

# Self-Assessment Report November 2017

Department of Veterinary and Animal Sciences (IVH)



Faculty of Health and Medical Sciences/October 2017

# Table of content

<b>INTRODUCTION TO THE DEPARTMENT</b> .....	<b>1</b>
<b>A brief history of the Department</b> .....	<b>1</b>
<b>Strategic highlights</b> .....	<b>3</b>
<b>SELF-ASSESSMENT PROCESS</b> .....	<b>3</b>
<b>Summary of self-assessment</b> .....	<b>3</b>
<b>THE QUALITY AND INTERNATIONAL IMPACT OF THE RESEARCH</b> .....	<b>5</b>
<b>General introduction to the research carried out by Department of Veterinary and Animal Sciences</b> .....	<b>5</b>
<b>The level of the Department’s scientific publications and citations</b> .....	<b>10</b>
<b>RESEARCH-BASED EDUCATIONAL ACTIVITIES</b> .....	<b>22</b>
<b>Research-based bachelor’s and master’s courses</b> .....	<b>22</b>
<b>PhD supervision and course activity</b> .....	<b>23</b>
<b>The Departments own view on teaching activities</b> .....	<b>23</b>
<b>PRIVATE AND PUBLIC COLLABORATION</b> .....	<b>25</b>
<b>Strategy for collaboration</b> .....	<b>25</b>
<b>Level of (international) educational collaboration</b> .....	<b>26</b>
<b>IMPACT AND INNOVATION</b> .....	<b>27</b>
<b>Strategy for public engagement</b> .....	<b>28</b>
<b>Strategy for societal impact</b> .....	<b>29</b>
<b>Commercialisation and consultancy</b> .....	<b>30</b>
<b>GOVERNANCE AND ORGANIZATION</b> .....	<b>32</b>
<b>Governance of the Department</b> .....	<b>32</b>
<b>Organization of the Department</b> .....	<b>33</b>

**RESOURCES AND CAPACITY ..... 36**  
**Attracting external funding ..... 36**  
**Recruitment and career paths at the department ..... 37**  
**Infrastructure ..... 38**

## Introduction to the Department

The Department of Veterinary and Animal Sciences (IVH) is one of two Departments of the School of Veterinary and Animal Sciences. It covers pre-clinical, para-clinical, biomedical, and herd health and production orientated disciplines of predominantly the veterinary and animal science curricula. IVH is organized into nine sections, which are responsible for the execution of research and teaching. Sections at the Department are large and cover more than one discipline. This is a deliberate choice to stimulate cross disciplinary research. Due to their size, all but one section is subdivided into research groups (Figure 1). A common secretariat supports the sections and the Head of Department. The staff numbers 344 per June 2017. Details on the number of staff can be seen in Table 1. The research disciplines covered by the Department are reflected in the professorships. Appendix 1 shows the list of professors and the titles of their professorships. The Department is located in 13 buildings at the Frederiksberg Campus.

Table 1. Number of staff divided according to staff category<sup>a</sup>.

<b>Professors</b>	<b>Associate professors</b>	<b>Assistant professors</b>	<b>Post doc fellows</b>	<b>PhD fellows</b>	<b>Other scientific staff</b>	<b>Technical staff</b>
32	40	17	31	123	24	77

<sup>a</sup>Staff numbers shown are staff on the pay list June 2017, except for PhD students, where 53 fellows are paid directly by an external partner.

### A brief history of the Department

IVH was formed January 1<sup>st</sup> 2017 by merging all preclinical, para-clinical, biomedical, and herd health and production orientated sections of the former Department of Veterinary Clinical and Animal Sciences, Department of Large Animal Sciences, and Department of Veterinary Disease Biology. No change in sections took place as a result of the merger, i.e. sections of the old Departments were maintained in the new Department. As a consequence of the merger, most management procedures and staff guidelines are in the process of being reviewed.

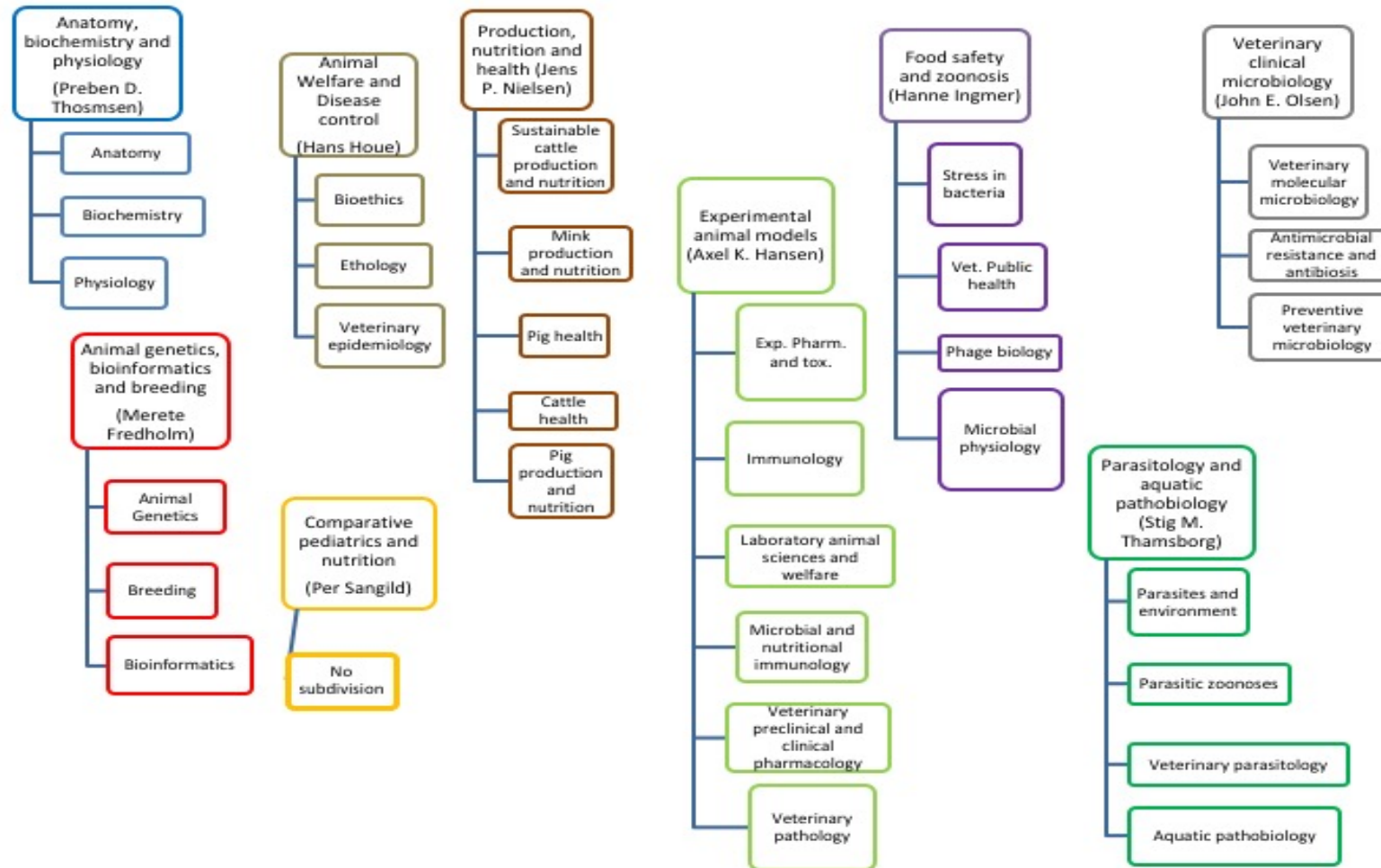


Figure 1. The Department is organized into 9 sections. Names of Head of sections, as well as research groups are listed.

