to the digital collections.

Adequacy of information retrieval and learning resources

In Denmark the role of scientific libraries as the principal repositories of literature within specific topics was abandoned some years ago, partly due to a new Danish University Act, affiliating the university libraries more closely with the universities, but also due to the comprehensive and growing accessibility of digital material – mainly full-text scientific journal articles, but now also books.

The library focuses on information resources relevant to the users of the Faculty in order to continue to support the Faculty's areas of research also after the university merger in 2007.

In 2009, the library spent EUR 800,000 on licences for digital full text, but only EUR 100,000 on paper-based books – out of a total library budget of EUR 3 million. And the difference between resources spent at digital versus paper-based materials is rapidly increasing.

Opening hours

The Library is open for 76 hours a week during term time. Term opening hours are 08.00-20.00, Mondays-Fridays, and 10.00-17.00 at weekends. Outside of term, the library is open 10.00-18.00 on Mondays, and 10.00-14.00 on Tuesdays-Fridays. Remote access to all library services online when studying at home is available to faculty and students on a 24/7 basis.

Access to computers and study spaces

At LIFE all students are expected to own a laptop computer as an important studying tool, and consequently the library is covered by the wireless network (*Eduroam*) which also covers the rest of the campus including the gardens. Furthermore, the library provides 70 publicaccess computers for students (and other users) to access electronic resources, and two dedicated computers for CD-ROM based materials. All working areas with computers are wired with power and network points.

Academic credential(s) for the librarian in charge of the library

Faculty Librarian Mr Frede Mørch, Librarian DB from the Royal School of Library and Information Science, Master from the University of Copenhagen, Institute of Applied and Mathematical Linguistics. Deputy Librarian Ms. Marianne Grützmeier, Librarian DB from the Royal School of Library and Information Science, Master in ICT and Learning from the University of Aalborg.

Availability of learning resources support for faculty and students, including personnel

The library provides all students at Bachelor level with a course in Information Literacy. The library building is gradually transformed into a learning facility, as more and more information is provided via servers, which decreases the demand for physical space for information media. The library transforms this extra space into learning facilities, powered by IT, for the students of the Faculty of Life Sciences.

In 2004, the library removed all paper-based journals which are accessible in digital form. This policy has enabled the library to establish facilities and studying areas for students.

In 2009, half of the printed book collection was moved to the upper basement – still with public access. This enabled the library to increase the number of study places in the building from 200 to 260.

Additional services to LIFE from the library

Furthermore, the library comprises an IT Learning Center (ITLC), which supports lecturers who want to use more IT as part of their teaching methods. At the moment, the centre focuses on assisting the Faculty in developing online, globally accessible courses within the research fields of the Faculty.

The library runs a unit for bibliometric services for the Faculty, which also validates the data describing the Faculty's annual research production (scientific articles etc.).

8.3 Suggestions

The LIFE Faculty library focuses on improving the accessibility of especially eBooks – a new, rapidly emerging medium, which offers more challenges as regards retrieval than the well known technology of providing full-text electronic journal articles.

9. ADMISSION AND ENROLMENT

The veterinary course is a rigorous one, and students admitted must have proven capabilities.

Although admission and enrolment are the legal responsibility of the individual countries, the selection should be competitive, based upon academic achievements and on other criteria.

Admissions must also be compatible with facilities and staff numbers, bearing in mind the need for low student/ staff ratios, particularly in the clinical side of the course, and the amount of clinical and pathological material available.

Generally, the universities decide on the number of students admitted into the individual study programmes. However, the Minister for Science, Technology and Innovation may fix an admission maximum, which has been done in relation to veterinary medicine. In any event, admission capacity is established with reference to the number of qualified lecturers and adequate building capacity, thus ensuring that the teaching will be soundly research-based. Finally, the number of students admitted also depends on society's need for training in that field.

9.1 Undergraduate courses

9.1.1 Undergraduate student numbers

The study programme in veterinary medicine takes a minimum of 5.5 years, i.e. 3 years for the BSc degree and 2.5 years for the MSc degree. The MSc degree equates to the international DVM.

Table 9.1: Undergraduate student compositionwithin BSc and MSc education in 2009

Total number of undergraduate students		1028
Total number of male students	110	
Total number of female students	918	
Foreign students		
- from EU countries*	260	
- from non-EU countries**	44	

* From Sweden

** From either Norway or Iceland

9.1.2 Student admission

All applicants must fulfil the same requirements in terms of the entrance qualifications to the BSc programme in veterinary medicine. Foreign nationals must provide proof of their Danish skills or pass a test in Danish. Students from the Nordic countries are, however, exempted from the language test.

There is a numerus clausus at 180 new veterinary students per year. For this reason it is not possible to offer all qualified applicants, Danish or foreign, admission to the BSc programme in Veterinary Medicine.

All students who obtain a Danish BSc degree in Veterinary Medicine are guaranteed admission to the MSc programme.

Minimum admission requirements

Applications will be considered for admission if they fulfil the following general and specific requirements prior to enrolment.

General requirements

A) A nationally recognised university entrance exam from one of the member countries of the European Council. A conclusive list can be found at www.ciriusonline.dk under 'Assessment of your qualifications'. Applicants with different entrance exams from the ones listed are encouraged to contact the University of Copenhagen prior to applying.

B) International Diplomas, i.e. Baccalaureate avec Option Internationale (BOI/OIB), Danish/French Baccalaureate (DFB), European Baccalaureate (EB), International Baccalaureate (IB) and other diplomas/certificates from countries which have signed the European Convention on the Equivalence of Diplomas Leading to Admission to Universities.

C) Apart from the above-mentioned diplomas and certificates, a number of foreign certificates and diplomas from the USA may be considered as valid qualifications.

Specific requirements

In addition to the general admission requirements, all applicants must document a specific level of competences¹⁶ in Danish (i.e. level A), English (level B), Mathematics (level A), Physics (level B) and Chemistry (level B) or Biotechnology (level C) in the upper secondary school qualification or in specific entrance exams. Foreign applicants must include information and transcripts about their levels (A/O level, higher/subsidiary level, number of years studied at secondary school or university) in relevant subjects.

Danish language requirements Students from the Nordic countries with Danish,

¹⁶ Danish upper secondary school levels defined by the Danish Ministry of Education.

Norwegian or Swedish included in their upper secondary exam are not required to do a Danish test. Danish nationals are not required to do a test in Danish provided they can document being native speakers or having learned Danish at school.

All other foreign applicants must pass a Danish language test before being admitted. The required Danish test is: *'Studieprøven i dansk som andetsprog for voksne udlændinge'*.

Table 9.2: Admission of veterinary students in the past five years

	Number applying for	er admitted	
Year	admission	Standard Quota I & II intake	Other entry mode ¹
2009	610	178	13
2008	462	184	2
2007	574	186	3
2006	563	174	9
2005	578	142	3
Average	557	173	6

1. Later enrolment from waiting lists due to early dropout or into later BSc study level.

Student selection process

All applicants with a valid entrance exam are considered for admission in two ways when applying to a Bachelor programme – either via 'quota I' or 'quota II'. The Faculty of Life Sciences has since 2008 admitted 50% of applicants in quota I and 50% in quota II.

Quota I

Applicants who apply in quota I are evaluated exclusively on the basis of their academic grades obtained at the qualifying exams, i.e. the top 90 applicants are directly admitted into the BSc programme.

Applying through quota I is possible only when the grading system of the applicant's qualifying exam is translatable to the Danish grading system. Applicants with qualifying exams from countries with grading systems that are incompatible with the Danish grading system must apply in quota II instead.

Quota II

The applicants in quota II must have obtained academic grade points from their entrance exam corresponding to at least an average grade. Furthermore, the applicants must be able to describe personal motivation for choosing the BSc programme in Veterinary Science and to account for and reflect on qualifications and experiences in regard to admission. Subsequently, applicants are tested, interviewed and selected on the basis of the following stepwise procedure:

 Multiple-choice test comprising a broad range of general and vocational questions relating to veterinary medicine, animal welfare and veterinary public health in today's society. The best 180 applicants are invited to the following interview step.

- 2. Interview by a panel consisting of one senior academic staff member appointed by the veterinary departments, one veterinarian appointed by the Danish Veterinary Association and one veterinary MSc student appointed by the Veterinary Students organisation. Applicants are questioned about their personal motivation, experience with animals, knowledge about the veterinary field, animal welfare, social abilities, 'how to study' and more.
- 3. Selection of 90 students with the best combined score in multiple choice test (weighted 1/3) and interview (weighted 2/3).

Admission number

The student capacity of the study programme in veterinary medicine was increased in 2006 from 140 per year to the present level of 180 students per year. Each year a small number of additional applicants (i.e. 5-10) are admitted in order to match the anticipated early drop-outs among admitted applicants. Admission may also happen at later BSc levels (i.e. Years 2 and 3) if applicants have passed relevant BSc courses corresponding to at least 90 ECTS at other universities and the maximum capacity of 180 students is not exceeded. The latter applications must be approved by the Veterinary Admission Board consisting of the Director of Veterinary Studies, Head and Vice-head of the Veterinary Study Board.

The Faculty has no plans of changing the admitted number of students.

1.9.1.3 Student flow

Table 9.3: Student flow and total number of veteri-nary students

3-year BSc programme in Veterinary Medicine

Year of admission	2005*	2006	2007	2008	2009
No. admitted	145	183	189	186	183
No. dropped out	18	18	7	5	
No. graduated	109	120	2		
No. active/still enrolled	18	45	180	181	183

2½-year MSc programme in Veterinary Medicine

Year of admission	2008	2009
No. admitted	91	142
No. dropped out	1	1
No. graduated	1	
No. active/still enrolled	89	141

5½-year MSc programme in Veterinary Medicine*

Year of admission	2000	2001	2002	2003	2004
No. admitted	114	114	140	140	144
No. dropped out	24	16	27	16	18
No. graduated	86	92	97	84	1
No. active/still enrolled	4	6	16	40	125

*2004 was the last year where students were enrolled for a full 5½-year programme. From 2005 students were enrolled in the 3-year BSc programme and then 3 years later in the 2½-year MSc programme.

Table 9.4: Number of students graduating annually over the past five years

Year	Number graduating
2009	121
2008	127
2007	113
2006	108
2005	96
Average	113

Table 9.5: Average duration of studies (distribution of students in years)

Year	Average duration in years (median)
2009	5,8
2008	6,0
2007	6,4
2006	6,5
2005	6,5

9.2 Comments

As all applicants must fulfil the same requirements, including specific requirements in mathematics, physics and chemistry (or biotechnology), the knowledge base of the enrolled students is very even and adequate for commencing the BSc programme.

The study programme in veterinary medicine is highly attractive, and the number of motivated applicants is high. This is reflected in a high level of student progression and low drop out rates compared to other BSc programmes at the University of Copenhagen.

The fall in drop out rates and the shortening of the average study period over the past few years are expected to continue, as student progression is highly regulated by a number of governmental regulations. Students:

- Must pass the '1st-year test' within two years of enrolment on a BSc programme. At the veterinary BSc programme this refers to four specific Year 1 courses, i.e. a total of 45 ECTS.
- Have a maximum of three attempts to pass exams
- Must pass courses equivalent to 30 points within a 2-year period
- Must complete the BSc degree within 5 years of matriculation

 Must complete of the MSc degree within 5 years of matriculation

The Veterinary Study Board may grant a dispensation from these rules on the basis of a motivated application if circumstances are extraordinary and the student is suitable for studying.

The higher intake of quota II students is expected to positively influence the decline in the drop out rate despite their slightly lower average upper secondary academic grades compared to quota I applicants as these students are very motivated. The preliminary evaluation data from the enrolments in 2008 shows that so far fewer quota II students (no. = 1) have dropped out compared to quota I students (no. = 4) but the difference is statistically insignificant.

