UNIVERSITY OF COPENHAGEN

Self-Assessment Report

Department of Veterinary Clinical Sciences

[Faculty of Health and Medical Sciences/October 22, 2017]

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Introduction to the Department

The veterinary area at the Faculty of Health and Medical Sciences at the University of Copenhagen (UCPH-Health) is the only place in Denmark which offers pre and post graduate veterinary medical education. The Department of Veterinary Clinical Sciences (DVCS) contributes nationally and internationally through teaching, research, innovation and dissemination. The Department employs approximately 160 persons (full-time equivalent; FTE) and is located at two campuses 25 km apart: Frederiksberg and Taastrup.

The Department is organized in five scientific sections and two integrated University of Copenhagen veterinary teaching hospitals (UCPH-VTH-CA and UCPH-VTH-LA):

- Large Animal Medicine and Surgery
- Veterinary Reproduction and Obstetrics
- Large Animal Teaching Hospital (UCPH-VTH-LA)
- Companion Animal Medicine, Oncology, and Veterinary Clinical Pathology
- Companion Animal Surgery, Neurology, and Cardiology
- Veterinary Imaging
- University Hospital for Companion Animals (UCPH-VTH-CA)

Researchers from the Department are and have been actively involved in the following national and international Centers and infrastructures:

- CUBE: Copenhagen University Biobank for Experimental Research
- UC-CARE: University of Copenhagen Research Centre for Control of Antibiotic Resistance
- CPH Cattle – Center for Research in Cattle Production and Health
- BrainStem – Stem Cell Center of Excellence in Neurology
- Pro-Eel – Center for Reproduction in European Eel
- Center of Functionally Integrative Neuroscience
- SHARE – Synergy in Human and Animal Research
- UNIK-Food, Fitness and Pharma
- Danish Center for Interventional Research in Radiation Oncology (CIRRO) - better tumour control with fewer side effects through individualized treatment (Lundbeck Foundation Center)
- EATRIS-European Infrastructure for Translational Medicine-(UCPH membership)
- DVCR -Danish Veterinary Cancer Registry
- Copenhagen Companion Animal Research Center (under development)

The Department is responsible for the PhD graduate programme in Veterinary and Animal Sciences entitled Companion Animal Clinical and Comparative Sciences (KLINIK).

Our mission

Based on our high professionalism, we educate and prepare the veterinarians of the future for a professional and balanced work life. We contribute at the highest international level to veterinary clinical research, and evidence based diagnostics and therapeutics to strengthen veterinary science and benefit health and life quality of the individual animal and their owners and aim at applying clinical research in all clinical practice settings (family, farm or stable based).

Our vision

To be an international leader in veterinary clinical sciences, primarily at the individual animal level
To become an international leader within veterinary health innovation, clinical studies, and individualized therapy of animals
UCPH-VTH-LA and UCPH-VTH-CA have state-of-the-art infrastructure and sufficient and specialized staff and are a strong platform for research, teaching, innovation and clinical service.

A brief history of the Department

The Department of Veterinary Clinical Sciences was established on January 1st 2017. Until December 31th 2016 the veterinary and animal science area was distributed across the three departments: Department of Large Animal Sciences, Department of Veterinary Disease Biology, and the Department of Veterinary Clinical and Animal Science. The three departments formed an internationally recognized research and education platform for education of veterinarians and animal science graduates, prepared for a national and international labour market exemplified by QS Veterinary Science ranking of 10 in 2015 and 13 in 2016 and the highest ranked QS scientific area at UCPH and in Denmark. The veterinary and animal science area was, however, challenged financially. Following a process of assessing strengths, weaknesses, challenges and opportunities in light of stakeholders' estimated requirements and future needs, and on a realistic assessment of the economic and political realities at present and in the future, it was decided to re-organize into two new departments: Department of Veterinary Clinical Sciences (DVCS (IKV)) and Department of Veterinary and Animal Science (DVAS (IVH)) from January 1, 2017.
Provided sufficient resources, the two new departments will ensure that veterinary medicine in Denmark can continue to have a wide and profession-oriented profile with candidates remaining among the best in the world. This organization of the veterinary and animal science areas creates an efficient platform which is clearly directed towards specific groups of stakeholders. DVCS is

centred on the individual animal (the veterinary clinical patient) with teaching, clinics and research being integrated in the highly specialized university veterinary hospitals with relations-based practice as a key element. DVCS has a very strong and comprehensive clinical environment with strong collaborations and relationships with veterinarians, veterinary practice, industry, animal owners and their associations.

Strategic highlights

DVCS has initiated an internal strategy process in February 2017 immediately after we were established. It is estimated that the new strategy is finalized and ready for implementation by the end of 2017.

In our new department we will take advantage of the increased clarity of our shared profile encompassing research, teaching, innovation, clinical services and communication centred around the individual animal patient and their owner. For the production animals such as cattle and swine, advanced clinical diagnostics and treatment on individual animals are applied at the farm level as well. Our strong **clinical** research disciplines and teaching integrated across the hospitals and our shared and unique clinical obligations including a high demand for specialized patient care, client contact, communication to colleagues and the lay public will support our endeavours to remain among the international leaders in veterinary clinical science.

DVCS disciplines target general and specialized clinical practice which is where >60 % of the veterinary graduates are employed.

DVCS has a clear and easily communicated profile nationally and internationally to collaborators and industry.

One of our major strategic focus areas is to continually increase our external research funding opportunities through interdisciplinary national and international collaborations and partnerships. We also want to explore the area of public fundraising, including crowd funding activities.

We would like to highlight that several of our current faculty when based in the two previous departments and in our new department have had recent success in attracting funding from high profile government and EU sources as well as private companies including:

- Two Marie Sklodowska Curie post.doc grants obtained.
- Six grants from the Danish Council of Independent Research (Technology and Production) since 2012.
- One grant from the High Technology Foundation and three grants from the Innovation Fund Denmark since 2012.

- Three PhD-stipends from the Faculty of Health and Medical Sciences since 2012
- A number of research and training grants from private national and international companies including Animal Hospitals and levy foundations.
- One Sapere Aude Research Talent Award from Danish Council of Independent Research in 2016
- A grant from GUDP (a national support program for green development)
- One PhD-stipend from Milk Levy Foundation and Cattle Levy foundation.
- A 3 mill. DKR private co-founding for the locomotion Unit KUSTOS-hallen, Taastrup

To fulfil this ambition, several issues must be achieved, e.g. continued state-of-the-art infrastructure at the veterinary hospitals thus supporting an internationally competitive platform for clinical research and teaching.

Please be aware, that exclusion of the external income (listed as DR30 in the table below) secured by UCPH-VTH-CA and UCPH-VTH-LA hospitals, results in a skewed picture of external overhead funding activities. All staff and especially the faculty specialists are active and may have/have their major time commitment in this type of activity.