## **Strategic highlights**

Research is carried out according to the strategies listed in the merger document produced when the Departments was formed [in Danish only] and the 2013 strategy for the veterinary school (“Impacting the lives of animals and people every hour of every day” [also in Danish only]). The latter strategy identified five research areas of particular importance to the Veterinary and Animal Science area: Animal welfare through improved animal health; public health and infection control; translational research with emphasis on animal models; companion animal research to the benefit of both animals and humans, and domestic animal genomics and epigenomics. The Department deals with all these research areas. The Department will use the outcome of the evaluation report as input in the development of an IVH strategy, which will reflect the priorities in the UCPH strategy 2016-2023, which is under development.

## **Self-assessment process**

In preparation for the report, each section produced a self-evaluation report (SER). The section reports were produced with the involvement of senior scientists in a process carried out in different ways in the different sections. Based on the section reports, the research committee of the Department, which has members from all sections, produced a SER\_version1. This report was further developed by iteration between the research committee and the leader group of the Department. The final report (version\_7) was approved by the leader group.

## **Summary of self-assessment**

The Department of Veterinary and Animal Sciences (IVH) is one of two Departments of the School of Veterinary and Animal Sciences at University of Copenhagen. It covers pre-clinical, para-clinical, biomedical, and herd health and production orientated disciplines of predominantly the veterinary and animal science curricula. It is organized into nine sections. The Department has four main research areas: Animal health and production management; Infectious disease control; Translational and comparative medicine, and One Health and Public health. The Department constitutes the largest and strongest Veterinary Research Institute in Denmark. The Department and the individual sections have had an impressive research output of reviewed publications over the period 2012-2016, which has resulted in an abundant scientific impact as measured by share of cited

publications. A very high proportion of the reviewed publications results from international collaborations. The foundation for the constant high output has been a stable intake of research grants from external sources. All sections contribute to this, however, with some variation between sections and in particular between years. Over the years, a shift from predominantly public funding to a higher degree of private funding has taken place. From 2020, the Department will assume the responsibility for the veterinary advisory services to the Ministry of Food and Agriculture in a One Health consortium with Statens Serum Institut (Danish equivalent to CCD). This will create an increased income for research activities, and will place the Department in the centre of veterinary research in Denmark. Overall, the Department has a good alignment between research and its bachelor and master courses. In selected areas, where IVH does not carry out research currently, the research base for teaching is ensured through collaboration with external partners. The Department has excellent contacts to relevant livestock, food and pharma industry as well as to the Food and Veterinary Administration and the Danish International Development Agency, DANIDA. This forms a solid foundation for public engagement and for impact through research-into-practice. Overall, IVH considers itself a strong Department with good prospects for the future. The major challenge is a constant reduction in basic funding, requiring a steady increase in external grants to maintain the current research activity level. In addition, a considerable part of the income is paid by faculty in exchange for education of PhD candidates with full external financing, creating a risk of fluctuation of income.

# The quality and international impact of the research

## General introduction to the research carried out by Department of Veterinary and Animal Sciences

The Department aims to conduct animal, clinical, biomedical, and basic veterinary and animal science research, which

- Has impact on society
- Is internationally recognized
- Pursues comparative and translational aspects where relevant

The Department has four main research areas: 1) Animal health and production management, 2) Infectious disease control, 3) Translational and comparative medicine, and 4) One Health and Public health. The research is the sum of research carried out in the nine sections, and Table 2 shows the disciplines covered and the research topics that are prioritized in each sections. Figure 2 summarizes the topics that are covered within each of the four main research areas.

Table 2. Main disciplines and research topics of each section

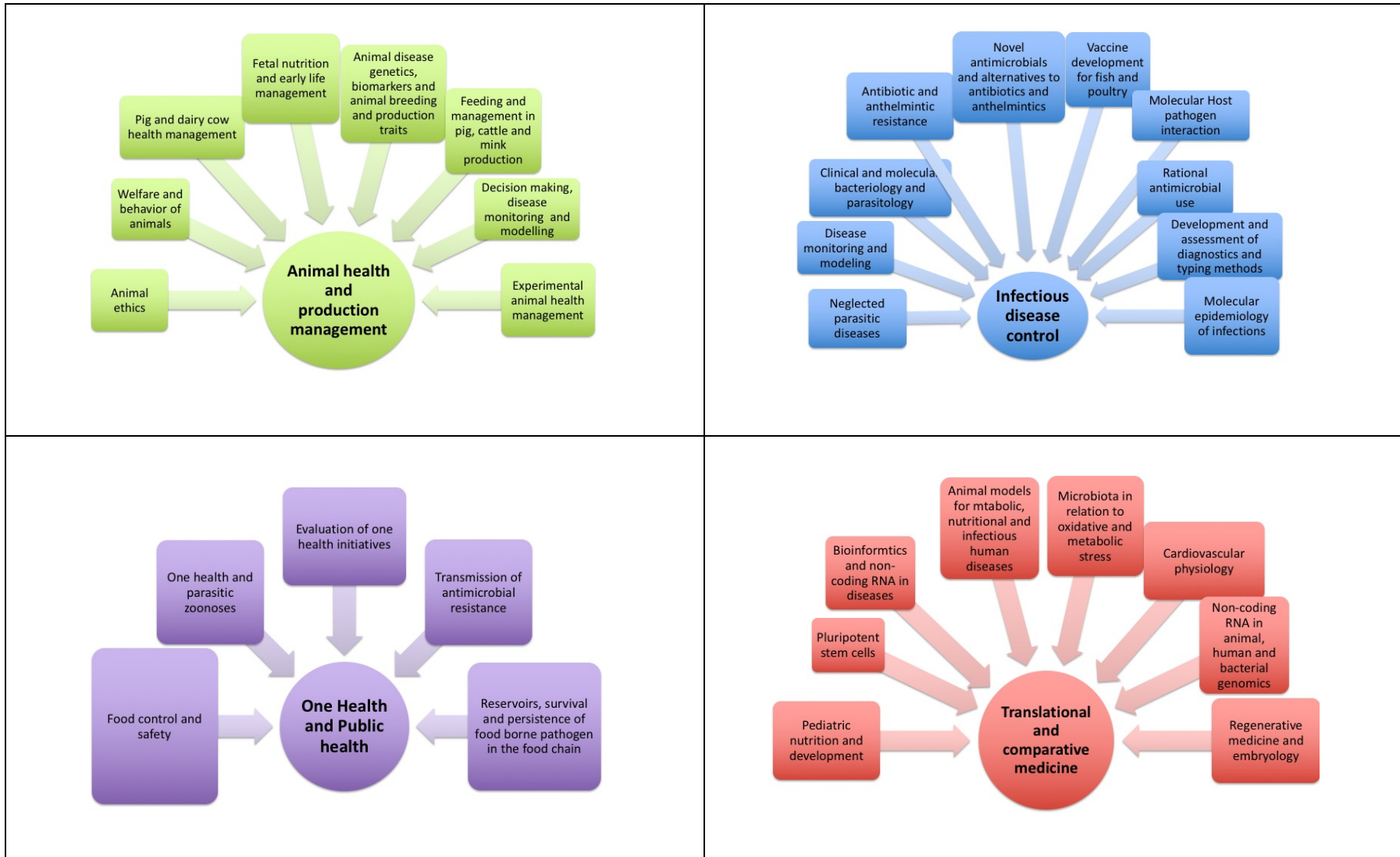
Section	Total number of staff and number of faculty*	Main disciplines and research topics in the section during the period 2013-2016
Anatomy, Biochemistry and Physiology	3P, 8AP, 4 PD, 8 PhD, 8 TECH <b>(N=31)</b>	Disciplines: Anatomy, biochemistry, physiology Research themes: Pluripotent stem cells, regenerative medicine, embryology & embryo-technology, cardiovascular physiology, biomechanics, educational research.
Animal Genetics, Bioinformatics and Breeding	3P, 3AP, 2AsP, 2PD, 4PhD, 1OS, 5TECH <b>(N=20)</b>	Disciplines: Genetics, Bioinformatics, Breeding Research themes: Animal disease genetics, biomarkers and population genetics, animal models for human diseases, animal breeding and production traits, host- pathogen interaction, bioinformatics and non-coding RNAs in animals, human and bacteria.