9.3 Suggestions

As expected, the increase from 140 students to the present student intake level of 180 students per year has put pressure on the teaching facilities and resources even though the departments have been compensated economically and teaching facilities have been improved in order to accommodate 180 students. This accepted pressure is, however exaggerated, by the combination of (i) a Faculty admission policy that dictates enrolment of more than 180 students per year in order to compensate for possible drop outs, (ii) the natural yearly fluctuations in student numbers on specific courses due to study delays, (iii) the implementation of the new curriculum and (iv) the internationalisation strategy commanding facilitated intake of foreign guest students. The high numbers of students, i.e. more than 180, are specifically challenging for the practical and clinical courses. At the same time, clinical courses are the most popular among foreign guest students and the least popular to exchange for foreign courses among LIFE students. In order to meet the requirements of the internationalisation strategy while at the same time easing the pressure on the courses due to high student numbers, the Veterinary Study Board including the director of studies has in 2010 suggested that the yearly intake of first-year BSc students is reduced to a maximum of 185 including the extra uptake due to possible drop outs.

^{62 |} The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

10. ACADEMIC AND SUPPORT STAFF

The competence of the full-time academic staff must enable coverage of all the subject areas of the curriculum, allowing research based teaching except where alternative arrangements are made for outside teachers. The number of full-time academic staff (FTE) must allow teaching of small groups, thus maximising the learning opportunities for the students. A minimum percentage of 70% of the academic teaching staff should have veterinary training. Teachers of clinical veterinary subjects must be veterinarians, as should be those carrying out para-clinical services reporting to the public.

Part-time staff, residents and graduate students may lend support to full-time academic staff if they are appropriately integrated into the instructional programme. The Faculty should define which academic level is required.

Overall, the workload of the academic staff should be organised in such a way that apart from teaching and clinical duties, they should be able to perform research and other non-teaching related academic activities within working hours.

Appropriate teacher supervision requires satisfactory teaching staff/student and teaching staff/support staff ratios.

10.1 Factual information

	Budget (F	ed posts TE)	Non-bud posts (geted FTE)	Total (FTE)		
1. Academic staff		NVS	VS	NVS	VS	NVS	
Tooching staff ¹ (total ETE)	57.5	41.0			57.5	41.0	
Research staff ² (total FTE)	3.5	5.8	22.1	21.4	25.6	27.2	
Others ² (FTE)			2.4		2.4		
Total FTE	61.0	46.8	24.5	21.4	85.5	68.2	
Total FTE (VS + NVS)		7.8	45.9		153.7		
Estimated FTE used on teaching veterinary students ³						73.4 ³	
2. Support staff							
Responsible for the care and treatment of animals ⁴		100.6		2.4		103.0	
Responsible for the preparation of practical and clinical teaching		43.0			43.0		
Responsible for administration, general services, maintenance, etc.		44.6	3.8		48.4		
Engaged in research work⁵		39.6	13.2		52.7		
Others (please specify)							
Total support staff		227.8		19.4		221.1	
3. Total staff		335.5	65.3		400.8		

Table 10.1a: Personnel in the establishment provided for veterinary training*

* The personnel involvement in the veterinary teaching is calculated as a proportion of the total Faculty teaching staff based on the proportional relation between faculty vs. veterinary teaching load, student number and progress. The personnel involvement in veterinary research is likewise calculated as a proportion of the total Faculty research staff on the basis of budgetary key ratios. VS = veterinary surgeons. NVS = non-veterinary surgeons. 1) Includes academic staff within the regular scientific employment structure at universities (i.e. professors, associated and assisting professors; see Comments) and external academic lecturers.

2) Includes post docs and other academics with special research assignments, and academics on external funding. PhD-students are not included.
 3) Calculated total FTE used purely on teaching of veterinary students. Includes contributions from research staff and PhD-students, and is calculated on the basis of actual teaching load of individual academic staff and estimates from the departments.

4) Includes veterinarians in non-scientific positions (23.6 FTE), primarily employed as clinical support staff that are not allowed to lecture but may demonstrate clinical procedures etc. to students.

5) Includes technical support staff responsible for work in laboratories etc in relation to research.

Table 10.1b. Personnel in the total LIFE establishment*

	Budgeted posts (FTE)	Non-budgeted posts (FTE)	Total (FTE)
1. Academic staff			
Teaching staff ¹ (total FIF)	376.9		376.9
Research staff (total FTE)	20.2	245.1	265.3
Others ² (FTE)		2.4	2.4
Total FTE	397.1	247.5	644.6
2. Support staff			
Total support staff ^{4,5}	816.3	126.7	943.0
3. Total staff	1213.4	374.2	1587.6

* For legends see table 10.1a

	Table 10.2: Allocation of academic staff ((veterinary surgeon	and non-veterinar	v surgeon)
--	--	---------------------	-------------------	------------

	Academ	Academic teaching staff Support staff (see Table 10.1)											
Department name	Professor		Associate professor		Assistant professor		Assistant		Other ¹⁾		Technical/	Animal carers	Admin.
	VS ²⁾	NVS ³⁾	VS	NVS	VS	NVS	VS	NVS	VS	NVS	(b + d + e)	(a)	(c)
IBHV	3.0	4.5	6.0	5.8	4.0	10.8	1.0	2.1	8.6	17.7	25.4		8.9
IPH	5.4	2.0	15.9	5.0	6.0	3.0	6.3	0.0	28.9	0.0	6.1	32.4	13.4
IMHS	3.4	0.0	5.7	0.0	3.8	0.0	2.4	0.0	31.1	0.0	22.5	34.8	6.9
IVS	4.8	4.3	9.2	8.6	2.9	12.2	2.3	4.7	13.1	30.4	38.5	9.8	18.4
ЛŴ	0.0	0.3	0.0	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.9		0.3
IGM	0.0	0.9	0.0	2.3	0.0	0.2	0.0	0.2	0.0	0.1	2.3		0.5
Sum	16.5	12.0	36.9	22.3	16.6	26.2	11.9	7.1	81.8	48.2	95.7	77.0	48.4
Total													500.6

¹⁾ Includes PhD students, veterinarians in non-scientific positions and part-time academic staff (external lecturers etc.), ²⁾ Veterinary surgeon, ³⁾ Non-veterinary surgeon, IBHV: Department of Basic Animal and Veterinary Sciences, IPH: Department of Large Animal Sciences, IMHS: Department of Small Animal Clinical Sciences, IVS: Department of Veterinary Disease Biology, IJØ: Department of Agriculture and Ecology, IGM: Department of Basic Sciences and Environment

Staff is allocated to the Faculty/departments either directly following biannual negotiations with the Management or by way of a departmental decision to allocate or reallocate staff members financed directly by the department. It should be kept in mind that each department receives a lump sum every year on 1 January to cover all expenses (salaries, investments, equipment, animals etc.), and the department has the right to make changes in the staff composition, with the exception of full professorships which are always negotiated with and finally decided by the Faculty Management.

From this, it follows that it is easy to employ additional staff from service income (e.g. from revenue from clinical or diagnostic work).

The so-called 'Job Structure' in Denmark determines the rules about the length of employment in academic positions at Danish universities. Academic positions are divided into different levels:

1. Positions below assistant professor level

 PhD student (almost the same salary as an assistant professor)

- Academic assistant
- 2. Positions at assistant professor level
 - Postdoc
 - Assistant professor
 - Researcher

3. Positions at associate professor level

- Associate professor
- Senior researcher

4. Positions at professor level

- Professor
- Professor with special assignments (limited to 5 years)

Positions at level 1 and 2 will most often be temporary, whereas positions at level 3 and 4 most often will be permanent.

Scientific staff is hired through a four-step procedure:

- 1. Description of the position
- 2. Academic assessment committee
- 3. Interview committee
- 4. Final decision

All faculty must hold the required academic qualifications as well as teaching qualifications. Both requirements are equally weighted during the hiring process.

Staff members wishing to do work outside the University, including consultation and private practice, must report their wishes to the department head. Acting on behalf of the Rector, the department head can grant permission for such work if the workload is deemed to be reasonable and the work does not pose any threat of direct competition with the University and does not place the employee in a position of conflict of interest.

The staff has ample access to participating in congresses and international meetings. Staff with externally financed research projects can participate freely as long as they adhere to the eventual conditions set up by the sponsoring company/authorities (government grants). The same applies to sabbatical leave. Technically, however, all travel arrangements are governed by national regulations (cheapest possible flight, maximum hotel price, standardised daily allowances etc.).

	No. total academic FTE in veterinary training 153.7 1	Denominator
R 1:	Image: matrix and the second	_6.7_ (EAEVE: 8.85 – 10.42)
	No. of total academic FTE at Faculty 644.6 1	Denominator
R 2:	No. undergraduate students2-at Faculty32515.0	_5.0_ (EAEVE: 8.75 – 12.54)
R 3.	No. total VS FTE in veterinary training 85.5 1	Denominator
к 5 .	No. undergraduate veterinary102812.0	_12.0_ (EAEVE: 10.62 – 12.62)
P. 4.	No. total VS FTE in Veterinary training ¹ 85.5 1	Denominator
R 4:	No. students graduating annually ² 121 1.4	_1.4_ (EAEVE: 4.91 – 7.21)
R 5:	No. total FTE academic staff in Veterinary training 153.7 1	Denominator
	No. total FTE support staff in veterinary training==221.11.4	1.4 (EAEVE: 0.53 – 2.20)

Table. 10.3: Ratios students/staff

Legends. 1) Non-scientific veterinary clinical support staff (23.6 FTE) is not included. 2) Number of students graduating annually is expected to raise to near 180 within the next 2-3 years due to the expanded intake of students from 2006 (see Comments).

10.2 Comments

PhD-students are not included in the staff contributing to the total FTE-figures in tables 10.1a and b. However, PhD students play a significant part of the research as well as the teaching at LIFE. Within the budgeted posts, PhD students holding and not-holding a veterinary degree comprise 43.2 FTE and 30.1 FTE, respectively. Within the external non-budgeted posts the similar figures are 11.3 FTE and 17.4 FTE, respectively. In total, PhD students comprise 102.1 FTE within the veterinary establishment at LIFE. PhD-students are obliged by law to do teaching for up to 20 % of their time (included time for preparation). The teaching load varies from 5 - 20 % for the individual PhD-students.

There has been an overall net gain in the number of faculty members, which corresponds with the increase in student intake. Some areas have difficulties recruiting.

LIFE has a highly qualified academic staff.

LIFE has increased the number of veterinary students by 50%, which brings along more governmental funding for the Faculty.

The number and the qualifications of support staff are high and sufficient to fulfil the Faculty mission. The number of PhD positions and PhD students has increased considerably at Faculty level, e.g. 208 new PhD student positions were filled in 2009.

The Faculty works with long-range staff plans to anticipate staff flow. This includes strategic PhD programmes, strategic postdoc programmes and tenure-like positions at assistant professor level.

In Denmark, veterinarians have a long tradition of high employability. Salaries in the private sector are generally higher than they are in the public sector. The difference in salaries between the private and public sector will be a challenge for LIFE with respect to maintaining faculty numbers in the years to come. Another of our challenges is to continue to attract highly qualified PhD students for all the PhD programmes relevant to veterinarians.

However, the Faculty faces the same challenges as other veterinary universities with regard to recruitment and retention. Competition from the private sector and other universities is making staffing of specialists with the best talent increasingly difficult. A concerted and organised effort on behalf of not only the university, but also the Danish government, is necessary if Denmark wishes to attract the best talent from the international community.