Distribution of expenditure type at IKV in 2012-2016 (mill DKK). [1,2,3]

IKV	2012 mill DKK	2012 PCT	2013 mill DKK	2013 PCT	2014 mill DKK	2014 PCT	2015 mill DKK	2015 PCT	2016 mill DKK	2016 PCT
DR10	92.9	74%	114.6	73%	98.5	75%	96.6	74%	94.7	67%
DR30	24.2	19%	31.7	20%	25.0	19%	28.7	22%	37.5	27%
DR40		0%		0%	0.0	0%	0.0	0%		0%
DR50	8.0	6%	10.4	7%	6.8	5%	4.9	4%	9.0	6%
DR60	0.2	0%	0.0	0%	1.5	1%	0.0	0%	0.0	0%
Total	**125.3**	**100%**	**156.8**	**100%**	**131.8**	**100%**	**130.2**	**100%**	**141.3**	**100%**

Our strategy will be based upon the new UCPH strategy currently being developed focused on excellence, societal needs, global perspectives and digital insights. In addition, we will continue to advance and support the current and coming UCPH-HEALTH research strategy including strengthening high quality, interdisciplinary research collaborations; developing, recruiting and retaining highly valued faculty; increasing our share of external funding offered in open competition; promoting free and open intellectual inquiry and expression as well as responsible conduct of research; and promoting innovation in research and teaching.

Self-assessment process

The DVCS self-assessment process began on March 3rd, 2017 with preparation of an action plan. This was discussed and approved by the DVCS leadership group. Subsequently, members of the leadership group together with all associate professors and full professors prepared drafts on individual chapters at a departmental seminar April 27th. A draft version was created and subsequently distributed and discussed in the Department Council in all sections and the DVCS Teaching, Liaison and Work Environment Committees. All inputs were discussed and commented in the leadership group who then prepared the final Self-assessment report.
Thus every employee at the Department received a copy of the initial draft and had the opportunity to contribute. Every employee also received a copy of the final self-evaluation report.

Summary of self-assessment

The Department is established very recently and we are in the process of establishing new routines in many areas. The Department is focussed on veterinary clinical science with a particular focus on the individual animal irrespective of it being the sole animal in a house hold or part of a herd. Research output in terms of publication number is high (roughly 3 per researcher per year), especially considering that our researchers also have clinical duties in addition to research, teaching and administration. Publications are in international journals both within the relevant field (i.e. veterinary medicine) and in other fields (e.g. medicine, biochemistry, genetics, and immunology). There is a high degree of international research collaboration, and academic-corporate collaboration is actually higher compared to the UCPH in general. The Department's impact has reach, significance and diversity in its methodologies and beneficiaries. Beneficiaries include the public, veterinary and medical practitioners, government, animal owners, and the livestock farming industry. Impacts are delivered by influencing a range of instruments including; research, activities within the two veterinary teaching hospitals, participation in public bodies, pre- and post-graduate training and best practice standards.
Our researchers are able to attract external research funding, and significantly, the external research funding is from diverse sources and includes EU funding, international funding, Danish private funding and Danish public funding as well as funding from breed associations and individual animal owners.
Like all other departments, our Department is also subject to fluctuations in governmental resource allocation. However, a substantial and increasing part of the Department's total income depends on

income from clinical activities which is attracted in competition with surrounding private clinical practices in the Greater Copenhagen Region.
Some significant factors that have enhanced the quality of research are: Very dedicated high-performing employees, a number of which also being Diplomats, national specialists, in residency training, and/or PhD-students; A clear profile with focus on the individual animal patient, our unique position in Denmark as the only establishment for veterinary clinical research in the individual patient; Our scientific sections covers the major scientific fields required for research-based veterinary clinical theoretical and practical teaching on individual animals of the major animal species i.e., cattle, horses, pigs, dogs, and cats.
Some critical needs of the Department are: A stable and sufficient basic funding, the number of permanent scientific staff (i.e., associate professors, professor MSO, and full professors) for each scientific field is generally limited, a need to maintain and develop relevant clinical competences, a need to maintain and replace state-of-the-art technical infrastructure. Further, the distance between our two teaching hospitals significantly reduces potential internal synergies.

The Quality and International Impact of the Research

[The assessment of research quality should insofar as possible be based on the aims for research outlined in the department's strategy. 5 page maximum]
[Consider current strengths and weaknesses, and future threats to and opportunities for the research carried out in the department.
As DVCS is newly formed we undertook a SWOT analysis together with all faculty members at our new department on April 27th which is presented below.
The bibliometric analysis in Appendix C may be used for reference where relevant.]

Current strengths:	**Current weaknesses:**
• Very dedicated high-performing employees • Success in obtaining funding from several external sources, both smaller and substantial grants including high profile such as EU, The Danish Council for Independent Research and Innovation Fund Denmark • Strong research output in applied and veterinary clinical sciences • Strong research and research collaborations within spontaneous animal models of human diseases • EBVS approved residency programmes in multiple disciplines (ECVN, ECVDI, ESVCN, ECVIM-CA, ECVIM-Oncology, ECVS, ECEIM-, ECVECC) • High quality publications • High number of publications per researcher • Cost efficient publications • Unique position in Denmark as the only establishment for veterinary clinical research in the individual patient Internationally leading experts within specific veterinary clinical disciplines and associated research areas	• High teaching load and clinical obligations compete with/precludes research and grant preparation time • Limited funding for independent PhD-scholarships (significant opportunity change since 2012) • Very limited financial support for young researchers • Lack of funding for new faculty positions to serve as a career goal for younger talented researchers and secure recruitment and succession within the clinical disciplines
Opportunities:	**Current threats:**
• Securing and prioritizing dedicated time to conduct research and apply for external funding • Advanced state of the art diagnostic modalities and methodologies create potentials for advanced research in all animal species • Potential financial support through private/crowd funding – horses and companion animals are important for many people • Potential for establishing a clinical trial unit for companion animal clinical studies • Open possibility for UCPH-VTH-LA to expand first opinion practice • Increase the quality of our grant applications, e.g. by sharing evaluation results between researchers • Increase public awareness of the expertise available and the role of specialisation in veterinary medicine since we in many areas have the only specialists in Denmark • Increase veterinary clinical individual patient research within individual production animals • Increase the number of affiliated professors	• High teaching load and clinical obligations compete with/precludes research and grant preparation time • Lack of uninterrupted time periods to focus on research tasks/strategy and innovation causing loss of creativity and opportunities (too few staff with too many tasks to lift) • 20 % of faculty secure 80 % of the research funding, however the external income secured by all faculty through hospital specialist service are not “counted” towards external income • Shortfall in funding for updating and securing State of the Art infrastructure, e.g.: • CT-scanner, MRI, Radiation therapy unit or access to radiotherapy • Increased competition for external funding • Decreasing resource allocation from the government/university funding in current budget models • Employee fatigue and burn out due to the complexity and multitude of demands and poor work/life balance leading to absences due to sick leave and increased pressures on remaining staff • Brain drain due to current working conditions becoming less competitive with market alternatives in industry • Lack of public funding for EBVS residency programmes

	• Potential decrease in patient load due to increased competition from private clinics for first opinion and referral patients and due to diagnostic infrastructure which is not competitive

The department's ability to identify new scientific challenges

[Assess the department's contribution in making significant progress in the scientific field]