Animal Welfare and Disease Control	4P, 4AP, 3AsP, 1PD, 6PhD, 2OS, 4TECH <b>(N=24)</b>	Disciplines: Epidemiology, ethology, ethics Research themes. Animal ethics, risk perception, applied animal behaviour, animal welfare assessment, evaluation of diagnostic tests, disease monitoring and modelling, disease control and eradication, evaluation of one-health initiatives.
Comparative paediatrics and nutrition	1P, 2AP, 2AsP, 1PD, 8PhD, 2OS, 4TECH <b>(N=20)</b>	Disciplines: Nutrition Research themes. Pediatric nutrition and brain development, pediatric gastroenterology and immunity, chemotherapy induced mucositis and nutrition, gastrointestinal surgery and clinical nutrition, malnutrition and under-nutrition.
Experimental animal models	6P, 5AP, 2AsP, 6PD, 34 PhD, 9OS, 16TECH <b>(N=78)</b>	Disciplines: Immunology, pathology, pharmacology, toxicology, experimental laboratory animal science and welfare. Research themes: Animal models metabolic-inflammatory diseases, animal models for infectious diseases, animal models for traumas, and animal models for nutritional deficiencies. Production animal health, pet animal health, laboratory animal welfare.
Food safety and zoonoses	3P, 3AP, 2AsP, 5PD, 17PhD, 2OS, 7TECH <b>(N=39)</b>	Disciplines: Food microbiology, veterinary public health Research themes. Food control and safety, reservoirs and transmission of antimicrobial resistance and pathogens, novel antimicrobials and alternatives to antibiotics, virulence of food related pathogens, survival and persistence of food related pathogens.
Parasitology and aquatic pathobiology	4P, 4AP, 2AsP, 3PD, 11PhD, 2OS, 3TECH <b>(N=29)</b>	Disciplines: Parasitology, fish diseases and immunology. Research themes: Treatment and transmission of neglected parasitic diseases, one health and parasitic zoonoses, drug resistance and alternatives to anthelmintic treatment, host-parasite interactions, clinical and molecular parasitology, fish parasite diagnosis and control, fish immunology and vaccinology.

Production, nutrition and health	4P, 7AP, 1AsP, 5PD, 16PhD, 2OS, 4TECH <b>(N=39)</b>	Disciplines: Diseases of pig, diseases of cattle, diseases of mink, Nutrition, Research themes: Production, nutrition and health of pigs, cattle and mink. Herd health and production management. Sustainable animal production. Didactics of veterinary medicine and animal science. Prudent use of antibiotics.
Veterinary Clinical Microbiology	4P, 4AP, 3AsP, 4PD, 19PhD, 3OS, 9TECH <b>(N=46)</b>	Disciplines: Bacteriology, poultry diseases Research themes: Host pathogen interaction of veterinary relevant bacteria, antimicrobial resistance, rational antimicrobial use and alternatives to antimicrobials, diagnostics and bacterial typing methods, taxonomy and epidemiology of veterinary important bacteria.

\*: Personnel in sections per June 2017. P=Professors, AP= Associate professors, AsP=Assistant professors, PD=Post doc fellow, PhD=PhDs, OS=other scientists, TECH=non-academic staff. In addition to this, 1 junior scientist and 17 technical/administrative staff are working in the secretariat.



*Figure 2 (previous page). Schematic presentation of the four main research areas of Department of Veterinary and Animal Sciences with details of the topics that have been covered within each research area*

Research is carried out across sections. Table 3 shows the contribution of peer reviewed articles from each section in the period 2013-2016 for each of the above mentioned areas.

Table 3. Contributed of each section to the main research areas, expressed as the number of peer reviewed publications (2013-2016)\*.

Section	Research area			
	Animal health and Herd management	Infectious disease control	Translational and comparative medicine	One Health and Public health
ABP			161	
ABB	58	7	31	
AWD	79	75		20
CPN	2	45	49	
EAM	86		286	
FSZ		48		89
PAP	17	144	5	170
PNH	187	15		
VCM	5	176	4	49

ABP: Anatomy, Biochemistry and Physiology; ABB: Animal genetics, Bioinformatics and Breeding; AWD: Animal Welfare and Disease Control; CPN: Comparative Paediatrics and Nutrition; EAM: Experimental Animal Models; FSZ: Food Safety and Zoonoses; PAP: Parasitology and Aquatic Pathobiology; PNH: Production, Nutrition and Health; VCM: Veterinary Clinical Microbiology.

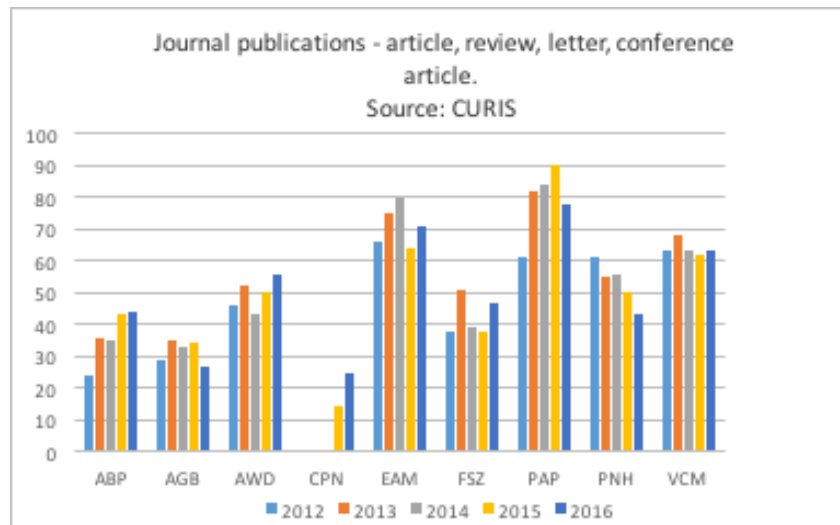
\*Note that the number of publication in this table cannot be compared to the numbers shown in the figures 3-8, since the data material differs and some articles are counted more than once in the current table, because they relate to more than one research area.