The increase in student numbers from 120 to 180 and the introduction of a new veterinary curriculum has been a challenge in terms of sufficient physical facilities such as teaching facilities and faculty offices, which has caused some frustration and job dissatisfaction. LIFE has been aware of this challenge from the beginning and has built a new Large Animal Veterinary Teaching Hospital in Taastrup and will increase the facilities considerably for the Small Animal Veterinary Teaching Hospital accordingly by the end of 2010.

The vast majority of the faculty is veterinarians holding a PhD degree, and a number of these are also board certified.

The number of faculty is sufficient to instruct 180 new students every year. The staff members are all highly qualified.

Superior quality in both research, teaching and services is acknowledged by the departments through the annual, individual salary negotiations.

LIFE has a strategy for competence development. Both social, personal and professional competences are in focus.

An important tool is the annual performance and development review. Each year, all employees at LIFE participate in a structured interview with their immediate superior. The aim of the interview is to focus on the employee's results, goals, general job satisfaction and wishes for professional development and continuing education. Both the employer and the employee have a responsibility for the employee's professional development. The development opportunities are not limited to a certain set of options. It is important for LIFE that all employees must be able to impact their own development as much as possible and that this can be defined in close cooperation between the employer and the employee. Possible development activities could be internal LIFE courses, participation in international congresses, lecturer exchange, change of workload etc.

Additionally, it is important that the individual development is coordinated with the strategic goals of the department and the local group of which the employee is a part. In order to ensure this, each section at LIFE must have an annual evaluation of its development as a group.

10.3 Suggestions

The number of postdoc positions should be increased to balance the number of PhD positions.

11. CONTINUING EDUCATION (SEE ALSO STAGE TWO)

The institution must cooperate with other professional organisations and competent authorities in the design, implementation and quality control of continuing education programmes.

It should strive to provide well-designed continuing education programmes in specific areas of practical veterinary medicine.

11.1 Factual information

Legal basis or other official requirements for continuing education

The legal basis for continuing education (postgraduate Master programmes) within the Danish university framework comprises the following legal orders:

- The Danish University Act: No. 985, 21 October 2009 (Lov om universiteter)
- The Danish Act on the Accreditation Agency for Higher Education: No. 294, 27 March 2007 (Lov om akkrediteringsinstitutionen for videregående uddannelser).
- Legal order on part time education at universities: No. 1188, 7 December 2009 (Bekendtgørelse om deltidsuddannelse ved universiteterne).
- Ministerial Order on Master's Programmes under a Continuing Education Scheme at Universities: No. 1187, 7 December 2009 (Bekendtgørelse om masteruddannelser ved universiteterne).
- Ministerial Order on Flexible Curricula in Continuing Education for Adults: No. 1206, 15 December 2000 (Bekendtgørelse om fleksible forløb inden for videregående uddannelse for voksne).

There is no legal basis for <u>mandatory</u> continuing education for Danish veterinarians.

The Faculty of Life Sciences currently offers two Englishlanguage veterinary Master programmes approved by the Ministry. They are the Master of Veterinary Public Health and the Master of Laboratory Animal Sciences programmes. These programmes offer 60 ECTS worth of course modules. LIFE also offers Master of Food Quality and Food Security (*Master i Fødevarekvalitet og -sikkerhed* (instruction in Danish)), which includes modules of veterinary relevance. Finally, LIFE offers a Flexible Master Programme which allows for an individual curriculum – also within veterinary medicine. A flexible Master of Companion Animal Clinical Sciences with specialisation opportunities within subdisciplines (internal medicine, surgery, oncology, cardiology, neurology, clinical pathology, diagnostic imaging) is being implemented. This Master programme will include the possibility of becoming a 'fagdyrlæge' ('acknowledged veterinarian') after two years of course modules and exams. The total programme is scheduled for four years of part-time study. The above mentioned Master programmes are different from the Master programme delineated by the Bologna Declaration.

According to the University Act, the postgraduate Master programmes are part-time job-oriented study programmes, i.e. they are offered to persons working professionally full-time concurrently with doing their Master studies at the university. The participants pay tuition fees, and the programmes also receive national subsidies.

A postgraduate Master programme equals a one-year full-time study period, but may be completed over several years. Thus, the Master programmes equal 60 ECTS at 27.5 hours of study, i.e. a total of 1,650 hours of study. This covers courses and a Master project, including teaching activities, homework and exams. The university must organise each Master programme so it can be completed within a maximum period of 3 years. Each Master programme is divided into thematic modules comprising one or more courses. Mandatory courses account for a minimum of 30 ECTS, elective courses account for a maximum of 18 ECTS, and the Master project must be completed within 12-20 ECTS. Admission to Master programmes requires a relevant BSc and/or MSc degree and a minimum of 2 years of relevant professional experience.

Quality assurance to monitor and promote the design, implementation and quality control of continuing professional development programmes

Master programmes

From 'idea' to 'Master programme': Ideas for new programmes may arise from individual researchers or from organisations/companies or groups of people with a common need for professionals with certain gualifications, training and education. The 'idea' is discussed with the Associate Dean for Education because responsibility for teaching programmes is placed at faculty level. The 'idea' is also discussed with the head of the department covering the relevant scientific disciplines because the financial responsibility for the Master programmes is placed at department level. If there is a general consensus that the 'idea' is good, the proposer is asked to write a more thorough proposal, including a curriculum outline, and submit to the Master Study Board. The Master Study Board evaluates the proposal and may suggest coordination with related existing programmes. Depending

on the feedback to the proposer for improvements and coordination the plan is sent to the Faculty Education Committee (Uddannelsesudvalget) for evaluation and advice to the Associate Dean for Education. Finally, the proposal is considered by the Faculty Management Board. If approved here, the proposal with the curriculum for the Master programme and statistical information (e.g. market surveys) confirming the need for such a programme is sent to the Accreditation Agency for accreditation. This institution has the final decision before final acceptance by the Ministry of Science, Technology and Innovation.

Courses: Proposals for new Master courses are submitted to the Master Study Board for evaluation and approval. Master courses must be linked to one of the existing Master programmes. As an example, a new course in toxicology was linked to the Master of Laboratory Animal Science and to the Master of Veterinary Public Health, because there is no Master programme in toxicology. Each Master course has its own course description with a unique course number in the Faculty Course Database. All course descriptions are considered for revision every two years and thus include recent adjustments to the course curricula. The course coordinator submits the updated course description to the Department Study Board. Following approval, the course description is sent to the Master Study Board for evaluation and approval, and the updated course description is uploaded to the Faculty Course Database. This process ensures the best possible quality of the courses. The course coordinator is responsible for conducting the course including developing the teaching plan, i.e. time plan, lectures, assignments and exams, and is also responsible for all practical arrangements.

Evaluation of courses: Course evaluation takes place after the completion of a course. All participants are asked to evaluate the course by responding to a questionnaire (either on paper or electronically), and usually the class and the lecturer(s) have a common discussion about the content and conduct of the course. The course coordinator summarises the results of the evaluation and reports this to the Department Study Board, which forwards it (with comments/approval) to the Master Study Board for final evaluation with either an acceptance or request for improvements the next time the course is offered.

Evaluation of programmes: Quality assurance of any Danish study programme is mandatory. All existing Danish study programmes must repeatedly and at certain intervals be evaluated, approved and accredited by the independent Accreditation Agency. New study programmes must be approved before onset. The Accreditation Agency is appointed by the Minister for Science, Technology and Innovation.

The Accreditation Agency works independently and with direct reference to the minister.

Master programmes are evaluated by the individual programme participants once they have completed the programmes. The evaluations are used by the Master Study Director for future adjustments of the programme, and an annual discussion by the Master Study Board also takes place. Once a year, the Associate Dean for Education invites all Master Study Directors to an individual and thorough discussion of programme activities during the past year. This process is beneficial for the Study Director and provides the Faculty Management Board with helpful insights into all study programmes as a basis for deciding on future adjustments and strategic planning.

Continuing education courses in collaboration with the Danish Veterinary Association

From idea to course: Every year continuing education programmes in a variety of subjects are offered to veterinarians through the Danish Veterinary Association and in close collaboration with the Faculty. The idea for each course usually comes from the course manager, but topics are also requested from practitioners as they evaluate courses they have participated in.

Courses: Courses are offered in a variety of subjects within the major fields of the veterinary profession, including successive courses of two to five courses within one particular topic or field which build upon the knowledge gained in a previous course.

Evaluation of courses: After participation in a course, each participant is asked to evaluate the course using a form elaborated and provided by the Danish Veterinary Association. The participants are, among other things, asked to score and comment on the quality of the overall course, the course materials, presentations, presentation techniques, lecturers and knowledge gained, and they are also invited to submit proposals for new courses. The evaluations are always reviewed by the course manager and lecturers so as to continuously improve the courses.

Department of Small Animal Clinical Sciences Within the companion animal field there is close collaboration between the Department of Small Animal Clinical Sciences and the Danish Veterinary Association. Currently most faculty at the department are course managers or lecturers at these courses each year. The courses are offered within most aspects of companion animal clinical sciences and are either single courses or course series. Examples are courses within cytology, haematology, diagnostic imaging, surgery, dentistry, oncology, cardiology, neurology and exotics. Nearly all courses include wet labs or workshop elements and are to a large extent casebased. A unique collaboration was established within oncology, in which there is a complete programme leading to certification within small animal oncology including an exam and certification of the participant clinic to perform chemotherapy.

In addition, a clinical update course with rotations in the Small Animal Veterinary Teaching Hospital is offered in which participants can request specific areas where they would like an update. Characteristically, the participants are there for one week and participate in one or more of the hospital services. In addition to the participant gaining an update, they also experience the current clinical education and evaluation of the students, they can provide feedback to the lecturers they meet about their experiences, and the students meet a coming colleague thus allowing inspiration of everyone involved.

Course evaluation: All courses are evaluated as described above in the general section.

List of companion animal courses offered in collaboration between the Danish Veterinary Association and the department:

- Ultrasound-scan
- Clinical pathology
- Practical surgery I
- Practical surgery II
- Basic Surgery urinary tract
- Basic Surgery Respiratory System
- Basic Surgery Anesthesia and Pain

Further, the Danish Veterinary Association, as a part of a more specialised continuing education programme ('Fagdyrlægeuddannelsen' = acknowledged veterinarian), has a 'Fagdyrlæge' programme within companion animal clinical sciences. One of the Department of Small Animal Clinical Sciences' faculty is course coordinator for this study programme, and most of the faculty teach courses which are part of the programme. The aim and structure of this CE programme is described below.

Department of Large Animal Sciences

The Danish Veterinary Association is primarily running the CE courses. The courses are often run in collaboration with the relevant department at the University, and the subjects of the courses vary. Examples of CE courses within large animal sciences involving the participation of the Department of Large Animal Sciences are:

- Reproduction in the horse
- Standing surgery on the head and limb of the horse
- The colic horse.
- Emergency treatment
- How to deal with Salmonella infections and paratuberculosis in cattle.

Further, the Danish Veterinary Association, as a part of a more specialised continuing education programme ('Fagdyrlægeuddannelsen'), has the following 'Fagdyrlæge' programmes, typically also involving the participation of the Department of Large Animal Sciences:

- Pig production and diseases in pigs
- Cattle production and diseases in cattle

• Equine diseases

One of the Department of Large Animal Sciences' faculty is course coordinator for the study programme within equine diseases as well as the pig diseases programme, and most of the faculty teach courses which are part of these programme.

The 'Fagdyrlæge' programme is a two-year postgraduate course for practitioners. The participants have at least 3 years experience in practice and work part-time in the area in which they want to specialise.

The aim of the 'Fagdyrlæge' programme is:

- To ensure the specialist a continuing education on a high level in the specific area
- To enable the specialist to acquire and evaluate knowledge from research and development work out of the area.
- To enable the specialist to participate in the planning and development in that area.
- To enable the specialist to disseminate new knowledge and skills in the area.
- To enable the specialist to practice the profession in that area in accordance with the area's current professional requirements.