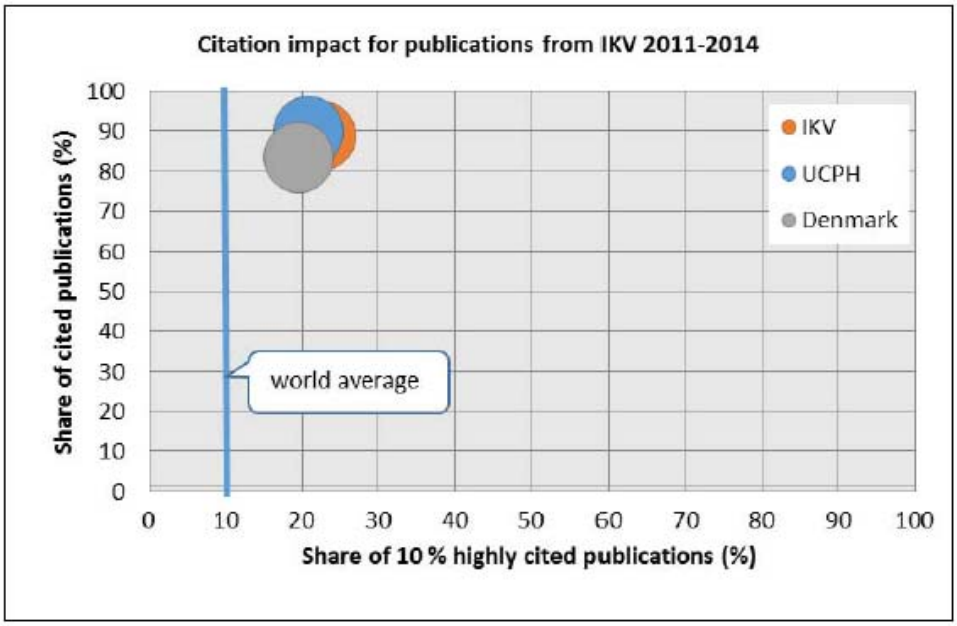
Researchers at the Department successfully identify new scientific challenges and develop clinical research projects to embrace these challenges. New scientific challenges identified have amongst others included; clinical animal disease models (cardiac, dementia, epilepsy, diabetes, reproductive, cancer, wound healing, degenerative joint diseases); novel laboratory (inflammatory, haemostatic, thrombotic), imaging and genetic biomarkers; antibiotic resistance/prudent antibiotic use, and chlamydia vaccine testing model as well as educational research including clinical skills training laboratory, blended learning and other novel training models.

Future challenges which the department is uniquely suited to address and will embrace is the increasing focus on veterinary precision medicine, preclinical trials in veterinary patients to be integrated in both veterinary and human drug and biomarker development, increasing digitalisation and big data opportunities.

The level of the department's scientific publications and citations

[A bibliometric report is included in Appendix C – please assess the quality rather than quantity in international journals and other publication outlets.]

The excellence of DVCS research is demonstrated by publication in high ranking veterinary international journals as evidenced by the high percentage of BFI-2 publications.



Citation impact for publications from IKV 2011-2014.[1]

Only publications up to 2014 are included since the publications need time to get cited.

Source: SciVal

The great majority of journal publications are in English, many publications appear in human medical journals. Furthermore, the publication rate per researcher in internationally recognised journals is high (e.g. 98 publications/year from 23 senior researchers). Publications are typically based on patients recruited through the hospitals and clinical practice (both companion and large animal patients).

The ability of staff to attract prizes, prestigious grants and awards

[Please refrain from listing all but the highlights, and assess the overall strengths and weaknesses and future threats and opportunities for the staff's ability to attract the above.]

Our researchers have attracted prestigious grants and a Sapere Aude talent award from The Danish Council of Independent Research, and from EU. On many occasions, our researchers' contributions have been selected as best abstract presentations at key international conferences (e.g. ECVIM, ECVCN, ECVECC, and World Equine Airway Symposium 2017), best paper in a journal, the Abildgaard Award, Waltham Research Award. Scientific papers have been honoured with an editorial or highlighted as a major contribution to science in the field. Several faculty members have been nominated for best teacher at SUND-KU and for Saly's Horse for best teacher in the veterinary curriculum. One PhD student won 'PhD Cup' as the PhD project best communicated (2011).

Although the number of grants and awards available within veterinary clinical sciences is limited, we have been successful in obtaining grants from the Danish Research Council of Independent Research and EU in competition with medical, basic and applied research disciplines. With

increasing competition it has become increasingly difficult for conventional veterinary clinical sciences to compete with globally societal grand challenges such as the diabetes epidemic, global warming, cancer and green energy and even other areas of veterinary medicine with much political focus such as multi resistant zoonotic bacteria and avian influenza. Also large prestigious grants and awards are rarely aimed at veterinary clinical disciplines. We have however also turned this trend into an opportunity and have had success with projects of translational value where investigations of spontaneous diseases in cats, dogs and horses represent a supplement to experimental animal models of such human diseases.

Level of projects carried out in collaboration with non-Danish researchers

[Assess the level of visiting researchers, joint publications, visits to foreign universities conducted by the department's researchers, joint projects with foreign universities etc.

Joint publications with non-Danish researchers amount to 50% of the DVCS publications. PhD students and Post Docs are strongly encouraged to spend and most do spend at least 3 months at an international research environment. Researchers from other universities have been on sabbaticals at DVCS. In addition, in connection with collaborations including international researches they often visit DVCS or faculty visit their institutions. International joined projects include collaboration with University of Zürich, Maastricht University, Swedish University of Agricultural Sciences, Norwegian University of Life Sciences, Royal Veterinary College - University of London, University of Glasgow, University of Edinburgh, Utrecht University, University of Bern, University of Pretoria, and University of Kentucky.

In addition, some researchers have participated in international multicentre studies (anti-parasitic drug trial, thromboelastography (TEG) standardization effort (PROVETs))

Participation in international conferences and networks

[Are the department's researchers invited to participate in the most prestigious networks, panels etc.? Is the department present at the most important conferences in the field? Are there ways to strengthen or benefit further from this presence?]

The Department's researchers are invited as speakers at international meetings which are the most important and prestigious within their fields on a regular basis. Such congresses include ECVS, ECEIM, ECVN, WEAS, WEVA, ECVIM, ACVIM, ESVONC, WorldVetCancer, BSAVA, WSAWA, and ECVECC. In addition, department researchers participate in international scientific networks/panels on e.g. Antibiotic resistance in companion animals (ISCAID), epilepsy in dogs (ACVIM Consensus statement), cardiovascular diseases in horses (ACVIM consensus statement 2014) and cancer (COST action application through INRA (companion animal cancer), Scandinavian Veterinary Oncology Consortium).

The Department's researchers present their research at relevant international meetings on a regular basis both orally and as posters. Participation in international meetings is important for establishing networks. However, departmental funding for participation in meetings is limited so participation depends in many cases on external funding. In addition, all PhD theses are evaluated by international assessors which are a very important source of both continuous external international evaluation of DVCS research quality but also an opportunity for establishing new networks and collaborations.

Establishing research networks has also been strengthened through engagement in arranging conferences. The Department's researchers have played major roles in organizing the annual scientific meeting of European College of Veterinary Emergency and Critical Care 2013; the Annual Meeting of The International Society of Animal Biochemistry 2014, the annual meeting of the European College of Veterinary Surgeons 2014, World Equine Airway Symposium 2017; World Small Animal Veterinary Association Congress 2017.