## **The level of the Department's scientific publications and citations**

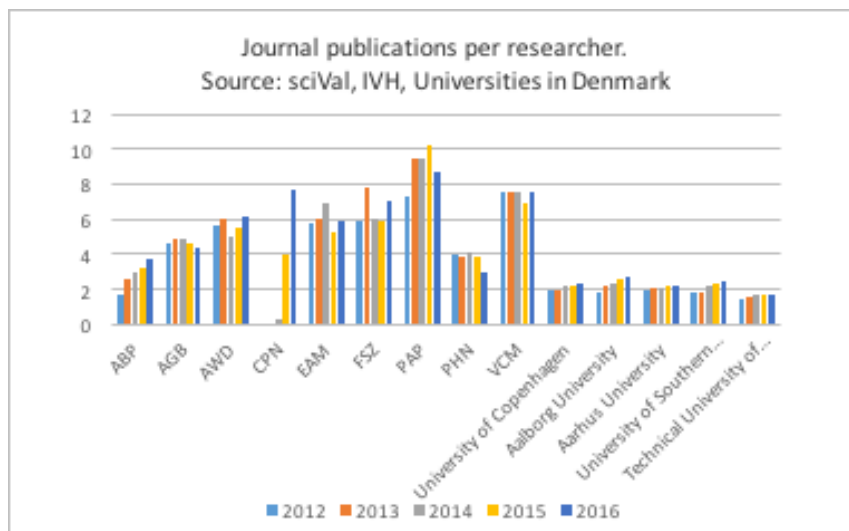
This paragraph is based on the information available in the database used to produce the SUND Health Report. In extracting the relevant information, the Department observed that the currently available data in CURIS were insufficiently updated following the merger of the veterinary departments. However, with the assistance of SUND faculty services, updated bibliometric data from CURIS were provided. Consequently, the data presented here differs from the data presented in the SUND Health Report. There are significant historical fluctuations in the composition of the sections over the observation period. The figures, which express scientific production per scientist over the time period, are based on 2017 staff numbers. Hence, variations in the production per scientist should be reviewed with caution, as the staff numbers do not precisely reflect the situation at the time of publication.

IVH has had a relatively stable and high output in terms of numbers of peer reviewed publications over the period 2012-2016. The output from each of the IVH-sections are presented in Fig. 3. For some sections, the trend is towards increased publication output per year over the period, whereas other sections display neither this tendency nor the reverse.

In Fig. 4, the number of peer reviewed publications are presented relatively to the section staff numbers defined as full Faculty ViP in 2017 (Professors and Associate Professors; see comment above regarding the use of 2017 staff numbers). The trend towards increased publication output over the period is more clearly depicted. The publication output per section ViP is compared with data retrieved for University of Copenhagen as a whole as well as with other Danish universities. It should be underlined that the staff numbers, used for the full university calculations, are retrieved from more generalized internet sources and may include more staff than full Faculty ViP defined as Professors and Associate Professors. Hence, the lower profiles of the full university data should be viewed with this precaution.

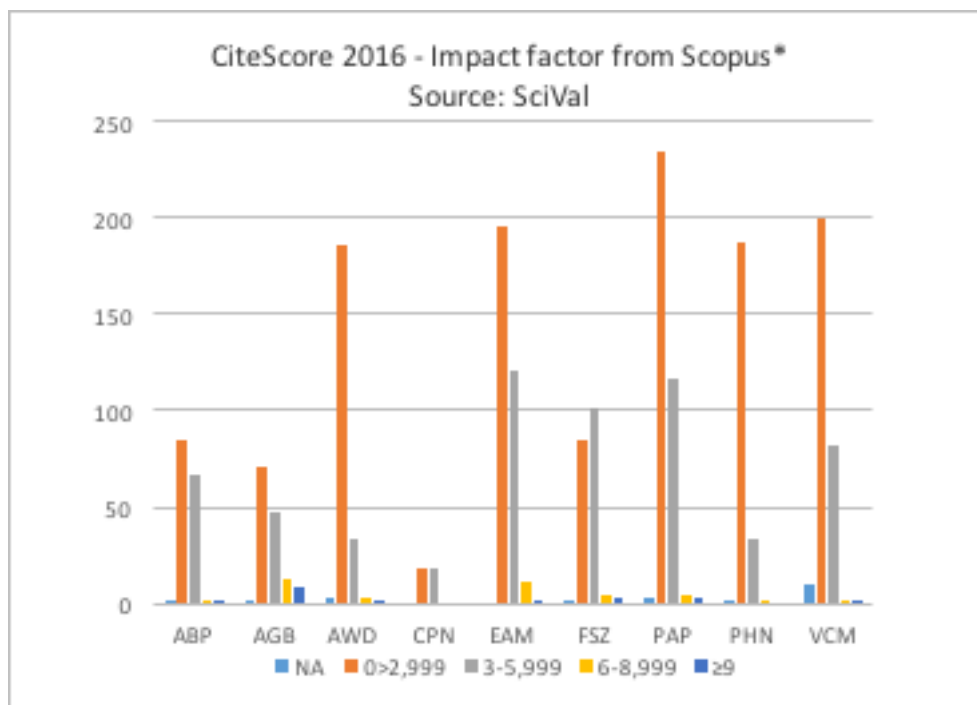


*Fig. 3: Total publication output from the individual IVH sections 2012-2016. ABP: Anatomy, Biochemistry and Physiology; AGB: Animal genetics, Bioinformatics and Breeding; AWD: Animal Welfare and Disease Control; CPN: Comparative Paediatrics and Nutrition; EAM: Experimental Animal Models; FSZ: Food Safety and Zoonoses; PAP: Parasitology and Aquatic Pathobiology; PNH: Production, Nutrition and Health; VCM: Veterinary Clinical Microbiology. Note that data for CPN prior to 2015 was not present.*



*Fig. 4: Average publication output per full Faculty ViP (Professors and Associate Professors) from the individual IVH sections based on 2017 staff numbers compared with data retrieved for University of Copenhagen as a whole as well as other Danish universities (see text for precautions). ABP: Anatomy, Biochemistry and Physiology; AGB: Animal genetics, Bioinformatics and Breeding; AWD: Animal Welfare and Disease Control; CPN: Comparative Paediatrics and Nutrition; EAM: Experimental Animal Models; FSZ: Food Safety and Zoonoses; PAP: Parasitology and Aquatic Pathobiology; PNH: Production, Nutrition and Health; VCM: Veterinary Clinical Microbiology.*

In order to further dissect the scientific impact of the Department's output, the reviewed publications are displayed according to different categories of journal impact factors based on the Scopus categorization of impact in Fig. 5. It is clear from the data that a majority of publications appear in low impact journals although medium impact journals are also used to a certain extent varying between sections. The presented data should be viewed in light of the tradition for a part of the Department's output to be directed towards the veterinary and animal science fields. Due to its limited volume, as compared with e.g. medicine *per se*, these fields will be represented by lower impact factors. Publications presented in e.g. the translational scientific area may penetrate into higher ranking journals; a tendency that is expected to become more pronounced over the coming years.