Danish specialist acknowledgement

After completing an extended amount of continuing education and individual training, a veterinarian in Denmark can apply to become a 'Danish specialist' (*specialdyrlæge*). The educational plan has to be approved by a specialist committee. Each committee consists of two standing members, one appointed by the Danish Veterinary Association and one by the Faculty of Life Sciences, and two additional members appointed again by the Danish Veterinary Association and the Faculty of Life Sciences within the specialty area in which acknowledgement is applied for.

11.2 Comments

Nearly all faculty members and many of the senior and junior veterinary staff members, including PhD students and residents, participate in the planning and teaching of continuing education courses and programmes. The continuing education courses and programmes offered continuously receive positive evaluations.

11.3 Suggestions

Continue the process of establishing a Flexible Master's programme allowing completion of an updated 'fagdyrlæge' programme as part of the Master programme and allowing veterinarians in Denmark who have already obtained 'fagdyrlæge' acknowledgement the opportunity to pursue further structured continuing education leading to certification and ultimately to the Danish specialty veterinarian acknowledgement (a report is available regarding the pilot project describing and implementing this option for a 'Master of Companion Animal Clinical Sciences'). In this way, further cooperation with veterinary practitioners and the Danish Veterinary Association in the provision of substantial and structured continuing education is secured.

12. POSTGRADUATE EDUCATION

TOWARDS A QUALIFICATION IN A SPECIFIC AREA The institution must co-operate with other professional organisations and competent authorities in the design, implementation and quality control of continuing education programmes leading to qualifications in the clinical and paraclinical fields, including the achievement of national specialist recognition.

Where appropriate, institutions should aim their programmes to meet the standards and regulations of the respective European specialist colleges and of the European Board of Veterinary Specialisation or equivalent bodies.

RESEARCH TRAINING

The institution must offer post-graduate training programmes by research (PhD or equivalent) based on an international-level programme in biomedical and veterinary research.

The programmes must be well designed and cover theoretical as well as practical training, leading to a certificate/degree within a period of three to four years.

The institution must provide an adequate number of places for research students

12.1 Factual information

12.1.1 Clinical specialty training (interns and residents)

Diplomate	Number of	umber of Number of Interns Number of residents		dents	Success rate		
title offered	on staff	2009	2008	2009	2008	2009	2008
DECVIM-CA	2	0	0	1	1	1	n/a
DACVIM-SA	1	0	0	0	0	n/a	n/a
DECVIM-Oncology	1	0	0	0	0	n/a	n/a
DECVS-SA	1 (Professor (PMSO) approved by ECVS as supervisor)	0	0	1	1	1 (passed 2010)	n/a
DECVCP	1	0	0	1	0	n/a	n/a
DECVDI	2	0	0	1	1	n/a	n/a
DECVS-LA	1	0	0	2	0	n/a	n/a
DECBHM	1	0	0	1	0	n/a	n/a
DECEIM	2	0	0	0	0	n/a	n/a
DACVIM-LA	1	0	0	0	0	n/a	n/a
DECVPH	7	0	0	1?	0	n/a	n/a
DECVParasitology	3	0	0	0	0	n/a	n/a
DECVP	1	0	0	0	0	n/a	n/a
DECAR	4	0	0	0	0	n/a	n/a
D ECVPH	2	0	0	0	0	n/a	n/a
DECLAM	1	0	0	0	0	n/a	n/a

Table 12.1.1: Clinical specialty training

1) n: year preceding evaluation. 2) n/a = not applicable

The candidates involved in the above programmes all receive a salary negotiated by the Danish Veterinary Association.

Residency programmes are not part of the formal training structure in the Danish university system, where emphasis has been on research education (PhD programmes). All residency programmes are approved by the European Board of Veterinary Specialisation, and the residents receive a salary comparable to that of assistant professors. Some of the residents are financed through the industry or partly through grants.

12.1.2 Research education programmes

In Denmark, all PhD students are enrolled within the same PhD framework. The PhD programme has a duration of 3 years and consists of the following activities:

- Research the research project takes up most of the time
- Teaching and dissemination
- Participation in PhD courses, approx. 6 months of study (30 ECTS)
- Writing articles and the PhD thesis
- A stay at another research institution, possibly abroad

Each PhD student has a principal supervisor who is responsible for the entire, individual PhD programme. Additional supervisors are allowed, if necessary.

At the end of the study period, the PhD student submits the thesis to an assessment committee, which consists of three members who must be at least at associate professor level. After having defended the thesis at a public defence, the PhD degree is awarded.

At LIFE, most PhD students are affiliated with a research school, which provides the PhD students with good social networks among PhD students enrolled within a similar subject at other universities.

Table 12.2: Number of research students enrolled on different programmes as of 15 March 2010

Type of degree	Full time	Part time	Duration
PhD candidates enrolled at one of the four 'veterinary departments'	204	Very few	3 years
PhD candidates holding a DVM degree	97	Very few	3 years
PhD candidates enrolled at LIFE, total	588	Very few	3 years
Other doctoral level ¹⁾	No	No	n/a

12.2 Comments

In 2009, LIFE awarded 98 PhD degrees, 15 of which were degrees to holders of a DVM degree. In the future, LIFE expects to increase the number of PhD graduates holding a DVM degree due to the increased intake into the PhD programme in general – see below for further details.

72 | The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

The number of PhD students enrolled at LIFE has increased much over the past few years. This is due to a decision made by the Danish government which, back in 2006, decided to increase the number of students enrolled on the national PhD programmes by a factor of almost two.

In 2009, 207 PhD students were enrolled at LIFE. Thirtyfour out of the 207 hold a DVM, 27 of these from LIFE.

In the undergraduate PhD programme at LIFE (the BSc and MSc programmes), approximately 120 students graduate per year, which implies that more than 20% pursue their academic career as PhD students.

LIFE aims to reach enrolments at a PhD/DVM graduation ratio of 25% and has therefore allocated 28 fullyfinanced PhD scholarships to DVM holders for 2010.

12.3 Suggestions

To increase the funding for European Board of Veterinary Specialisation-approved programmes and specialist positions.
13. RESEARCH (SEE ALSO STAGE TWO)

It is desirable for undergraduate students to gain experience of research by undertaking a research project and writing a report on it.

The Faculty should provide an appropriate balance for these opportunities between basic, applied and clinical research.

The Faculty should assign an appropriate number of academic and technical posts specifically to research.

The Faculty should also allocate adequate facilities, equipment and operating funds to research.

13.1 Factual information

Research experience offered to veterinary students

The University of Copenhagen is a research-intensive university. In 2009, the University of Copenhagen was ranked as number 51 on the THE-QS ranking list (http://www.timeshighereducation.co.uk/hybrid. asp?typeCode=438). Additionally, the University collaborates with some of the top research universities in the world through the International Alliance of Research Universities (IARU).

The main focus of the research at the Faculty of Life Sciences is in the area of basic research relevant for animal and human health, food production and the environment. Generally, the different research programmes and projects benefit the students greatly in attracting good academic staff and creating a study environment with much emphasis on research and innovation.

The Faculty disseminates research results through publication in peer-reviewed scientific journals. Furthermore, most faculty members are involved in research committees for international meetings, congresses and national and international commissions.

Each scientific lecturer has a responsibility to include relevant aspects of the latest research knowledge and research methods in his/her teaching. The extent to which this is achieved is assessed during the annual (from 2010 biannual) course evaluations and during the associated discussions at Faculty level (Veterinary Study Board and Faculty Teaching Committee) and at the departmental levels (the departmental teaching committees).

One of the first courses at the BSc level is the course: 'Veterinary introductory course'. In this course, the student should obtain a better understanding of the possibilities and limitations of scientific methods and learn how to evaluate the quality of different scientific sources. Learning goals in that respect are:

- To identify scientific methods and good scientific practise
- To evaluate the scientific validity of different sources, search for relevant scientific information and correctly present quotes and lists of references
- To be able to communicate clearly on scientific issues in written form

In most practical and practical-clinical courses, the student learns how to use research methods i.e. methods that at some time have been developed scientifically and by now are and for many years have been integral to veterinary research, e.g. chemical and biochemical analyses, anatomical dissection, staining of cells and tissues, physiological analyses on organs and whole animals, clinical examination, clinical pathological analyses. Recent examples include the PCR analysis included in the veterinary chemistry and biochemistry course and thromboelastographic analysis of canine and feline blood samples during the small animal practical clinical courses.

The students are further taught how to critically evaluate scientific sources and experience research through their written BSc work (10 ECTS) and finally through their veterinary MSc thesis work (30 ECTS). Through this exposure, they experience the full impact of research on the veterinary profession as well as get inspiration to pursue a research education programme.

All veterinary students actively participate in research through their veterinary MSc thesis project, which includes an experimental research part, either a laboratory experiment, a clinical study or an analytical activity. In addition, many students participate or are involved in research during their clinical or other rotations in the tracking programmes.

The MSc programme is concluded with a thesis, where the student works independently on an issue which constitutes an important part of the individual student's academic profile. The thesis equals 30 ECTS and must include independent experimental and/or analytical work. The thesis is presented at a public defence with both internal and external examiners. The title of the thesis and the grade obtained is noted in the student's curriculum.

The main thesis supervisor must be an employee at the Faculty of Life Sciences and must, as a minimum, be at the level of assistant professor or a postdoctoral fellow. Supervision is based on a mutual agreement and on students' individual needs. The supervisor acts as a partner and primarily provides guidance with respect to the structuring of the assignment, the method of analysis, important sources etc. In general, the supervisor must approve:

- the subject area
- the problem formulation
- the provisional outline of the project

A written and signed contract is agreed between the student and the main supervisor, which includes project title, name of supervisor(s), project period which is not to be exceeded and preliminary arrangements regarding supervision, publication and dissemination of results.

When the student has concluded a thesis, he/she will be able to:

Knowledge:

- identify scientific problems within the degree programme's subject areas
- use an appropriate set of methods and theory based on international research in his/her work with the problem formulation

Skills:

- utilise and assume a critical stance towards theories and methods and their applicability and limitations
- assess the extent to which the production and interpretation of results/material depends on the selected theory/method and the selected delimitation
- discuss matters of relevance to the scientific and industrial environments raised by the thesis

If the thesis includes experimental data/personal data production, the student will also be able to:

- substantiate the idea of conducting experimental work/producing one's own data in order to cast light on the problem as formulated in the problem formulation
- handle data through a choice of methods of scientific analysis and present results objectively and in a concise manner
- assess the credibility of the results based on relevant handling of data

Competences:

- draw clear and scientifically-based conclusions in relation to the problem formulation and, more generally, in relation to the overall problem and the subject area
- discuss theories/models on the basis of an organised set of values and with a high level of independence
- assess the scientific and societal impact of the thesis from an ethical viewpoint
- start up and complete scientific work in a research setting
- solve complex problems and carry out development assignments in a work context

These goals are primarily reached by integrating research and research results in the veterinary curriculum at BSc and MSc level, heavily supported by the written work done by students at both their BSc and MSc level. There is no formal system for securing an appropriate balance between opportunities for student involvement in basic, applied and clinical research. The subject area of the BSc and MSc thesis is mainly based on the students' own interest and, in case of doubt, the Veterinary Study Board can decide which department is relevant in respect of providing a supervisor. However, no such decision has been made yet by the Veterinary Study Board. The four veterinary departments are all involved in BSc and MSc thesis work.