Department research and research funding support initiatives:

SUND's goals within Research	Actions at our Department
Strengthening high-quality, interdisciplinary research collaborations	• Participate in CPH-Cattle • Initiate CPH-Companion Animal Clinical Research Center • Initiate CPH-Equine • Initially funded 1/3 PhD-stipends but due to budgetary constraints, the department now only pays tuition-fee for PhD-students fully funded externally • Cofinance (when possible) equipment for research and teaching • Seminars: Introduction to funding instruments (SUND F&I, DFF) • Research performance discussed in annual faculty performance and development reviews (MUS, GRUS, LUS)
Developing, recruiting and retaining highly valued faculty	• Annual performance and development review for all faculty and technical staff
Increasing our share of external funding offered in open competition	• Our researchers have prepared and submitted an increasing number of research applications and obtained substantial grants • Cooperation agreements with parties outside of the University of Copenhagen
Promoting free and open intellectual inquiry and expression as well as responsible conduct of research	• Our researchers participate in courses on responsible conduct of research • Researchers have participated in research leadership courses offered by the University of Copenhagen
Promoting innovation in research and teaching	• Patent activities • Faculty participating in innovation training targeted towards awareness of innovation opportunities in both research and pedagogy

Interdisciplinary Research

[Taking into account the department's strategy for interdisciplinary research, please assess the current strengths and weaknesses, and future threats and opportunities for the interdisciplinary research carried out by the department. Interdisciplinary research within the department may also be included. 2 page maximum.]

Level of interdisciplinary research

[Questions for discussion could include:

- *Assess the strengths and weaknesses of department's level of interdisciplinary research*
- *What areas might benefit from more interdisciplinary activities?*

- *Does the department have an effective framework and incentive structure in place for promoting interdisciplinary research collaborations?*
- *What, if any, are the boundaries for conducting interdisciplinary research?]*

As DVCS is newly formed we undertook a SWOT analysis together with all faculty members in our new department on April 27th. The outcome of this is presented below

Current strengths:	**Current weaknesses:**
• Many individual initiatives reaching out for interdisciplinary collaborations across sections within DVCS and across the two veterinary departments, across UCPH-HEALTH departments and other UCPH faculties as well as external national and international universities, private practices, interest organisations and industry. • Daily clinical collaboration at hospital level promotes interdisciplinary research. • Unique position for interdisciplinary clinical and comparative research due to the presence of a broad range of clinical research disciplines in the department • The annual VET Science day creates networking opportunities across all veterinary research groups	• Faculty time constraints creating bottlenecks in internal and external collaborations • UCPH Tech Trans support is a bottleneck delaying establishment of collaboration • Brain drain - Collaborations depend on individuals if they leave, the collaboration may be lost • Distance between the two campus sites (Frederiksberg and Taastrup) reduces possibilities for informal meetings between researchers
Opportunities:	**Current threats:**
• Increasing speed of UCPH Tech Trans support will remove bottlenecks and promote UCPH as a speedy and reliable collaboration partner nationally and internationally • Create mutual seminar structure bridging research faculty meeting and knowledge exchange opportunities could promote and support collaboration • Expand existing and create new opportunities for meeting other researchers from other Faculties • Create a position for a departmental fund raiser • More interdisciplinary master thesis projects may also lead on to larger projects • Encourage interdisciplinary PhDs within and outside the Department by financing 1/3 for each section involved if the current economic constraints improve	• High teaching load and clinical obligations compete with/precludes research collaboration establishment and interdisciplinary cooperative grant preparation time • Lack of uninterrupted time periods to focus on research tasks/strategy and innovation causing loss of creativity and opportunities (too few staff with too many tasks to lift) • Shortfall in funding for updating and securing State of the Art infrastructure

What areas might benefit from more interdisciplinary activities? /Does DVCS have an effective framework/strategy for interdisciplinary collaborations/ Boundaries for conducting interdisciplinary research/Action points

DVCS already has a wealth of great interdisciplinary research collaborations especially across other veterinary, human medical and natural science disciplines. This is exemplified by our publications

in which around 50 % are with international collaborators and in addition, the majority of publications involve collaborators outside the individual research group.

Share of publications co-authored with at least one foreign institution. IKV 2011-2015.[1]

Source: SciVal

To further strengthen interdisciplinary research especially i.e. across to humanities and societal research communities, a more formal incentive structure is crucial in order to succeed further and inspirational targeted meetings may also be supportive in this regard. Furthermore there is a multitude of opportunities offered throughout the UCPH, but time constraints preclude participation. Finally our faculty prefer a supporting rather than a 'commanding' framework– allowing for the free and voluntary collaboration to take place.

Quality of interdisciplinary research

Please see above and the bibliometrical index as well as the DVCS publication BFI points underlining the high quality of DVCS interdisciplinary research. Furthermore the recent top QS ranking of the UCPH veterinary science area supports the high amount and quality of interdisciplinary research. In addition, interdisciplinary research has had a huge focus the past 10-15 years in Denmark. DVCS activities are further underlined by the number of prestigious grants from DFF and EU which would not be possible without interdisciplinary collaboration and internationalisation as well as contributing public and private national and international collaboration partners.

Research-based educational activities

[Consider current strengths and weaknesses, and future threats and opportunities for the research-based educational activities carried out in the department. 2 page maximum]

Research-based bachelor's and master's activities

[Does the course portfolio match the research profile? Could they be better aligned? If so, how?]

The course portfolio of the department focuses on theoretical and practical training in clinical veterinary sciences ("Basic veterinary clinical sciences", "Medicine, Surgery and Reproduction", "Imaging", "Emergency, Obstetrics and Anaesthesia", "Veterinary Paraclinics", "General Clinical Practice" and tracking in equine and companion animal clinical sciences).

In general, all teaching is research based as course subjects at both the bachelor and master levels are taught by veterinary clinical researchers conducting active research within the specific disciplines.

Currently there is a very good alignment between the Department's research profile and the course portfolio. However, many subjects are covered by only one or two senior researchers; in some cases these subjects are peripheral to the researcher's main research area. This makes the Department vulnerable to the adverse effects of "brain drain". Loss of one or two individuals can severely affect the Department's competency in specific areas. Brain drain is a significant danger as a result of reduced funding and competition for staff from private practices and the pharmaceutical industry. Hands-on training in basic and specialised surgical procedures and medical decision-making are taught by skilled veterinary faculty. In addition to the course activities covering theoretical and practical teaching in veterinary clinical sciences, the Department offers supervision of both Bachelor and Master student theses. Often Master thesis projects are integrated with on-going research activities and the students benefit from working closely together with PhD students or Post docs under the supervision of their principal supervisor thus making them acquainted with state of the art research. A main driver for the researchers in supervising Master thesis projects is to involve the students in conducting original research at a level that enables publication in national and international journals. This is however not fully exploited as a number of thesis are not transformed to publications although they are based on original research – mainly because of lack of time for the supervisors to publish. In addition to the veterinary Bachelor and Master curriculum, the Department has initiated the post graduate Master of Companion Animal Clinical Sciences, which is also well aligned with research and clinical competences at the Department. Furthermore DVCS

has many on-going EBVS approved residency training programmes contributing actively to training veterinary specialists despite the lack of university funding for these types of programmes.
A major challenge to the Department, and to the Faculty, is the need for maintain and develop relevant technical and clinical infrastructure as the ESEVT (EAEVE) accreditation standards states that "The Establishment must ensure state-of-the-art standards of teaching clinics which remain comparable with the best available in the private sector" .

PhD supervision and course activity

[To what extent does the department have the right tools in place for supervising and supporting PhD students? To which extent does the department provide doctoral courses at the highest academic level?]