*Fig.5: Distribution of publication output according to journal impact factor from the individual IVH sections. ABP: Anatomy, Biochemistry and Physiology; AGB: Animal genetics, Bioinformatics and Breeding; AWD: Animal Welfare and Disease Control; CPN: Comparative Paediatrics and Nutrition; EAM: Experimental Animal Models; FSZ: Food Safety and Zoonoses; PAP: Parasitology and Aquatic Pathobiology; PHN: Production, Nutrition and Health; VCM: Veterinary Clinical Microbiology.*

For further benchmarking of the scientific impact of the reviewed publications of the Department, Fig. 6 presents the percentage of cited publications as well as the percentage of cited publications found among the top 10% most cited ones. The

Department's citations are compared with the citation data for University of Copenhagen and Denmark as a whole. It is clear from the data that a higher fraction of the Department's publications in general is cited when compared with publications from University of Copenhagen and Denmark as a whole. On the other hand, the Department's share of publications with very high citation numbers (top 10%) is less than for University of Copenhagen and Denmark as a whole. The analysis uses field weight according to journal. A possible explanation for the lower score on 10% citations is that the relatively high number of articles published outside the traditional veterinary and animal science journals is scored against the average citation for articles dealing with either humane medicine, general para-clinical topics (microbiology parasitology, physiology, pharmacology, genetics), basic sciences or biomedicine. Thus, the strive of the Department to increase impact by publishing in journals outside the traditional veterinary and animal science field results in a relative poorer results on this parameter.

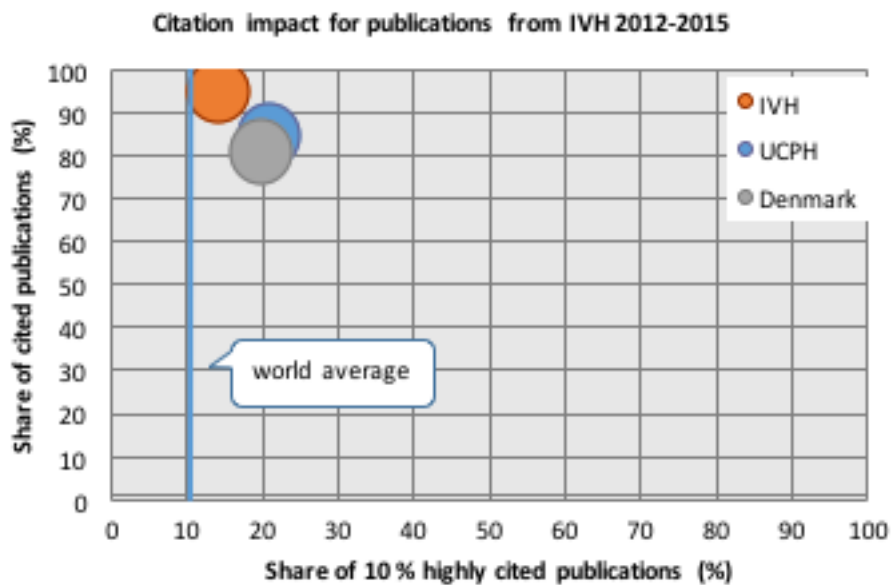


Fig. 6: Share of cited publications (%) and share of 10% most cited publications (world average = 10%) from the Department (IVH) as well as University of Copenhagen (UCPH) and Denmark as a whole.

In Fig. 7, the data displayed in Fig. 6 is broken further down on the individual sections of the Department. It should be underlined that this illustration is based on a low number of publications. However, it clearly shows that the tendency to high fractions



of cited publications is very consistent between sections, but also that certain sections achieve higher shares of very highly cited publications than others.

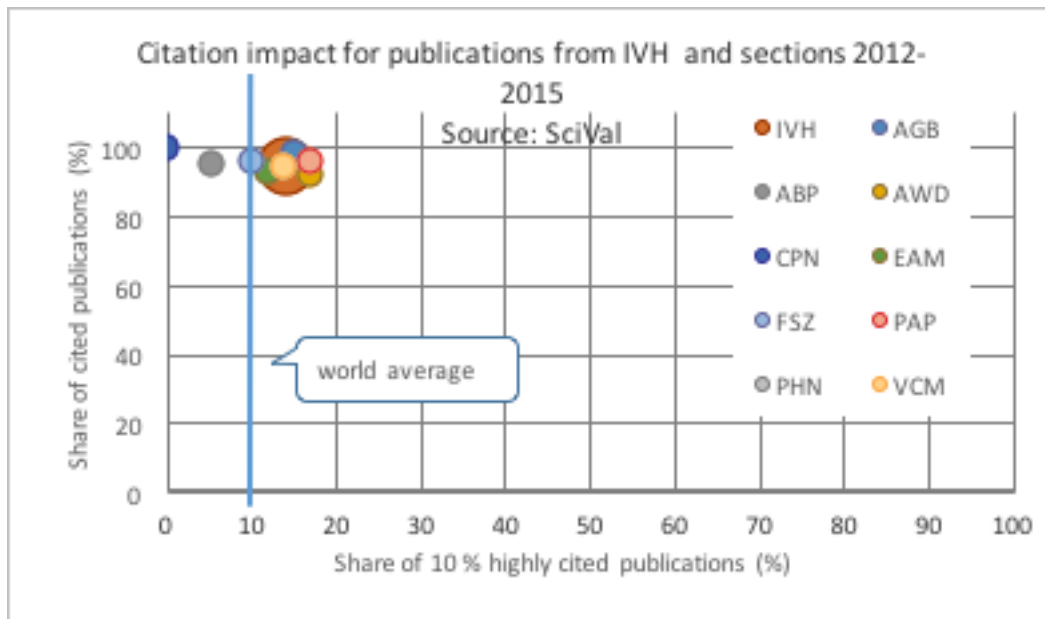


Fig. 7: Share of cited publications (%) and share of 10% most cited publications (world average = 10%) from the Department's individual sections.

#### **Publications carried out in collaboration with non-Danish researchers**

As an indication of the level of international research collaboration, the share of international publications within the Department (2012-2015) is shown in Fig. 8. An overall share of more than 50% of all publications have at least one international contributor, and this high fraction has been constant over the years. The result signals the extended collaborative nature of the Department's research activities, and reflects the extensive international network of the researchers at the Department (see Appendix 2 for examples of collaborating partners).



*Fig. 8: The Department's share (%) of publications co-authored with at least one foreign institution. (Source: SUND HEALTH Report 2016).*

In conclusion, the Department and the individual sections has over the period 2012-2016 had an impressive output of reviewed publications, which has resulted in an abundant scientific impact as measured by share of cited publications. A very high proportion of the reviewed publications results from international collaborations.