In general, it is easy for the students to find a supervisor. Further, the Veterinary Study Board and the departmental teaching committees monitor the time for completing each thesis in order to be able to intervene if the deadline for completion of the thesis is exceeded. Most students complete their theses within the time allotted. Together with the Faculty's high research output, this indicates that the Faculty has an appropriate number of academics and technical posts assigned to research. In 2003, plans were made for gradually increasing the number of veterinary students admitted. These plans necessitated that the Faculty spent approx. DKK 250 million on new buildings, new personnel and new equipment. In 2009/2010, the government has allocated specific funding to the universities for increasing the standards and quality of research laboratories. LIFE has received approx. DKK 200 million, and LIFE is in the process of finalising plans to renovate and rebuild research laboratories in 2010.

The general trend among Danish universities is that operating funds increasingly have to be derived from external funding.

13.2 Comments

The opportunities for Danish students to participate in active research work are very good, and all departments are available for the students to choose between when selecting their subject area. So far, the Faculty has not experienced limitations in the supervising capability.

13.3 Suggestions

Despite the huge efforts time-wise and financially, it can be concluded that students' research work at BSc and MSc level should continue to be an integral and important part of the curriculum.

New ways to secure sufficient amounts of operating funds have to be considered.

APPENDIX 1

Suggestions from the evaluation of the 1972 veterinary curriculum by the Advisory Committee on Veterinary Training in 1989 and KVL's follow-up on the suggestions

Organisation

1. Serious consideration should be given to reducing the number of departments to a number comparable to that of leading veterinary schools similar in size to the Royal Veterinary and Agricultural University (RVAU).

2. We can see advantages in RVAU commissioning a management audit, perhaps accompanied by a technical audit, before deciding on the number and types of departments and changes in the management structure to meet the new requirements.

Comments: The number of departments within veterinary medicine has been reduced from 17 to 5. In some fields, this has led to very large departments, and especially the structure of the Department of Clinical Studies is currently under debate.

3. Steps should be taken to ensure the input of advice from the profession in general and from animal owners, particularly on matters concerning the curriculum.

Comments: KVL has a Board of Representatives comprising 15 people acting in their personal capacity and covering all educational fields at KVL. Currently one member is from animal science and veterinary medicine and four from the agricultural sciences. The Academic Coordination Committee for Animal Science and Veterinary Medicine is charged with making proposals related to the future veterinary education and includes one member of the Danish Veterinary Association, one representative of the pig-producing organizations, one representative of the cattle-producing organizations and other members.

4. Opening times of clinical services should be extended to more closely reflect the reality and ethics of professional practice.

Comments: The clinical service has been extended to 24 hours, 7 days a week all year. Students participate on a voluntary basis in this extended service.

Funding and staffing

5. Priority should be given to increasing the number of support staff and professional staff in clinical departments.

Comments: From 1990 to 2000, the full-time equivalents of academic staff increased from 31.5 to 47.0, a total of 15.5. Of the 47.0 full-time equivalents, 10 are for extended clinical service and 2 for other clinical service, totalling 12 for these activities. The Department of Clinical Studies also pays salaries for 3 clinicians from fees charged for the emergency service. Further staffing is still needed.

6. It is strongly recommended that the veterinary clinical departments be considered in the same light as clinical departments in human medicine in terms of staff : student ratios, and that the staff : student ratio of those departments be improved.

Comments: The ratio of teaching staff to the number of undergraduate students and the corresponding ratio of teaching staff to the number of full-time equivalents are 1 : 7.8 (acceptable) and 1 : 5.2 (satisfactory). The burden of teaching in the Department of Clinical Studies is higher than in other veterinary departments.

7. It is also recommended that paraclinical departments with diagnostic responsibilities be treated in an analogous fashion.

Comments: The Department of Veterinary Microbiology and the Department of Pharmacology and Pathobiology have ratios of teaching : support staff of 1 : 1.1 and 1 : 1.8.

8. We also strongly suggest that earnings from clinical cases be retained within the departments generating that income (minus an element for central overheads)

Comments: The Hospital for Small Animals retains 80% of the fees received.

Facilities and equipment

9. Emphasis should be placed on improving the facilities on the present site to accommodate an intake of 100 students per annum. A management audit of the use made of the existing facilities would be a useful first step.

11. In any extension of facilities, priority should be given to those used in practical work and the provision of adequate accommodation for experimental animals.

Comments: The annual student intake has increased to 116. Thus, the dropout in the first years of study should be taken into account. Facilities for microscopy have been extended accordingly, and

a postmortem room for 116 students is being constructed. New and modernized facilities for practicals in physiology, biochemistry and veterinary microbiology will improve the situation but still do not meet the demand arising from the increased annual intake.

The Department of Clinical Studies has been expanded and renovated somewhat, but the facilities are not adequate for the number of students.

Facilities for experimental animals have been expanded and designed to house experiments with genetically modified organisms and infective agents of low pathogenicity. These facilities are located at the Frederiksberg campus and at the research farm in Taastrup.

12. Obvious deficiencies in equipment for teaching, such as the microscopes for anatomy and the ultrasound equipment in the clinics, should be corrected.

13. As a matter of urgency, audio-visual facilities should be improved, not only to make the best use of the limited amount of clinical material available, but also to enable students to take advantage of videotapes and other audio-visual aids now available within the European Community.

Comments: New adequate teaching microscopes for histology and histopathology have been acquired. The situation with respect to clinical ultrasound equipment has improved.

KVL has improved considerably within information technology (IT). The lecture halls are equipped with IT equipment, and an IT Service Centre has been established recently. The development within this area is continuing. Support staff have been hired to produce videotaped teaching materials. Seminar rooms with IT equipment for the students have been built. Facilities for videoconferencing are also present at KVL.

10. We strongly support the building of a new library that should help overcome some of the design problems in the existing building.

Comments: A modern library has been built equipped with up-to-date IT equipment and workplaces. There is access to electronic journals as well as important Internet and CD-ROM databases.

<u>Curriculum</u>

14. A review of the curriculum at an early date is highly desirable. Attention needs to be given to

ways of ensuring that changes in the curriculum are implemented.

16. Greater collaboration in the teaching of paraclinical subjects should be considered.

17. Consideration might well be given to including more project work in the electives to prepare students for a lifetime of self-learning, with a corresponding reduction in formal teaching.

Comments: The curriculum was revised in 1994. Distinct boundaries between the subjects were removed to integrate them. As a consequence, some subjects are not taught individually but are incorporated into larger blocks. The curriculum is still compressed. Very few candidates have graduated under the 1994 curriculum (2 years of candidates), and their experience with the curriculum and with its relevance for their subsequent professional career has not yet been evaluated. Nevertheless, the 1994 curriculum is being revised as a result of an assessment in Denmark and the students' experiences during the first 3 years of the study. The Veterinary Study Committee has also initiated an assessment of the most recent years of the curriculum (V5-V11). This material as well as the proposals for a revised curriculum will be available to the expert panel.

15. There should be an increase in the proportion of practical teaching compared with theoretical teaching Comments: In the current curriculum, the ratio of theoretical training to practical and clinical training is 1 : 1.5 (satisfactory). The ratio of clinical training to theoretical and practical training is 1 : 6.5 (unsatisfactory).

18. The possibility of developing a comprehensive clinical extramural studies programme in collaboration with the Danish Veterinary Association should be investigated.

Comments: The proposed field station has not been established, and access to animal herds has not improved significantly. The possibility of practicals in veterinary practice has not been implemented. There is still limited access to live animals under practical conditions. There is still a need for more patients at the Hospital for Large Animals.

Despite limited access to animal herds, research and teaching in production-related health, preventive medicine, epidemiology and herd health have improved.

<u>Library</u>

19. The opening hours of the Library should be extended

and attempts made to encourage the students to use the Library, perhaps with the addition of self-instruction programmes and courses on how to make use of the Library, particularly if more project work is introduced into the curriculum.

Comments: The Library is now open 42 hours per week, an increase from 32 hours per week in 1987. Further, there is on-line access 24 hours a day to CD-ROM-based databases and international databases.

APPENDIX 2

4 Summary

4.1 Introduction

The Danish Centre for Quality Assurance and Evaluation of Higher Education has conducted an evaluation of veterinary studies at the Royal Veterinary and Agricultural University of Denmark (KVL). The evaluation was initiated at the request of the Danish Advisory Board for the Natural Sciences. The evaluation is one of a process of systematic evaluations of higher education in Denmark in recent years.

Under the terms of reference the aim of the evaluation is as follows:

"to examine the quality of the programme by analysing major aspects of veterinary studies at the university concerned and the conditions under which the study programme is conducted."

Consequently, the evaluation covers:

- Conditions applying to organisational factors and the structure of studies.
- Administrative/economic conditions.
- · Composition of the teaching group.
- · Programme components and the study period.
- Subject content and subject development.
- Tests and examinations.
- · Internationalisation aspects of the study programme.
- · The labour market.

EVALUERINGSCENTERET

67

The terms of reference also permit other aspects of the study programme to be included in the evaluation to the extent that they warrant special attention.

In counsel with the Advisory Board for the Natural Sciences, the Evaluation Centre appointed a steering committee. The Steering Committee comprises:

7

- Professor Lars-Erik Appelgren, Agricultural University of Sweden, chairman
- Professor Kåre Fossum, Veterinary Institute, Oslo, Norway
- Charlotte Madsen, veterinary surgeon, Institute of Food Safety and Toxicology, Veterinary and Food Directorate
- · Dorte Lebech, veterinary surgeon, Vrønding Veterinary Practice, Denmark
- Mogens Gammel Pedersen, veterinary surgeon, Environmental and Food Centre, Slagelse, Denmark.

The Steering Committee, within the framework of the terms of reference, drew up guidelines for the documentation used in the evaluation and has analysed the material. The conclusions and recommendations expressed in the evaluation are thus those of the Steering Committee.

The Evaluation Centre is responsible for methodology and the practical implementation of the evaluation. This includes preparation of the report, collection and registration of documentation, and contacts between the Steering Committee, the Advisory Board for the Natural Sciences, the veterinary study programme, PLS consulting company, etc. This work was done by:

- Mette Lindgaard, project manager
- Mikkel Haarder, project assistant
- Kaspar Bach, project assistant.

EVALUERINGSCENTERET

4.2 Methodology

The organisation and methodology of the evaluation were the responsibility of the Evaluation Centre. The Centre is an independent institution under the Ministry of Education with a mandate to initiate evaluation of higher education programmes, to develop appropriate methods and procedures, and to inspire and advise institutions of higher education on quality issues.

The main activity of the Centre is the regular and systematic evaluation of study programmes on a rotating basis in which most programmes of study in Denmark will be evaluated over a period of 5-7 years.

The standard evaluation comprises three phases, spanning a period of 12-14 months:

Phase 1: Planning

Phase 2: Documentation, i.e. self-assessment, user surveys, and site visits Phase 3: Reporting.

The Steering Committee was appointed during the *planning phase*, and the Centre held briefing meetings with the institutions involved.

The *documentation phase* comprised self-assessment of the programmes, a user survey including veterinary students, and visits to the study programmes involved.

The central element in the evaluation was the self-assessment process in which the universities involved prepared self-assessment reports. These were designed to identify and discuss the central aspects of the evaluation, and were also to contain assessments of the strengths and weaknesses of programmes in relation to their objectives. Furthermore, reports were required to set out proposals for initiatives that might secure the quality of the programmes. The long-term objective of the self-assessment process is to encourage continued internal quality development of study programmes.

The site visit involved the Steering Committee visiting each of the institutions under

EVALUERINGSCENTERET

review. The self-assessment reports and the survey were all necessary prerequisites of the site visit.

The results of the *reporting phase* were presented by the Steering Committee in its final report, which contains a summary of the Committee's observations. These observations were first discussed at a conference attended by representatives of the institutions under review. The report was then submitted to the Ministry of Education, the Danish Advisory Board for the Natural Sciences and the institutions for implementation.