According to the PHD Rules and Regulations at SUND, a PhD student must have at least two supervisors: A principal supervisor and a primary co-supervisor.
The principal supervisor must be employed at the Faculty as a professor, clinical professor, associate professor, or clinical associate professor. It is mandatory for all principal PhD supervisors to participate in the seminar on Responsible Conduct of Research. The primary co-supervisor must have an academic level equivalent to at least associate professor, but does not have to be employed at the Faculty.
At the Department level, the principal supervisor is also responsible for conducting the annual Performance and development review with the PhD-student. At UCPH, a specific paradigm for this review has been developed and it focuses on research, teaching, and career planning.
The Department is responsible for the PhD Graduate programme in Veterinary and Animal Sciences entitled "Companion Animal Clinical and Comparative Sciences (KLINIK)" under the PhD School at SUND-KU. Historically, this Graduate program was a merger of two previous and very successful veterinary PhD research programs RAN and KLINIK. The aim of the subject area KLINIK has been to strengthen PhD research within companion animal science (dogs, cats and horses). Especially research investigating disease mechanisms and pathophysiology (e.g. molecular, genetic and epigenetic mechanisms), validation of diagnostic tests and disease biomarkers, disease prevention, prophylaxis and investigations and validation of comparative clinical spontaneous animal models of diseases occurring in companion animals and humans. Furthermore KLINIK aims to promote rational and evidence based diagnostic and therapeutic guidelines. KLINIK has achieved these aims by establishing work-shops and courses such as "Post graduate course in Research Methodology, Planning of Controlled Clinical and Experimental Trials (CCT) and Basic and Laboratory research (BLR)", research seminars and Abildgaard seminars where applied research including clinical guidelines and protocols have been disseminated to first line practitioners by PhD

students. PhD student researchers associated with KLINIK have collaborated with national and international partners; universities, university hospitals, smaller and larger businesses and industry. The aim of the subject area RAN has been to strengthen research within the basic and applied areas of animal and veterinary sciences: anatomy, cell and developmental biology, biochemistry, nanobiotechnology, molecular and organ physiology, endocrinology, pathophysiology, immunology, ethology, metabolomics, molecular and quantitative genetics, animal breeding, systems biology, molecular and quantitative nutrition, food quality and safety, ethical production and environmental sustainability.

After establishing our new departments in 2017 the subject area of RAN is integrated in our sister department and therefore it is important to rethink and strengthen the former KLINIK - Companion Animal Clinical and Comparative Sciences.

European Board of Veterinary Specialists residency supervision and training

The Department is active in EBVS residency supervision and training. Funding for residency positions is difficult and in most cases depends on external funding. At present, we have the 12 residency programs:

EBVS-college	Number of residents
European College of Veterinary Neurology	1
European College of Veterinary Internal Medicine- Companion Animals:	2
European College of Veterinary Comparative Nutrition	2
European College of Veterinary Internal Medicine- Oncology	3
European College of Veterinary Clinical Pahology	1
European College of Equine Internal Medicine	1
European College of Veterinary Diagnostic Imaging	1
European College of Veterinary Surgeons	1

We have Diplomats, National specialists, and Certificate holders in the following:

College	Number of Diplomats
European College of Veterinary Internal Medicine- Companion Animals:	2
European College of Veterinary Comparative Nutrition	1
European College of Animal Reproduction	2
European College of Veterinary Clinical Pathology	1
European College of Equine Internal Medicine	2
European College of Veterinary Diagnostic Imaging	2
American College of Veterinary Internal Medicine	1
European College of Veterinary Surgeons	1
European Veterinary Dental College	1

National specialists	Number
Diagnostic imaging	2
Odontology	1
Large animal surgery	1
Equine internal medicine	1
Comparative nutrition	1
Veterinary neurology	1

Certificate holders	Number
Royal College of Veterinary Surgeons – Small Animal Medicine	1
Royal College of Veterinary Surgeons – Veterinary Dermatology	1
Royal College of Veterinary Surgeons – Small Animal Surgery	1
Danish Veterinary Association Certificate – Small Animals	1
Danish Veterinary Association Certificate - Equines	1

Private and public collaboration

[Consider current strengths and weaknesses, and future threats and opportunities for private and public sector collaboration in the department. 2 page maximum]

DVCS has a continued focus on continuing and increasing external collaboration with relevant veterinary private and public collaboration. This is reflected in our publications, funding as well as dissemination activities. Collaboration includes external national and international universities, private practices, interest organisations and industry. As DVCS is newly formed we undertook a SWOT analysis together with all faculty members in our new department on April 27th. The outcome of this is presented below

Current strengths:	**Current weaknesses:**
• The University of Copenhagen is a strong brand with high international veterinary science ranking • National and international bench marked (EAEVE approved and accredited, AVMA accreditable but was not obtained as the Dean of Faculty is not a veterinarian) • Highly motivated staff including both faculty, house staff veterinarians, and technicians • We are a member of the European Union • Close (bilateral) network to key stakeholders	• Limited funding opportunities compared to human medicine • Bottle necks with regards to current and new collaborations: small number of faculty staff, therefore having to turn down opportunities • Salary is not attractive for international top researchers • Lack of funded sabbatical opportunities

• Nationally: the only University concerned with veterinary clinical research activities
• A clear profile with focus on the individual animal patient
• We represent high credibility and integrity within our field
• Collaborations, alliances and networking with different national and international private and public partners among others:
  • Danish private veterinary practices
  • With one of the capital veterinary chains
  • International private veterinary practices
  • Various national and international universities
  • A variety of national and international private companies including leaders within their fields (up start Biotech, established larger companies (Novo Nordisk A/S, Lundbeck A/S, Kruuse-VET A/S, Hills Ltd, Brogården), SEGES (pigs, cattle and horses), Non-govermental organisations (Danish Kennel Club (DKK), Hestens Værn (protection of horses))
  • The public sector (Danish Veterinary and Food Administration, Danish Medicines Agency)
• Private companies are willing to contribute to a certain number of student projects
• Societal relevance
• In many areas, we have state- of – the art clinical facilities
• Level of educational collaborations is high in both pre and post graduate programmes
• The “Danish way of life”	

Opportunities:	**Current threats:**
• Research collaborations with new corporate practice chains • Improved infrastructure for fast track collaborations (contracts, and execution of research tasks) • Establishment of a Clinical Trials Unit • Copenhagen Center for Companion Animal Research • Copenhagen Center for Equine Research • Monetize public interest via Facebook, Twitter, and other social media • CUBE (Copenhagen University Biobank for Experimental Research) • Expand the external research potential in the Diagnostic Imaging and Veterinary Laboratory services • Large un-used research potential in the veterinary electronic record system if a more user friendly diagnosis system is implemented • Launching of new activities which will generate a larger research potential	• Limited numbers of faculty and staff due to continuous retrenchments since 2010 • Loss of leading position due to burn out syndrome, brain drain • Complicated administrative procedures for external collaborations • Slow collaboration agreement establishment • Lack of novel approaches for micro funding opportunities • Fragmented and limited time for research

Strategy for collaboration

[Give an account of the department's strategy and/or activities for collaboration with industry, the regions, municipalities, museums, NGOs etc. Is the department's network outside academia good enough? Where could it improve?]

As DVCS is newly formed we do not yet have a mutual departmental strategy but our future strategy will build on existing and future strengths and opportunities.

Level of research collaboration

[Assess the level of collaborative research projects, co-funded positions, donations – what works well, where is there the potential for improvement?]

DVCS has a continued focus on continuing and increasing external collaboration with relevant veterinary private and public collaboration. As mentioned above, this is reflected in our publications, funding as well as dissemination activities. Collaboration includes external national and international universities, private practices, interest organisations and industry as illustrated below with tables and figures. Currently the most interesting potential for improvement lies in further strengthening of industry collaboration (clinical studies), private fund raising and attracting large private funds from Danish private foundations.