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

In this paragraph, we provide an overview of the proportion of external funding received by the Department and its sections. Fig. 9 shows the overall distribution of external grants at IVH in the period 2012-2016, as depicted in the SUND HEALTH report 2016. It shows a relative change in funding towards a increased share coming from Danish private funding. However, changes from year to year over such a short time period may reflect single, large grants coming into the Department. Further details are provided, showing the distribution of external grants within each section (Fig. 10), illustrating that income per year varies greatly for most sections, but also that all sections contribute to research funding. Large grants exceeding 5 mio DKK are listed in Table 4.

Appendix 3 shows a list of all grants (>500,000 DKK) received between 2013-2016. As shown by the figures and tables, there has been a slight decrease in funding from 2015 to 2016. This slight decrease should, however, be viewed in the light of the significant increase from 2014 to 2015.

Overall the degree of external funding within the Department encompasses all four categories of funding sources, with an increase in the fraction adhering to Danish private sources ( e.g. NovoNordisk and Lundbeck Foundation) in 2016, and a concomitant reduction in funding received from Danish public sources.

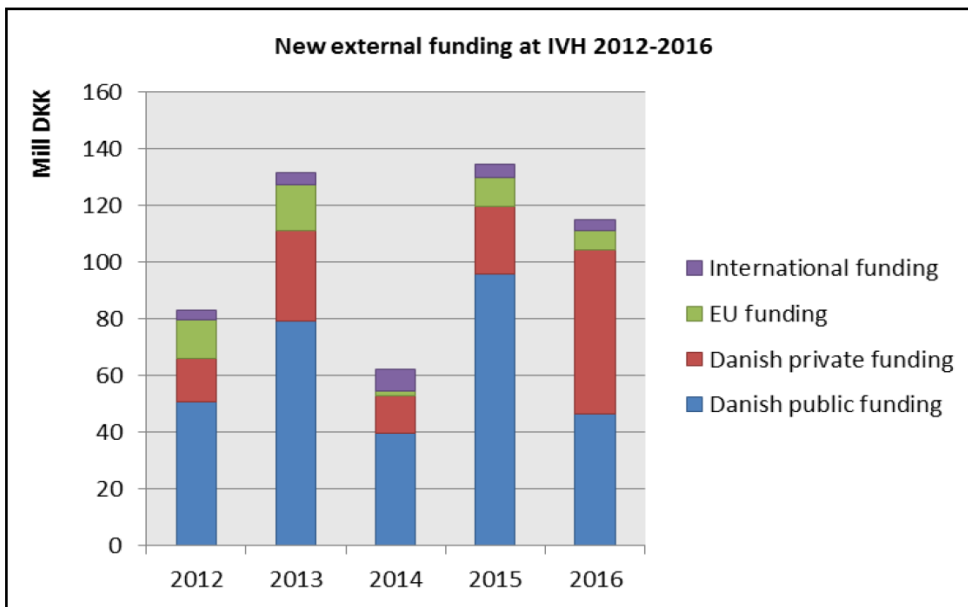


Fig. 9: The distribution of external funding within the Department. The figure shows the fraction of the different main categories of funding sources, depicting international, EU, Danish private and Danish public funding and the fluctuations during the chosen period of time. (Source: SUND-HEALTH report 2016).

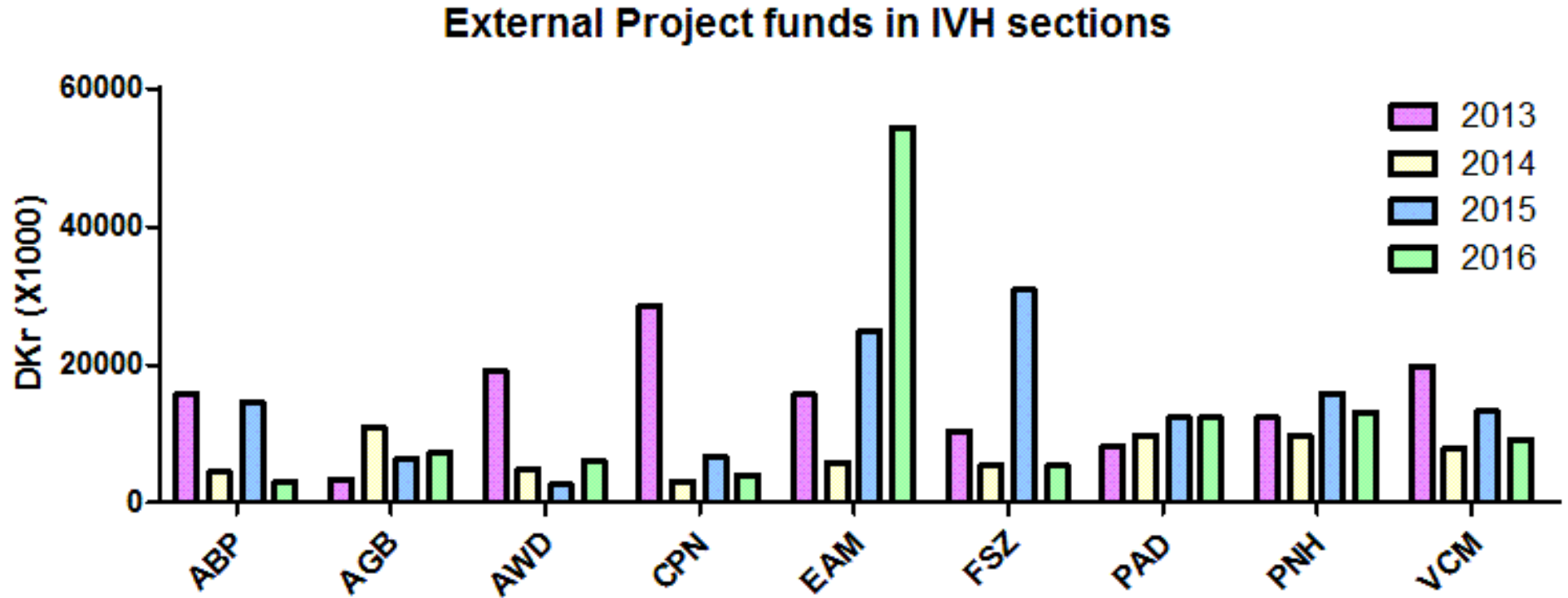


Fig. 10. External grants >100,000DKK received by each section during 2013-2016. Data on new external funding is registered by project start date, thus external funding obtained in 2016, with project start in 2017 or later, is not included. ABP: Anatomy, Biochemistry and Physiology; ABB: Animal genetics, Bioinformatics and Breeding; AWD: Animal Welfare and Disease Control; CPN: Comparative Paediatrics and Nutrition; EAM: Experimental Animal Models; FSZ: Food Safety and Zoonoses; PAP (PAD): Parasitology and Aquatic Pathobiology; PNH: Production, Nutrition and Health; VCM: Veterinary Clinical Microbiology.

Table 4: Overview of the received external funding exceeding 5 million DKK/grant in IVH sections, between 2013 and 2016.