4.3 Conclusions and recommendations

The veterinary science study programme is a well-run course of study with motivated, satisfied students. The course offers inspiring surroundings, and students display a largely positive attitude to their study environment. The recommendations contained in the evaluation should therefore be seen as a contribution by the Steering Committee towards supporting the quality development of the veterinary study programme.

Veterinary students have traditionally qualified as veterinary surgeons and for posts in the food-quality sector. Developments within society, however, have imposed new demands upon graduates – and consequently upon the course of study. The Danish Educational Regulations (LBK no. 863 of October 10, 1994) reflect the demands of society but the study programme must in practice take steps to combine as many of these demands as possible and define a course of study which does not stress its students unnecessarily. The veterinary study programme must endeavour to place itself in a clearer social context.

4.3.1 Branching and core curriculum

The veterinary study programme qualifies its students for a wide variety of employment. This is a great strength in that it presents graduates with a range of career choices. However, by its very breadth, the course imposes considerable pressure on students, and students are subject to a heavy work load and many examinations. The broad spectrum

EVALUERINGSCENTERET

of subjects makes it difficult for students to complete the study programme in the allotted 5¹/₂-year period and to achieve the necessary skills in all the various fields.

In order to give students some opportunity for specialisation and to provide some balance between professional breadth and depth, the Steering Committee recommends that the study programme defines a core curriculum, thereby focusing on the qualifications that are essential for graduation. At the same time the Steering Committee recommends the programme to consider dividing the study programme into two or more branches so that it can comprise a basic course taken by all students and a branched second tier for specialisation.

The Steering Committee has drawn up proposals for a branched programme. The proposal aims to secure for students skills "from plough to plate" but at the same time to give them a comprehensive introduction to clinical and food-related aspects. The other recommendations of the Steering Committee are a natural consequence of the proposals for branching. If, however, the veterinary study programme retains its present structure, the other recommendations should still be considered on their merits.

4.3.2 Veterinary forum

٠,

The Royal Veterinary and Agricultural University is a mono-faculty institution. One effect of the absence of a specialised veterinary faculty is that there is little or no co-ordination between the various institutes that offer teaching at the veterinary studies. With a view to closer co-ordination and integration of subjects and examinations, the Steering Committee recommends the establishment of a veterinary forum composed of relevant members of staff. Its purpose would be to debate the veterinary study programme in its entirety as well as the requirements that veterinary graduates must meet. The forum should define at an overall level the skills profile of a veterinary graduate, prioritise the various subjects and their objectives, work for a reduction of the actual study period to the agreed standardised period of 5½ years, define in concrete terms the programme's internationalisation strategy, and secure the continued recruitment of veterinary Ph.D. graduates in order that the study programme can progress smoothly from one generation

EVALUERINGSCENTERET

to the next.

4.3.3 Planning the study programme

In the adoption of the 1994 curriculum, one of the intentions was to achieve a better integration and co-ordination of the programme examinations and greater integration of practical and theoretical aspects of the programme. The programme was to have fewer confrontation classes and a greater element of project- and case-based study in order to give students the opportunity for a deeper appreciation of their subjects.

However, integration and co-ordination of subjects and examinations have enjoyed only partial success. The Steering Committee therefore recommends a review of programme planning to ensure that subjects act in support of each other. In particular, the Steering Committee recommends that teaching in methodology and project work be moved from the beginning of the programme to the microbiological project. And that the compulsory three-week courses be incorporated in a longer semester to give students a better opportunity to obtain a deeper understanding of their subject. It is generally important that the university improves the co-ordination and integration of subjects and links subjects to their application to the real world of employment.

4.3.4 Teaching and examinations

Most of the institutes involved find that there is a reasonable balance within their own institute between forms of teaching and examinations. None of the institutes, however, expresses a view on the balance of teaching and examinations for the study programme as a whole.

The Steering Committee recommends that a future veterinary forum should plan forms of examination and teaching for the study programme as a whole in as co-ordinated a fashion as possible. It should also take steps to ensure that the chosen forms of teaching promote active learning and are linked to the objectives set for the study programme in the curriculum. Clinic-based teaching in particular must be better co-ordinated with other classes in order to reinforce students' clinical skills – and do so in a way that makes best

EVALUERINGSCENTERET

possible use of the clinic. In addition, the study programme should include a compulsory period of work experience. The Steering Committee further recommends that the university gives its teaching staff an incentive to develop their teaching and professional qualifications.

The Steering Committee recommends that the assessment aspects of the veterinary study programme be evaluated in conjunction with preparation of the skills profile of graduates.

4.3.5 Veterinary studies in a wider context

It is the general impression that the world outside the university adopts an open and positive attitude to veterinary studies. The programme can therefore usefully expand its relations with those bodies and organisations which traditionally require the services of its graduates. It would be beneficial for all concerned – especially the students – if the positive attitude of the outside world could be exploited to an even greater degree than at present. To this end, the Steering Committee recommends that a veterinary forum invites the participation of relevant parties in debating the future skills profile of veterinary graduates.

Finally, the Steering Committee recommends that students are given a genuine opportunity to study abroad for one semester and to be credited for that period of foreign study. The present position is that students have difficulty in obtaining recognition for their period of study abroad. A determined effort should therefore be made to define a clear strategy of internationalisation.

EVALUERINGSCENTERET

84 | The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

APPENDIX $\mathbf{3}$

Veterinary Education in Europe

The New Veterinary Curriculum at the Royal Veterinary and Agricultural University, Denmark

Asger Lundorff Jensen

INTRODUCTION

One of the first veterinary schools in Europe, the Veterinary School at Christianshavn in Copenhagen was first founded by Peter Christian Abildgaard in 1773. On March 8, 1856, the Danish Parliament passed a resolution founding from it the Royal Veterinary and Agricultural University (KVL), and in 1858 the university, now located at Frederiksberg, was inaugurated. Initially, only veterinary and agricultural sciences were taught, but in 1863 horticulture and forestry were added. Dairy technician studies were subsequently introduced in 1921, and during the 1960s degree programs in food science and landscape architecture were established.

Today, KVL is a monofaculty university, which means that there is no unique veterinary faculty. The intention of this is to maintain easy, adaptable, and resourceful links between the governance of the university and the various scientific disciplines. The highest authority is the Board, which must safeguard the university's interests as an educational and research institution and determine guidelines for its organization, long-term activities, and development. The majority of the board members, including the chair, are external to the university. The other members represent the academic staff of the university (including PhD students with university contracts), the technical and administrative staff, and the students. The day-to-day management is the responsibility of the Rectorship, which consists of the rector, the pro-rector of research, the pro-rector of education, and the university director. Research and educational activities are the responsibility of the 12 departments, four of which are veterinary departments, each led by a head of department

The main campus at Frederiksberg, close to the centre of Copenhagen, covers 41 acres (16.6 hectares). KVL also has an arboretum at Hoersholm and four research farms at Taastrup, 20 km (12 mi) from the main campus, covering a total of 618 acres (250 hectares). These facilities play an important role in courses at KVL and make it possible to combine theory with practical research activities. There is a free shuttle-bus service from Frederiksberg to Taastrup several times a day.

The veterinary study program is a very popular one in Denmark, receiving between 550 and 600 applications per year. As of October 2004, KVL had a total of 863 veterinary students, of whom 731 are female and 132 male. Until 2003, 120 veterinary students were admitted and each year, while approximately 100 new veterinary candidates graduated. This number increased in 2003, 2004, and 2005 to 140, and in 2006 180 veterinary students will be admitted.

JVME 33(2) © 2006 AAVMC

The earlier veterinary curriculum, established in 1994, was taught over five and a half years. One year of a full-time program is equivalent to 60 European Credit Transfer System (ECTS) points. The complete curriculum thus has an equivalent of 330 ECTS points, 285 representing compulsory courses and 45 representing electives. Compulsory courses include zoology, veterinary ethics and philosophy of science, chemistry, biophysics, cell biology (including biochemistry), anatomy, physiology, biostatistics, genetics, nutrition, ethology, epidemiology, pharmacology, pharmacy, toxicology, bacteriology, mycology, virology, immunology, invertebrate zoology, parasitology, general and special pathology, small- and large-animal internal and surgical diseases, reproduction and obstetrics, population medicine and herd health management, veterinary jurisprudence, food and environmental hygiene, fish diseases, poultry diseases, food inspection and hygiene, and master thesis.

From September 2005, a new veterinary curriculum also of 330 ECTS points replaces the 1994 curriculum. The following sections present reasons for the curriculum change, the process of changing the curriculum, the outline of the new curriculum, and plans for future developments.

REASONS FOR CHANGING THE CURRICULUM

Developments in Research and Society

KVL's strategy is to continually improve, develop, and adapt its bachelor's and master's degree programs. The KVL faculty believed that a curriculum change was clearly needed, both because of developments in research leading to rapidly increasing biomedical scientific knowledge and because the work of the veterinarian has become more specialized and complex because of developments in society.

Job Opportunities

Unemployment of veterinarians in Denmark fluctuates around 3% and is forecasted to decrease.¹ Based on various inquiries, KVL assumes that traditional veterinary job opportunities (e.g., in clinical practice, food safety, and food hygiene) will remain unchanged, while job opportunities within biomedical research and industry will increase. KVL therefore decided on a strategy of changing the veterinary curriculum in the direction of more focus on public health and human medicine, without neglecting the traditional veterinary labor market (i.e., clinical practice, state veterinary medicine, food safety, and food hygiene).

Ramifications of the Bologna Declaration

The Bologna Declaration has been presented in detail in a past issue of this journal.² A major objective of the declaration is the adoption of a bachelor's and master's degree structure, and in 2003 the Danish Parliament passed a new law regulating universities³ that also requires a bachelor/master structure for the veterinary curriculum, with a veterinary bachelor's degree program of 180 ECTS credits and a veterinary master's degree program of 150 ECTS credits to be developed. Subsequently, the Ministry of Science, Technology and Innovation also stated that both bachelor's and master's degree programs should include elective courses and a written thesis. Another major objective of the declaration is to establish transparent systems of higher education in Europe, based on two main cycles and realized as a division of higher education into different steps. To have a real impact on curriculum development, recognition of foreign degrees, enhanced mobility, and international evaluation and accreditation, a more precise concept of qualifications is needed, and this led to the formulation of a Danish Qualifications Framework for higher education.⁴ At KVL, this framework was adopted by describing a competence profile for each bachelor's and master's degree program and for each course. The competence profile includes descriptions of the minimum competences to be obtained within the following categories: basic science, applied science, and ethics and values. The three categories essentially reflect the Aristotelian concepts of episteme, techne, and phronesis, respectively.

THE PROCESS OF CHANGING THE CURRICULUM

In 2002, in line with the strategy for the veterinary curriculum, KVL allocated financial resources to adjust the curriculum to include differentiation in the latter part of the curriculum, as well as to increase the number of students admitted per year from 120 to 180. Differentiation is not identical to tracking, since all students graduating from the veterinary master's degree program receive the omnivalent basic training required for recognition as a veterinary surgeon.

A steering committee composed of the heads of the four veterinary departments, the chair of the veterinary study board, and a student member of the veterinary study board was appointed to implement the process, while the director of studies and the veterinary study board were responsible for creating the new curriculum.

It was obvious that the existing campus was too small for the increased number of students, so the decision was made to replace and rebuild the large-animal hospital in Taastrup while at the same time rebuilding and renovating the facilities at Frederiksberg. A total of 76 new teaching positions (38 scientific and 38 technical) were stipulated, and the steering committee also made recommendations for allocation of the new positions and professorships to each department in accordance with the new curriculum.