List of top 10 collaborators according to number of joint publications. IKV 2011-2015.[1]

Rank	Institution	Country
1	Aarhus University	DK
2	Technical University of Denmark	DK
3	University of Kentuckey	US
4	Swedish University of Agricultural Sciences	SE
5	Novo Nordisk AS	DK
6	Royal Veterinary College University of London	UK
7	Utrecht University	NL
8	Ghent University	BE
9-10 (shared)	University of Pretoria, University of Minnesota	ZA, US

Collaboration with parties outside of the University of Copenhagen most often covers projects that are innovative by nature. Any collaboration with external parties must be formalised by a legally binding collaboration agreement issued by the UCPH Tech Transfer Office. These cover agreements such as co-financed research collaboration agreements (including Industrial PhD and Industrial Postdoc projects) and collaboration agreements on contract research.

New collaboration agreements at Department of Veterinary Clinical Sciences in 2012-2016						
	2012	2013	2014	2015	2016	Total
DVCS	1	4	1	6	8	20

Top 20 sources of new external funding at IKV in 2012-2016 (mill DKK) [1,2,3]

Rank	Funding Source	2012 mill DKK	2013 mill DKK	2014 mill DKK	2015 mill DKK	2016 mill DKK	Total mill DKK
1	Det Frie Forskningsråd Teknologi og Produktion (FT	5.1	6.3			2.5	13.9
2	Højteknologifonden	2.5					2.5
3	InnovationsFonden				2.3		2.3
4	Idexx Europe BV				1.8		1.8
5	HRZ 2020 Marie Curie Innovative Training Networks					1.7	1.7
6	Mælkeafgiftsfonden		0.5			1.2	1.7
7	Hesteafgiftsfonden	0.1	0.2	0.4	0.4	0.5	1.6
8	HRZ 2020 Marie Sklodowska-Curie actions (MSCA				1.5		1.5
9	Agrias & SKKs forskningsfond		0.1		1.1	0.2	1.3
10	Det Nationale Forskningscenter for Arbejdsmiljø					1.2	1.2
11	Dansk Landbrugsrådgivning (DBLR)		1.0				1.0
12	Helsingborg Dyrehospital		0.9				0.9
13	Fredrikstad Dyrehospital				0.9		0.9
14	Hills Pet Nutrition Ltd		0.6				0.6
15	Ministeriet for Fødevarer, Landbrug og Fiskeri			0.6			0.6
16	Norges Veterinærhøgskole	0.6					0.6
17	Rigshospitalet		0.5				0.5
18	Statens Serum Institut			0.5			0.5
19	Sveriges Lantbruksuniversitet					0.5	0.5
20	Det Frie Forskningsråd Natur og Univers (FNU)	0.5					0.5

Level of educational collaboration

[Assess the level of collaboration in terms of student's theses, guest lecturers, PhD collaboration etc. – what works well, where is there the potential for improvement?]

Educational collaboration is conducted at several levels within the Department. Collaborations include private veterinary practices, private companies, governmental institutions, and international lecturers. Examples are as follows:

- Guest lecturers in veterinary education include practitioners from private practice sharing their expertise within a specialty subject (e.g. ophthalmology and ethology) or giving the students insights into the skills needed and challenges to expect when working in private practice.
- Mandatory stays in private veterinary practices as part of course activities both in General Clinical Practice - Companion Animals (2 weeks), Large Animal (1 weeks), the Companion Animal Tracking (3 weeks) and equine differentiation track (2 weeks)
- Master thesis projects - collaboration with private companies (e.g. Novo Nordisk) and governmental institutions (The Danish Veterinary and Food Administration) and private clinical practices

- Guest lecturers for the Master of Companion Animal Sciences - international guest lecturers (United States, United Kingdom, Belgium, The Netherlands, Germany)
- Collaboration on PhD projects (private veterinary practice, Statens Serum Institut, other national or foreign universities)
- Collaborations on Residency training programmes (internal medicine, surgery, neurology, oncology, nutrition and veterinary clinical pathology)
- Post.Doc collaboration - e.g. GUDP/C&D Foods (a national support program for green development)
- Extended collaboration with private practice and animal owners

Impact and innovation

I*n focusing on research rather than education, impact may be understood as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia.*[1]*'*
An assessment of societal impact should not be based on submitting impact case studies. Instead, departments should comment on their approach to impact and strategy and plans for supporting impact.

The researchers at the Department have for many years been active in research funded by industry, government and private companies, who often are interested in solutions to practical problems. Research impact has often been achieved through direct interaction with stake-holders, who are often collaborators, throughout the research process, as well as by publication of findings.
The Department's impact has reach, significance and diversity in its methodologies and beneficiaries. Beneficiaries include veterinary and medical practitioners, government, and the livestock farming industry. Impacts are delivered by influencing a range of instruments including; research, activities within the two veterinary teaching hospitals, participation in public bodies, pre- and post-graduate training and best practice standards.

[Consider current strengths and weaknesses, and future threats and opportunities for impact on the community and innovation carried out in the department. 2 page maximum]

As DVCS is newly formed we do not yet have a mutual departmental strategy but our future strategy will build on existing and future strengths and opportunities.

[1] Impact as defined in the British Research Excellence Framework 2014

Strengths:	Opportunities:
• Patient-related research with fast track implementation into clinical practice nationally and internationally • Strategy to position the individual veterinary patient as a comparative research opportunity • The close proximity of our stakeholders render new therapeutic regiments possible (Recommendation on prudent use of antibiotics in clinical practice) • Evidence-based approach to patient management impact patients, clients pre and post graduates • Interaction with the general public (breeding meetings, "Kulturnat", "Forskningens døgn" articles in newspapers/non peer reviewed/popular journals, social media, television) . The university veterinary hospitals have Facebook profiles often displaying research project news or recruitment of patients for studies. • Large number of collaboration contracts with external partners • Our research impact the public understanding of diseases which change e.g. the work done by breeders • Focus on innovation	• Citizens science – more active participation of the community in e.g. our research projects, e.g. ECG on cell phones • Big data – identify and develop areas where the handling and analysis of large and complex data sets is helpful for solving research questions • Collaboration with Experimentarium (a science centre for all of Denmark) • Development and/or refinement of veterinary tools and devices

Strategy for public engagement

[Give an account of the department's strategy and/or activities for broader audiences outside academia. Examples could include the use of media contacts and popular outreach]

Approximately 50% of Danish families have companion animals and/or horses, and as we are the only place in Denmark to perform research and to educate veterinarians within the practical clinical aspects of these animals individually, we have solid impact outside academia. At our veterinary teaching hospitals, we have more than 20.000 consultations per year which gives a direct impact to the public. Our researchers participate routinely in public outreach activities, e.g Forskningens Døgn, Kulturnat, and they are also visible in newspapers, popular magazines, TV and radio. Our websites are frequently visited, especially through the websites of our two veterinary teaching hospitals with more than 55.000 views per year. In addition, staff at each of our veterinary teaching hospitals have developed and maintain *con amore* Facebook sites for the hospitals that are also frequently visited

Strategy for societal impact

[Give an account of the department's strategy and/or activities for collaboration with other public bodies and influence on politics, practice, legislation, etc.]