Section	Responsible Scientist	Funding Source	Research Project/ Centre	DKK
ABP	Poul Hyttel	Innovation Fund Denmark	Brainstem Stem Cell Center of Exc in Neurology	8.225.960
AGB	Jan Gorodkin	Danish Council for Indep. Res. (FTP)	AniGen: Animal genomes as model for human health	5.636.754
AGB	Jan Gorodkin	Innovation Fund Denmark	NextProd	7.032.240
AGB	Merete Fredholm	Collaborative Project - Large Scale Integrated Pro	26591 – LUPA	5.101.560
AGB	Merete Fredholm	Danish Council for Indep. Res. (FTP)	Obpig: A pig model for studies of gene-diet	6.423.706
AWD	Björn Anders Forkman	Danish Veterinary and Food Administration	Welfare assessment in livestock	<b>12.798.350</b>
CPN	Per Torp Sangild	Arla Foods Ingredients Group P/S	35943 - Early milk and microbionics to improve later immunity	5.170.918
CPH	Per Torp Sangild	Innovation Fund Denmark	Early Milk and Microbiota to Improve Later Immunity – NEOMUNE	<b>11.500.00</b>
EAM	Jens Ole Plum Lykkesfeldt	Novo Nordisk A/S	30886 - The Novo Nordisk-LIFE in Vivo Pharmacology	<b>44.657.998</b>
EAM	Jens Ole Plum Lykkesfeldt	Novo Nordisk A/S	35740 - LIFEHARM II - Framework Agreement	6.350.558
EAM	Jens Ole Plum Lykkesfeldt	Novo Nordisk A/S	Lifepharm Centre III	<b>41.068.000</b>
EAM	Søren Skov	Danish Council for Indep. Res. (FTP)	Immune evasion by Staphylococcus aureus	6.475.625
FSZ	Dorte Frees	Danish Council for Indep. Res. (FTP)	Restoring Antibiotic Sensitivity to MRSA	5.517.430
FSZ	Hanne Ingmer	Danish National Research Foundation	Bacterial Stress Survival and Persistence (BASP)	8.077.294
FSZ	Hanne Ingmer	Danish Council for Indep. Res. (FTP)	35799 - Metabolic modulation of pathogens	5.029.900
FSZ	Hanne Ingmer	Danish Council for Strat. Res. Health, Food and Welfare (DSFP)	28139 - Biocide resistance; an emerging threat to	5.493.133

<b>FSZ</b>	<b>Hanne Ingmer</b>	Integrated Projects (IP)	16922 - Biotracer - Improved bio-traceability of u	5.377.356
<b>FSZ</b>	<b>Lone Brøndsted</b>	Danish Council for Indep. Res. (FTP)	Hybrid Phage Enzybiotics (HYPHE)	5.595.978
<b>FSZ</b>	<b>Lone Brøndsted</b>	Ministry of Food, Agriculture and Fisheries	Targetted control	6.625.160
<b>PAP</b>	<b>Stig Milan Thamsborg</b>	Danish Council for Indep. Res. (FTP)	ParaGut - Parasites, diet and gut health	6.020.605
<b>PAP</b>	<b>Stig Milan Thamsborg</b>	Danish Council for Indep. Res. (FTP)	Parasites and plants	5.826.568
<b>PNH</b>	<b>Anders Ringgaard Kristensen</b>	Danish Council for Strat. Res. Health, Food and Welfare (DSFP)	34388 - PigIT - Improving welfare and productivity	9.861.354
<b>PNH</b>	<b>Anne-Helen Tauson</b>	Kopenhagen Fur (Pelsdyragiftsfonden)	36175 – Protein requirement and metabolism in mink	5.654.999
<b>VCM</b>	<b>Henrik Christensen</b>	The Danish Agricultural Agency (NaturErhvervsstyrelsen)	36756 – Novel probiotic concept in infection control	7.040.298
<b>VCM</b>	<b>John Elmerdahl Olsen</b>	Danish Council for Strat. Res. Health, Food and Welfare (DSFP)	31660 - Minimizing antibiotic resistance development	8.508.959
<b>VCM</b>	<b>Luca Guardabassi</b>	Initial Training Networks (ITN)	34328 - Training and Research Aimed at...	5.933.564

In January 2017, the Danish Ministry for Food, Fisheries and Agriculture put up for tender the entire Veterinary Advisory Service. This is presently undertaken by the National Veterinary Institute at the Danish Technical University. The Veterinary Advisory Service covers diagnostics of specific animal infectious diseases and research based scientific advice for the Danish Veterinary and Food Administration and has a budget of 92 mill DKK/year.

The Department formed a consortium with Statens Serum Institute (SSI) and submitted a tender for the contract in competition with the National Veterinary Institute, and won the tender from 2020 and onwards (rolling 5 years contract). This means that IVH will receive around 38 mill DKK per year from 2020, and will be in charge of research and research based scientific advice for the Danish Veterinary and Food Administration. SSI will be in charge of the diagnostics (laboratory analyses) and related research in collaboration with IVH. In the evaluation report from the Danish Veterinary and Food Administration it was noted that IVH has an internationally recognized research environment which paired with SSI has strong and robust competences within veterinary research and diagnostics, and that the One Health-approach and described synergies with existing activities were found very positive.

### **Department's own view on the quality and international impact of the research**

The Department has had a constant high research output in terms of publication in peer-reviewed journals, and all sections attract external funding for research project. The high research activity is reflected in the high number of young scientific staff (PhD and Post Doc-fellows). The research is internationally orientated and recognized. This can be seen by the fact that more than 50% of publications are produced in collaboration with international partners. The research atmosphere at the Department is pro-collaboration, and a high number of informal activities are carried out across sections and between the Department and our sister veterinary department. The high level of self-administration and responsibility for research funding in sections is viewed as a stimulator for researchers to be strategic in choice of research topics. For example, researchers are good at seeking alternative funding opportunities when needed and adjust the research topic to that specific funding body.

The outline below summarizes how the Department views its own strength and opportunities within research. The Department has not identified obvious weaknesses in its research performance, and the summary is therefore not presented as a traditional SWOT analysis. Weaknesses/Threats exists related to capacity and resources and these are listed in the last section of this report.

<b>Strengths</b>	<b>Opportunities</b>
<ol style="list-style-type: none"> <li>1. A high number of research groups with excellent research performance and CV's</li> <li>2. A constant high research output</li> <li>3. A constant high intake of external research funding</li> <li>4. An increasing number of research collaborations with industry and other private partners</li> <li>5. Many research areas with high public awareness</li> <li>6. The strongest research environment within Veterinary Science in DK</li> <li>7. Veterinary Medicine and Animal Sciences ranked 10 and 11 at QS world ranking list</li> </ol>	<ol style="list-style-type: none"> <li>1. From 2020 responsible for research based advisory service for the Food and Veterinary Administration in all matters related to veterinary sciences</li> <li>2. Re-build a strong research area within veterinary virology</li> <li>3. Strengthen the research within infectious diseases, zoonoses, epidemiology and disease control in a One Health approach</li> <li>4. Make better use of complementary skills across sections and within the veterinary area in general</li> </ol>



# Research-based educational activities

## Research-based bachelor's and master's courses

The Department teaches on the veterinary and animal science education, and contributes substantially to other study programs such as biology–biotechnology, bioinformatics, and food science anchored at the University of Copenhagen. In several Master's courses, there is a very close link between research and teaching. This is reflected by student participation in small projects within some of the courses.