In 2003, KVL decided to change the semester structure for all bachelor's and master's degree programs. The semester was divided into two blocks of nine weeks each, with an interim week in between. Each block was assigned a value of 15 ECTS credits; thus one semester now has a value of

Table	1: '	The I	new	semeste	r structure	at the	Royal
Veteri	nary	/ and	l Agi	ricultural	University,	Denm	lark

	9 weeks	9 weeks	9 weeks	9 weeks
One year	Block 1	Block 2	Block 3	Block 4
(60 ECTS)*	15 ECTS	15 ECTS	15 ECTS	15 ECTS

*One year has an ECTS-credit value of 60, thus each semester has an ECTS-credit value of 30. Each semester consists of 20 weeks, divided into two blocks of nine weeks each. Following each nine-week block is an interim week without planned teaching, during which, for example, re-examinations and excursions can take place.

30 ECTS (Table 1). It was also decided that courses, where possible, should have an ECTS value of 7.5, 15, 30, or 60 credits. Examinations were to take place within the nine weeks, and this also necessitated adjustment and rethinking of the examination procedure for each course (e.g., changing from a four-hour written examination to a portfolio examination, an oral examination, or other examination procedures). Re-examinations were planned for the subsequent interim week, nine weeks later.

The curriculum change also required transitioning students from the old curriculum to the new. Students in their last four semesters were allowed to complete their education according to the old curriculum, while all others were transferred to the new one. This, of course, called for a meticulously complex transference process, since some of the courses were now given in another order and often also involved different examination and grading procedures. However, the most delicate point was that the students transferred to the new curriculum now had to apply, and compete, for one of the five differentiations. As an interim solution, 25% of the places available in each differentiation were allocated based on the student's preferences and their previous grades, whereas the remaining 75% were allocated based on a weighted lottery. The students admitted before 2005, however, were guaranteed the opportunity to could continue their study without applying for entrance to the veterinary master's degree program.

In 2004, the new EU regulation concerning food hygiene⁵ was promulgated. The regulation explicitly states the professional qualifications required to be an official veterinarian. Not all of these qualifications were included in the new curriculum (e.g., principles of training of personnel working in the production chain). Work was therefore undertaken to identify the shortcomings in the new curriculum; once identified, these were grouped together in a separate course, but they will likely be integrated into existing courses when the new curriculum is reviewed at a later time.

OUTLINES OF THE 2005 CURRICULUM

The five-and-a-half-year veterinary curriculum is divided into a veterinary bachelor's degree program (3 years, 180 ECTS points) and a veterinary master's degree program (2.5 years, 150 ECTS points).

JVME 33(2) © 2006 AAVMC

Table 2: The 2005 veterinary bachelor's degree curriculum at the Royal Veterinary and Agricultural University, Denmark (ECTS credit values are given in parentheses)

Year	Semester	Curriculum Content
3	6	Bachelor's thesis (10)
	5	Applied veterinary disciplines ^{**} (50): Microbial Food Safety (6);Environmental Hygiene (2); Toxicology (4); Nutrition (5); Ethology (3); Epidemiology (4); Pharmacology and Pharmacy (7.5); Basic Clinical Science [*] (18.5)
2	4	Basic pathobiological disciplines (30): Virology (4); Immunology (4); Invertebrate Zoology and Parasitology (6); Bacteriology and Mycology (6); General Pathology (10)
	3	Basic veterinary disciplines (60): Biostatistics (6); Basic Genetics (6); Applied Genetics (5); Anatomy (12.5); Special Histology and Embryology (9); Physiology (21.5)
1	2	Basic biology course (30): Zoology (3.5); Biophysics (3.5); Veterinary Ethics and Philosophy of Science (3.5); Chemistry (7.5); Cell Biology (12)
	1	

^{*}Courses with clinical training.

**Elective courses that students must choose who wish to apply for the veterinary master's degree program.

The Veterinary Bachelor's Degree Program

According to ministerial regulations, the bachelor's degree program should give the student either the qualifications needed to apply to several master's degree programs or explicit work competence. The KVL decided to construct the veterinary bachelor's degree program so that the students obtain the qualifications needed to apply for several master's degree programs, including especially the veterinary master's degree program.

The ministerial regulations also state that compulsory elements, including a written bachelor's thesis of 10–20 ECTS credits, should be of at least 120 ECTS credits, while elective elements should cover at least 10 ECTS credits. The bachelor's degree program was therefore designed as follows (see Table 2):

- *Compulsory elements* (120 ECTS): zoology, chemistry, biophysics, cell biology, veterinary ethics and philosophy of science, anatomy, physiology, genetics, biostatistics, virology, immunology, general pathology, bacteriology, mycology, invertebrate zoology, parasitology
- *Elective courses* (50 ECTS): microbial food safety, environmental hygiene, toxicology, nutrition, epidemiology, ethology, pharmacology and pharmacy, basic clinical course
- Written bachelor's thesis (10 ECTS)

It may be surprising to see the topics covered by the elective courses. However, a student wishing to apply for the veterinary master's degree program must take all these electives. Student who do not want to apply for the veterinary master's degree program can elect other courses and thereby direct their bachelor education toward another non-veterinary master's degree program at our university (e.g., Biology/Biotechnology).

The Veterinary Master's Degree Program

The overall goal is that a student having completed the veterinary master's program should be qualified to be recognized as a veterinary surgeon and official veterinarian

IVME 33(2) © 2006 AAVMC

according to EU legislation.^{5,6} In addition, the program was designed so that students must apply for and attend one of the five following differentiations:

- companion animal diseases
- equine clinics
- farm animal health and production
- food safety
- biomedicine

Ministerial regulations state that compulsory elements should carry at least 90 ECTS points, including a written master's thesis of 30 to 60 ECTS points, and that elective elements should be of at least 10 ECTS credits.

The veterinary master's degree program, consisting of 150 ECTS credits, was designed as follows (see Table 3):

- *Compulsory elements* (97 ECTS): special pathology, diseases in poultry and fish, small animal internal medicine and surgery, large animal internal medicine and surgery, veterinary jurisprudence, meat inspection, hygiene, and a 9-ECTS compulsory module for the selected differentiation
- *Elective courses* (23 ECTS) for the selected differentiation in companion animal diseases, farm animal health and production, food safety, biomedicine, or equine clinics
- *Master's thesis* (30 ECTS)

Thus, having completed the veterinary master's degree program, students will have received not only the required omnivalent basic training but also a higher starting competence level in one of the specified differentiations. Each differentiation consists of two modules (9 and 23 ECTS credits, respectively), and thus each differentiation has a total credit value of 32. The first, nine-credit module is compulsory, while students can choose to apply to the veterinary study board to use the 23 ECTS points from module 2 on other courses, either at KVL or at other universities in Denmark or abroad.

Table 3: The 2005 veterinary master's degree curriculum at the Royal Veterinary and Agricultural University, Denmark (ECTS credit values are given in parentheses)

Year	Semester	Curriculum Content
3	5	Master's thesis (30)
		Compulsory courses (7): Meat Inspection and Hygienic Control (3); Veterinary Jurisprudence (4)
2	4	Differentiation—module 2 (23): Equine Clinics,** Companion Animal Diseases,** Food Safety, Biomedicine,** Farm Animal Health and Production**
	3	Clinics and Pathology (81): Special Pathology (12), Poultry Diseases (3), Fish Diseases (0.5), Seminar in Hygiene (0.5), Obstetrics ^{**} (3), Reproduction ^{**} (9), Clinics–Large Animals ^{**} ,† (10), Large-Animal Clinical Practice ^{**} (15), Clinics–Small Animals ^{**} ,§ (13), General Small-Animal Clinical Practice ^{**} (15)
1	2 1	Differentiation—module 1 (9): Equine Clinics,** Companion Animal Diseases,** Food Safety,** Biomedicine, Farm Animal Health and Production**

*Students apply and compete for one of the five differentiations. Module 1 of the differentiation is compulsory, while the students can apply to the veterinary study board to use the subsequent 23 ECTS points on courses at KVL or other universities. **Courses involving clinical training.

†Includes lectures in large-animal internal medicine and surgery, clinical propaedeutics, and general surgical techniques. §Includes lectures in small-animal internal medicine and surgery, clinical propaedeutics, general surgical techniques, and clinical pathology.

FUTURE DEVELOPMENTS

KVL has as a strategic goal that all master's degree programs shall be taught in English by 2010, and plans for teaching the veterinary master's degree program in English are in progress.

In June 2005, a bill to amend the legislation governing universities⁷ was passed which stated that, as an individual option and as an alternative to undertaking part of their course in Denmark, the university may offer students the opportunity to undertake part of the program at one or more non-Danish universities, as arranged through exchange agreements between the universities concerned. Plans to incorporate this legislation into the veterinary bachelor's and master's degree programs are also in progress.

Also in June 2005, four Copenhagen-based universities (the Danish University of Pharmaceutical Sciences, the Technical University of Denmark, the Royal Veterinary and Agricultural University, and the University of Copenhagen) have created the Danish Pharma Consortium. The objective of this consortium is to enable Danish universities and companies to play a greater role within life science by creating an effective joint cooperation platform. The universities will cooperate not only on research and innovation but also on education. The specific implications of this for the veterinary degree programs, however, have not yet been detailed.

CONCLUSIONS

The Royal Veterinary and Agricultural University (KVL) has reorganized the five-and-a-half-year veterinary curriculum into a three-year bachelor's degree program and a twoand-a-half-year master's degree program with five specific differentiations (equine clinics, food safety, farm animal health and production, companion animal diseases, and biomedicine), beginning September 2005. A new semester structure facilitating a module organization of the curriculum was also introduced in September 2005. From 2006, the number of admitted students is to be increased to 180 students per year. New facilities, both clinical and nonclinical, are being built or renovated. Plans for teaching the veterinary master's degree program in English and for constructing exchange agreements between KVL and non-Danish universities are also in progress.

REFERENCES

1 Groes N, Holm A, Groes F, Kongsø TH, Brink K. Akademikernes arbejdsløshed og indtjening—brikker til et mønster. Copenhagen: Akt forlaget, 2004.

2 González-Soriano J, Veiga ER. The Bologna Treaty: a contribution to the development of quality education in Europe. J Vet Med Educ 31:212–215, 2004.

3 Act on Universities: Act no. 403 of 28 May 2003 (Translation) http://www.vtu.dk/fsk/div/unisoejlen/ActofUniversities2003.pdf>. Accessed 07/21/05.

4 Danish Bologna Follow-Up Group. *Toward a Danish "Qualifications Framework" for Higher Education* http:// www.vtu.dk/fsk/div/bologna/DanishQFReport.pdf>. Accessed 07/21/05. Danish Bologna Follow-Up Group, 2003.

5 Regulation (EC) No 854/2004 of the European Parliament and of the Council <http://europa.eu.int/ eur-lex/pri/en/oj/dat/2004/1_139/ 1_13920040430en02060320.pdf>. Accessed 07/21/05.

6 Council Directive of 18 December 1978 concerning the coordination of provisions laid down by law, regulation or administrative action in respect of the activities of veter-inary surgeons (No. 78/1027/EEC) http://europa.eu.int/eur-lex/en/consleg/pdf/1978/en_1978L1027_do_001.pdf). Accessed 07/21/05.

7 Bill to amend the legislation governing universities (the University Act) <http://www.vtu.dk/fsk/div/unisoejlen/engudgave.af.int.4.1.05.pdf>. Accessed 07/21/05.

AUTHOR INFORMATION

Asger Lundorff Jensen, DVM, PhD, Dr.Vet.Sci., DECVIM-CA, DECVCP, is professor in Veterinary Clinical Pathology,

Department of Small Animal Clinical Sciences, The Royal Veterinary and Agricultural University, Groennegaardvej 3, stuen DK-1875 Frederiksberg C, Denmark. E-mail: alj@kvl.dk. Since 2003 he has been Director of Veterinary Studies, and since 2002 he has been Chairman of the Veterinary Study Board.