Researchers from each scientific section play a direct role in translating findings into veterinary clinical practice, and they have informed the development of new therapeutic interventions and pioneered new diagnostics; One example is the preparation of Antibiotic Use Guidelines for Companion Animal Practice together with the Danish Veterinary Association. The results of this have been demonstrated in the recent DANMAP 2016 report in the section Antimicrobial use in dogs and cats in Denmark – 2012-2016 (page 32)

One professor is currently member, and chairman, of the Danish Independent Research Foundation (Technology and Production Sciences). Others have been also been member of The Danish Accreditation Council, and currently three employees are member of the Veterinary Health Council.

At the European level, two employees are listed as experts at the European System of Evaluation of Veterinary Training (ESEVT), and one employee is member of the Committee on Internal Quality Assessment (CIQA) at the European Association of the Establishments for Veterinary Education (EAEVE).

On an ad-hoc basis, researchers also collaborate with the Danish Veterinary and Food Administration, a recent example being a survey of *Campylobacter spp.*among client-owned dogs.

Commercialisation and consultancy

[What, if any, is the department's strategy for commercialisation through patents, licenses, spin-outs and consultancy? What could be done to make the research results produced in the department more widely accessible outside the university?]

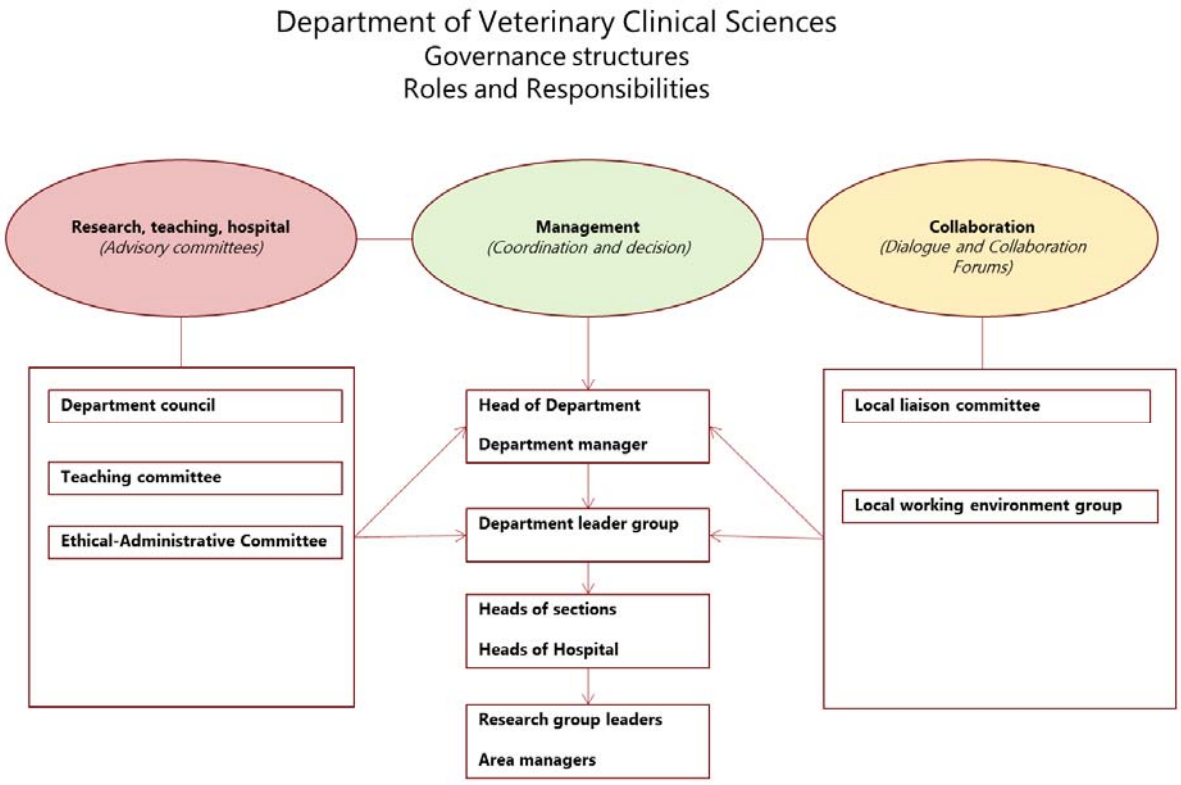
If a researcher as an employee at the University of Copenhagen has made the invention, you must (in accordance with the law (Danish)) report the invention to the University's Tech Transfer Office, which will then assess your invention patentability and commercial potential. If the University chooses to continue with the invention there will be prepared and filed a patent application for the protection of the invention. The Tech Transfer Office will also work to identify external parties who are interested in entering a license agreement on the basis of the invention. Since 2012, researchers at the Department have filed two Invention disclosures, (one in 2014, and one in 2016).

A licence agreement is usually entered as a result of a University researcher having disclosed an invention to the University, and the University having assumed rights to this invention (according to the Act on Inventions as Public Research Institutions). The UCPH Tech Transfer Office will subsequently seek to commercialize the invention through one or more licence agreements with Danish and/or international companies. Since 2012, researchers at the Department have entered in three licence agreements (one in 2012, and two in 2013).

Governance and Organization

Governance of the Department

The Department's governance structure can be illustrated as shown below:



Typically, strategic decisions and decisions affecting more than one section or area are made at the level of Head of Department and Leadership Group. In general, we strive for employee involvement in decisions and therefore, most decisions are made following discussions in the Local Liason Committee, the Local Work-Environment Group, the Department Council, the Teaching Committee and/or at section level.

The Head of Department has the overall responsibility of the budget and its allocation. In October/November, the budget and its allocation for the coming year is usually presented to the Leadership group and Local Liaison Committee, but the economic process in our new department is currently under development. In 2017, the new KU-Health budget model will be discussed and implemented incl. a budget distributed to the individual sections and university veterinary teaching hospitals. The decision for each department needs the approval by the Dean.

Research quality and productivity is discussed at the annual performance and development review discussions with each researcher and each scientific section. Also, the new department has recently discussed a description of expectations and academic merits in regards to appointments at the level of assistant professor, associate professor, professor MSO and full professor. General expectations per faculty member needs to be established in the new department

Incentives in the form of bonuses etc. is formalised in the Faculty's Associate Professor Wage Agreement. Extraordinary efforts are usually rewarded at the annual wage negotiation.

An internal research committee has as yet not been established because most professors are section heads and therefore, discussions on research are done in the Leadership Group as well as in the Department Council and at section research group meetings.

Organization of the Department

The Department has approx. 161 FTE employees, of which 49 are scientists with 23 being at the senior level (associate professors and professors).

	Medicine and Surgery (large animals)		Veterinary Reproduction and Obstetrics		Medicine, Oncology, Veterinary clinical pathology		Surgery, Neurology, Cardiology		Diagnostic imaging		Total for the Department		
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Total
Professor	1			1	2		1			1	4	2	6
Professor MSO	1										1	0	1
Associate professors	4		3		2		2	4	1		12	4	16
Assistant professor	4				3						7	0	7
Post.doc	2				1		1				4	0	4
Ph.D.-student	8	1	3		7		2		1		21	1	22
Scientists (others)	2				3				1		6	0	6

As is evident from the names of the individual scientific sections, the scientific sections covers the major scientific fields required for research-based veterinary clinical theoretical and practical teaching on individual animals of the major animal species i.e., cattle, horses, pigs, dogs, and cats. The number of permanent scientific staff (i.e., associate professors, professor MSO, and full professors) for each scientific field is generally limited, usually below 4. For Diagnostic Imaging, the number of scientists is critically low.

The low numbers are to some degree, but not adequately, offset by veterinarians in non-scientific positions (e.g., senior veterinarians, clinical veterinarians) and by veterinarians in non-permanent scientific positions (i.e., assistant professors, post.docs, PhD-students, and other scientists). Ideally, the number of veterinarians in permanent scientific positions should be higher in all areas.

Resources and Capacity

[Departmental expenditure and income are described in Appendix B, which can serve as a basis for an assessment of the current strengths and weaknesses, and future threats and opportunities. 2 page maximum]

Attracting external funding

[Taking into account the figures in Appendix B, assess the current status of the department's ability to attract funding, and discuss what future initiatives might enhance the level of external funding.]

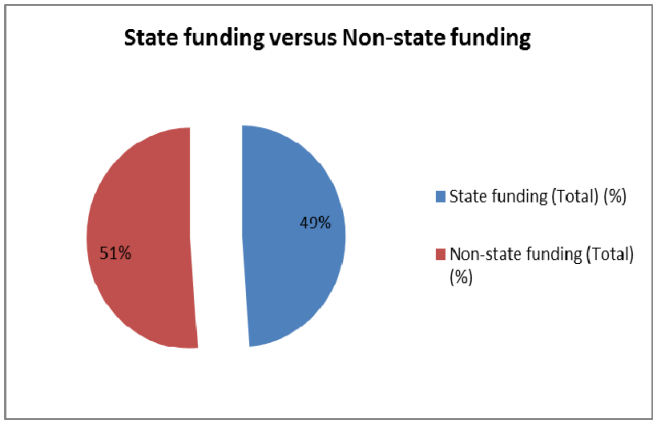
The department attracts external funding in three ways, i.e. income from clinical activities, income from external research funding, and income from other sources (e.g. from laboratory analyses and diagnostic imaging services sold to other researchers).

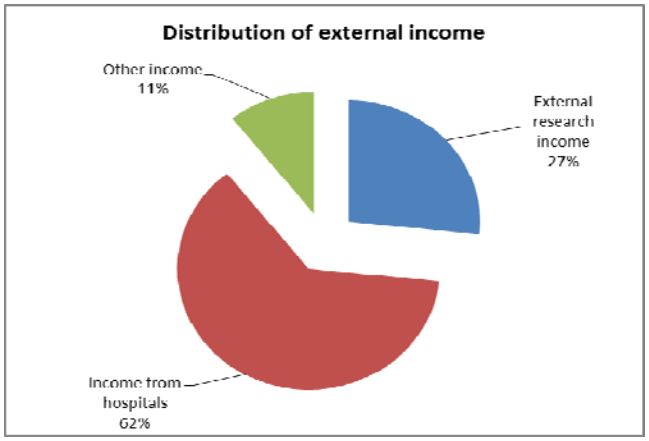
Distribution of expenditure type at IKV in 2012-2016 (mill DKK). [1,2,3]

IKV	2012 mill DKK	2012 PCT	2013 mill DKK	2013 PCT	2014 mill DKK	2014 PCT	2015 mill DKK	2015 PCT	2016 mill DKK	2016 PCT
DR10	92.9	74%	114.6	73%	98.5	75%	96.6	74%	94.7	67%
DR30	24.2	19%	31.7	20%	25.0	19%	28.7	22%	37.5	27%
DR40		0%		0%	0.0	0%	0.0	0%		0%
DR50	8.0	6%	10.4	7%	6.8	5%	4.9	4%	9.0	6%
DR60	0.2	0%	0.0	0%	1.5	1%	0.0	0%	0.0	0%
Total	125.3	100%	156.8	100%	131.8	100%	130.2	100%	141.3	100%

Expected (budgeted) funding 2017

Year	State funding to research and hospitals (mio.DKK)	State funding to teaching (mio. DKK)	State funding (Total) (mio.DKK)	External research income (mio.DKK)	Income from hospitals (mio.DKK)	Other income (mio.DKK)	Non-state funding (Total) (i.e. total of external research income, income from hospitals and other income) (mio.DKK)
2017	30.37	30.35	60.72	17.00	39.92	6.80	63.72





At present, a substantial part of the Department's total income depends on income from clinical activities which is attracted in competition with surrounding private clinical practices in the Greater Copenhagen Region. This necessitates a continuous focus on maintaining and improving specialist level clinical skills and infrastructure, which in turn compromise time available for research including time for writing grant applications. Measures to improve researchers time to apply for external funding include establishing a support function for researchers writing grant applications, communicating about potential grants and the help offered by the department and the Faculty. The Department will investigate the possibility of hiring a funding officer to facilitate the process. Future initiatives include setting up a Clinical Trials Unit to facilitate cooperation with private companies and external researchers, quarterly economy meetings between Head of Department and each Head of Section.

Recruitment and career paths at the department

[Assess the department's ability to recruit and maintain talented researchers – topics could include mentoring schemes and tenure track, if relevant.]

Attracting talented non-Scandinavian researchers is not always easy primarily because of salary and tax levels, but language barriers and for non-EU veterinarians, the demand for relevant clinical skills, licence to practice veterinary medicine in Denmark. Fluent Danish, Norwegian or Swedish language skills are required for veterinarians having client contact. Because of the low number of staff members, employment of researchers as adjunct professors or at higher levels who can't have client contact or don't have licence to practise veterinary medicine in Denmark is highly problematic because "all hands" are needed to run the clinical services and teaching. Similarly, employing non-veterinarians is challenging due to the same reason. Employment of non-Scandinavian researchers at PhD and Post Doc levels is easier and the Department currently have non-Danish speaking Marie-Curie Post docs.

The Department is also challenged by not being able to compete with private companies regarding salaries as university salaries are generally lower than offered in e.g. the pharmaceutical industry. It is therefore difficult to attract researchers once they have established a carrier in private companies. Many veterinary students are interested in pursuing an academic carrier as PhD students. However, funding of PhD studies (salary, running costs) is very challenging in veterinary clinical medicine, and it is a severe obstacle for clinical research.

It is difficult to maintain the most talented PhDs at the Department because of the low number of positions available and the uncertainties related to time-limited positions. Attracting the most qualified PhDs is very competitive and the complexity of demands from teaching, research, clinical activities, obtaining significant external funding and administration associated with a university position is not regarded as attractive for all PhDs. The combined effect of these issues may get some of the best PhDs to pursue a carrier in the private sector.

Infrastructure

[If relevant, assess the strengths and weaknesses of the department's access to laboratory equipment, databases and other research infrastructure.]

Our infrastructure is mainly directed towards clinical, clinical pathology and diagnostic imaging activities but we do have some specialized laboratories for e.g. cell cultures and in-vitro-fertilization. At present, our technical infrastructure generally has a high quality which needs to be secured, e.g. in Diagnostic Imaging which is acutely challenged by improvements in quality of the present equipment. The Department does not have a financial surplus for buying expensive technical infrastructure.

Possibilities for external funding are explored, but are considered difficult. It is therefore difficult to consider external funding as the sole basis for maintaining high quality facilities for diagnostic activities and research. However, it has been possible to co-fund a riding stables unit for horses. Some equipment can be funded by their use in services offered at the hospital units, e.g. ultrasound equipment for cardiology and equipment for veterinary clinical pathology.