APPENDIX 4

EAEVE evaluation 2001

Suggestion to improve the curriculum	Actions taken	Responsible	Time limit	Fulfilled 2009
General aspects				
There should be better coordination and inte- gration, both vertically and horizontally, of the departmental teaching in order to cover the required material more efficiently and comprehensively	The 2009-curriculum has integrated basic sciences much more into practical and clinical courses. E.g. parts of anatomy together with diagnostic imaging; parts of microbiology together with clinical pathology; parts of physiology together with pharmacology.	Vet. Study Board	December 2008	Completed
The time spent on the teaching of the basic sciences should be reduced by about 10%, to allow more time to be spent on the applied subjects. Some of this should come from identifiable subjects (see also the suggestions in Section 4.3), and from the phasing out of the VOP project with the introduction of the new curriculum.	VOP was eliminated in the 2005-curriculum and has been replaced by the bachelor-project required by law. In the 2009-curriculum, basic sciences has been reduced to approx. 99 ECTS compared to 138.5 in the 1994-curriculum. However, parts of basic sciences subjects have been incorpo- rated into clinical sciences courses. Core clinical sciences in the 2009-curriculum comprise 127.5 ECTS compared to 96 ECTS in the 1994-curriculum	Vet. Study Board	December 2008	Completed
Departments and staff, particularly those working in the applied fields, should be able to schedule practical teaching to take place during the entire day. This measure should not be delayed until the new curriculum is started, but should be implemented as soon as possible.	The teaching reform in 2005 introduced the block structure where full-day teaching could be introduced. This has especially been done in the clinical areas.	Faculty direc- tion/Study board	2005	Estimate 75% fulfillment
The curriculum should be planned to leave a lecture free year towards the end of the course in order to enable a major part of the practical work in the applied areas (e.g. clinical training, farm animal health manage- ment, diagnostic pathology, practical slaugh- tering/processing work) to be scheduled as intensive rotations.	A lecture-free final year has not been intro- duced. However, in the 2005 and 2009 cur- ricula, practicals in the clinical (hospital) areas have been planned so that whole days are used and these are also scheduled as rotations	Vet. Study board. Departmental teaching boards	2005	100%
Structured extramural work should be incorporated into the veterinary curriculum.	The 2005 and 2006 curricula both makes it possible for students to go for structured extra- mural work (vocational training)	Vet. Study board	2005	100%

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Fulfilled 2009
Basic subjects and Basic sciences				
The basic science teaching should be more closely oriented towards its application in the subsequent clinical, animal production and veterinary public health disciplines, ideally through a much greater level of integration and coordination of the teach- ing programmes of the various departments involved in the veterinary course	The 2009-curriculum has integrated basic sciences much more into practical and clinical courses. E.g. parts of anatomy together with diagnostic imaging; parts of microbiology together with clinical pathology; parts of physiology together with pharmacology.	Vet. Study Board	December 2008	Completed
The teaching on anatomy should pay less attention to basic anatomy and place more emphasis on topographical anatomy as preparation for surgery.	This should be reflected in the course description	IBH∨	March 2009	90% completed
The practical work in bacteriology should be reduced.	This should be reflected in the course description	IVP	March 2009	90% completed
The invertebrate zoology course should cease to exist as an independent subject, with its useful content be moved into parasitology, as an introduction to the protozoology compo- nent of the course	This should be reflected in the course description	IVP	March 2009	90% completed

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Fulfilled 2009
Animal production				
The animal production teaching in the KVL veterinary course needs to be given a much better structure and clearer orientation, viz.: The animal production disciplines should be taught as a basic foundation, covering all aspects of general husbandry and management, followed by applied 'professionalising'; teaching,, preferably adopting a problem-oriented approach.	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene)	Vet. Study Board	December 2008	Completed
Teaching in agronomy, rural economics and animal husbandry, in particular how these fac- tors influence production systems, have to be included in the early part of the course.	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene). Also, the Veterinary introduction course at the bachelor's level supports this	Vet. Study Board	December 2008	Completed
Training or exposure to the handling and basic day-to-day management of farm ani- mals should be provided at an early stage in the course through a combination of on-site teaching and extramural work.	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene). Also, the Veterinary introduction course at the bachelor's level supports this	Vet. Study Board	December 2008	Completed
The applied teaching in animal production should be closely integrated with farm clini- cal work	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene). Also, the Veterinary introduction course at the bachelor's level supports this	Vet. Study Board	December 2008	Completed
The coverage of poultry and fish management should be increased.	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene).	Vet. Study Board	December 2008	Completed
A working group of the Veterinary Study Committee should be established, with the remit of ensuring the teaching programme in the animal production field as a whole is integrated and comprehensive	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene). Also, the Veterinary introduction course at the bachelor's level supports this	Vet. Study Board	December 2008	Completed

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Time limit Fulfilled 2009	
Animal production					
The relationship between production factors and the quality of foods of animal origin needs to be clearly demonstrated in the veteri- nary course by closer coordination or combi- nation of the teaching in the two areas.	This is achieved with the 2009-curricu- lum, especially by the two new courses (Besætnings- og folkesundhed at the bach- elor's level, and Practical herd health assess- ment and meat hygiene). Also, the Veterinary introduction course at the bachelor's level supports this	Vet. Study Board	December 2008	Completed	
Much greater use should be made of the ex- perimental farm (the new facilities looks fine) for education in Farm animal handling all ba- sic management, and also of the commercial farms with which the KVL has contact (for the applied part of the teaching). Students must have sufficient exposure and knowledge in up to date farm animal production technologies (milk, beef and pig production) to be able to analyse factors influencing animal health and product quality.	A new large animal hospital has been build which include equine hospital, facilities for pigs and cattle, sheep, goats. Commercial farms are also visited	Faculty direction	2008		100%

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Fulfilled 2009
Clinical sciences				
The amount of clinical training, in particular in the small animal field, should be substantially increased.	In the 2009-curriculum, total hours of practical core training in small animal hospi- tal is stipulated to be 324 h approx. while in 1994-curriculum, this was 162 h	Vet. Study Board Departmental teaching board	December 2008	Completed
The main part of the clinical training should be provided through a system of rotations where the students are involved in the clinical activity for the entire day, and are an inte- grated part of the health-care team, with supervised case responsibility.	This was introduced in the 2005-curriculum and is also present in the 2009-curriculum	Vet. Study Board Departmental teaching board	December 2008	Completed
Attendance at Practicals has to be obligatory and made an integral part of the hours spent in formal clinical training.	This was corrected in 2001 so that 80% at- tendance was mandatory to practicals	Pro-dean of education	2001	100%
A full emergency and hospitalisation service should be started, with students taking an active role in this activity as part of their coursework.	This is included in the 2009-curriculum with the course in Acute medicine, critical care, obstetrics, and anaestesiology	Vet. Study Board	December 2008	Completed
The mobile clinic should be augmented, and a herd-health activity incorporated alongside the mobile clinical work. All students should participate in these activities as palrt of their coursework during the rotations in the ap- plied areas (i.e. part clinical, part animal production activity).	This should be reflected in the appropriate course descriptions	IPH	March 2009	95% completed
The curriculum should include formal training in reproductive disorders of small animals, whether this is done by the Section for Reproduction with referred cases from the Small animal hospital, or by the transfer the responsibility for small animal reproduction to the SAH.	This should be reflected in the appropriate course descriptions	IMHS	March 2009	95% completed

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Fulfilled 2009
Clinical sciences				
The teaching programme in radiology and in anaesthesiology needs to be reinforced for all species, and supported by appropriate staff and facilities.	In the 2009-curriculum, radiology is now a defined course. Anaestesiology is included in course Acute medicine, critical care, obstetrics and anaestesiology	Vet. Study Board Departmental teaching board	December 2008	Completed
The teaching on small companion animals ('pocket pets') and exotic species should be increased. As a specialised area, the KVL should assess whether developing an particular expertise in this field would be cost-effective in terms of the local market and competition.	This should be reflected in the appropriate course descriptions	IMHS	December 2008	Completed
For efficiency, the clinical facilities should be used for teaching most of the year. However more efficient use of the clinical facilities will require more staff.	This was achieved in the 2005-curriculum and is also present in the 2009-curriculum	Vet. Study Board Departmental teaching board	December 2008	Completed
Extramural vacation practice, where student work alongside practitioners, should be in- troduced in the latter part of the course both the large and small animal area. The KVL and Department for Clinical Studies should work along with the Danish Veterinary Association in the planning, selection of appropriate prac- tices, and supervision of such a programme.	The 2005 and 2006 curricula both makes it possible for students to go for structured extramural work (vocational training). DDD has not yet been included in planning and selection of practicies	Vet. Study board	2005	75%

Suggestion to improve the curriculum	Action taken	Responsible	Time limit	Fulfilled 2009
Food hygiene				
There should be a much greater coordina- tion and integration of the teaching in the field of food hygiene and veterinary public health, so that the interrelationship of the different elements is clear, rather than the teaching being presented as a series of separate topics	This is achieved with the 2009-curriculum, especially by the two new courses (Besætnings- og folkesundhed at the bachelor's level, and Practical herd health assessment and meat hygiene)	Vet. Study Board	December 2008	Completed
The teaching in food hygiene should be oriented towards the 'stable to table' concept, and incorporate the impact of production factors such as nutrition, en- vironment and health care aspects on the safety and quality of the finished product.	This is achieved with the 2009-curriculum, especially by the two new courses (Besætnings- og folkesundhed at the bachelor's level, and Practical herd health assessment and meat hygiene)	Vet. Study Board	December 2008	Completed
The KVL veterinary course should cover the slaughter and inspection of poultry, which would best be incorporated as part of the present course on poultry diseases.	This is achieved with the 2009-curriculum, especially by the two new courses (Besætnings- og folkesundhed at the bachelor's level, and Practical herd health assessment and meat hygiene)	Vet. Study Board	December 2008	Completed

		1		
Teaching: Quality and evaluation				
In order to get proper practical clinical education Practicals should be organised into uninterrupted blocks covering the whole day	This was achieved in the 2005-curriculum and is also present in the 2009-curriculum	Vet. Study Board Departmental teaching board	December 2008	Completed
Computer assisted learning should be reinforced	This was achieved in the 2005-curriculum and is also present in the 2009-curriculum	Vet. Study Board Departmental teaching board	December 2008	Completed
KVL veterinary professors should consider giving their good veterinary students some- what higher ratings at examinations, for example by standardising the statistical distribution of marks across the different courses provided by the KVL, in order that veterinary graduates can compete with other disciplines for PhD grants on an equal basis.	This is not legal in Denmark to do so			
KVL should consider placing greater use of continuous assessment, especially of practical work.	This was achieved in the 2005-curriculum and is also present in the 2009-curriculum	Vet. Study Board Departmental teaching board	December 2008	Completed
KVL should ensure that in using an averag- ing process for examinations, it is still main- taining a minimum level of competency in all key areas.	This is not legal according to Danish laws			

APPENDIX 5

OVERSIGTSKORT

Department of Basic Animal and Veterinary Sciences: 1-04, 1-51,1-61 Department of Veterinary Disease Biology: 1-05, 1-09, 1-11, 1-20, 1-35, 1-39, 1-62, 1-74 Department of Large Animal Sciences: 1-03, 1-18 Department of Small Animal Clinical Sciences: 1-71, 1-72, 1-82, 1-83 Frederiksberg, område 1, 2 og 3 / mål: 1:3500 / 21.06.10. PEA



94 | The Faculty of Life Sciences (LIFE) University of Copenhagen | EAEVE stage one

Bygningsafdelingen

Det Biovidenskabelige Fakultet

Faculty of Life Sciences University of Copenhagen 17 Bülowsvej 1870 Frederiksberg C Denmark www.life.ku.dk/English