The alignment between the veterinary bachelor and master course portfolio and the research areas indicated by each of the nine sections is shown in Appendix 4 and Appendix 5, while appendix 6-8 show the alignment for the courses headed by the Department on the animal science, biotechnology and food science educations.

For some topics, the Department has chosen to deliver research-based teaching in collaboration with external partners. Examples are Veterinary Virology in the infection microbiology course, which is delivered by experts from the National Veterinary Institute. Due to the fact that the Department is going to take over the responsibility for the Veterinary Advisory Service, as described above, establishment of a strong research environment within veterinary virology will have the highest priority. The University of Aarhus has a very strong and internationally recognized research center within quantitative genetics and breeding, and therefore we have decided to collaborate with this group in our Animal Science program instead of trying to build up a new research group within this field.

Some research activities, such as “Stem cell biology and modelling of brain diseases” and Parenteral Nutrition are poorly aligned with BSc and MSc courses. On the other hand, such areas are well aligned with PhD courses and attract a high number of project students from other degree programs than veterinary and animal sciences. We find that these activities are important as “models” for broadening the area of veterinary medicine and animal sciences, and to demonstrate that animals (other than mice and rats) are important in veterinary research, but also in medical/human related research, where we can attract external funding for the benefit of both human medicine and veterinary and animal sciences.

The Department is engaged in creation and use of cutting-edge teaching methods and technologies in classroom and e-learning environments. A fairly high proportion of traditional lectures are being replaced by e-lectures, which makes room for other types of teaching than traditional lectures.

### **PhD supervision and course activity**

The Department provides PhD courses at the highest academic level: Regular PhD courses include: Infection Microbiology; Laboratory Animal Science; Bioinformatics in Microbiology; Bioinformatics for Animal Genomics; Human induced pluripotent stem cell culture; Neural differentiation and gene-editing; Food, Medicine and Philosophy in East and West; Epidemiology I: Planning a study, Epidemiology II: Analysing continuous and dichotomous data from observational studies; Pain in animals; In Vivo Pharmacology; PhD summer school on RNA-sequencing and noncoding RNA, and One Health International Summer Course. The courses are directly linked to the research areas of the sections.

### **The Department's own view on teaching activities**

Overall, there is good alignment between the IVH bachelor- and master course portfolio and our research activities. In addition, the Department is good at using its research based knowledge across sections, with several sections often providing input to the same course. The Department prioritizes focus on research, and within each discipline/area, it is therefore not the aim to have research activities within many different topics. This affects the research base for teaching.

In the table below, the Department has summarized strength, weaknesses and opportunities in relation to the ability to carry out research based teaching.

Strengths	Weaknesses
<ol style="list-style-type: none"> <li>1. Good alignment between research topics and teaching topics</li> <li>2. Tradition for between sections and Departments involvement in courses</li> <li>3. Veterinary Medicine and Animal Sciences ranked 10 and 11 respectively at QS world ranking list last two years</li> <li>4. Very good students' base for project activities</li> <li>5. Good links to industry, which allow clinical teaching in production animals to be carried out in farms and joint projects with industry</li> <li>6. The Departments high profile on applied biotechnology attracts many master project students, also from non-veterinary and animal science educations.</li> </ol>	<ol style="list-style-type: none"> <li>1 Physical facilities are not yet optimised for 180 students, e.g. we lack large teaching labs.</li> <li>2 Resources for teaching in smaller groups are not present</li> <li>3 A few topics covered from outside the Department. While this may be acceptable from a research point of view, it arguably weakens the base for teaching</li> <li>4 Difficult to cover all areas and animal species i.e. within animal nutrition</li> </ol>
Opportunities	
<ol style="list-style-type: none"> <li>1. The veterinary advisory service provide many real scenarios for case based teaching of veterinary students</li> <li>2. Improved collaboration with the veterinary clinics in teaching para-clinical and pre-clinical subjects and in courses requiring animal hands-on.</li> </ol>	

## Private and public collaboration

It is the Department's policy to have close contacts with industrial partners (e.g. the livestock industry, fur-industry and pharmaceutical companies) as well as other private and public companies and organizations. Faculty members are therefore encouraged to become members of boards, funding bodies and research committees and to define their research projects in such a way that the very close collaboration between the department and the private sector can be maintained.

### Strategy for collaboration

In order to consolidate and promote industrially oriented livestock research, three centres for research in livestock production, health and welfare are led by the Department. The three centres, CPH Pig, CPH Cattle and CPH Mink are anchored according to animal species in order to create strong platforms for collaborating with the corresponding industries. The centres are platforms for greater efforts in research, innovation and education, and for closer collaboration with authorities, industries and universities on the national and international level. A unique aspect of the Department, as also demonstrated by the three centres, is that we have brought together researchers with background and skills in both animal and veterinary sciences. This combination of research skills gives us a particularly strong position for addressing the challenges of the Danish livestock industry.

The Department has a well-established tradition of collaborating with industrial partners both on a national and international level, ensuring knowledge-sharing and targeted efforts towards relevant research goals. These collaborations are also important in securing qualified candidates (master- and PhD-candidates) for the private sector, as illustrated by the LIFEPHARM Centre supporting PhD and post doc projects within the field of *in vivo* pharmacology, e.g. the collaboration between Novo Nordisk and UCPH and the Stem Cell Centre of Excellence in Neurology. The latter aims to bridge between stem cell biology and neurology in academia, industry and hospitals, and is a collaborative centre formed between IVH, other Departments at University of Copenhagen, regional hospitals and the industry.

The Department also actively tries to strengthen its collaboration with the authorities. Thus, the Department is an active participant of the Danish Centre for Animal Welfare established by the Danish Veterinary and Food Administration. As mentioned earlier, the Department will take over

the responsibility for the Veterinary Advisory Service to the Government in a consortium with the State Serum Institute from 2020. The Department also encourages projects in developing countries (preferably in collaboration with local universities and NGOs). Further, the Department seeks to increase collaboration with hospitals and other relevant partners in human medicine. A significant part of the Department has focus on pre-clinical and translational research with deep links to hospital partners both in Denmark and internationally. The Department is involved in one of the first Clinical Academic Groups in the Copenhagen Health Science Partners project just launched. The projects are based on research grants provided from The Danish Research Councils, EU grants and industry partners. It is considered an important part of the veterinary field to provide the knowledge of pre-clinical and translational medicine for society with potential for further engagement.

### **Level of (international) educational collaboration**

At the Faculty level we have collaboration agreements with international universities providing the Veterinary and Animal Science programs and we are working towards strengthening student-exchange.

In relation to PhD collaboration, there is a mutual exchange with many universities throughout the world, where PhD students from our Department spend a number of months abroad and PhD students from other Universities spend a number of months as guests at our Department.

The Department has participated in several ITN-networks and in the review period, it has coordinated two such PhD training networks: TRAINAU and TRAINASAP, both orientated towards control of antimicrobial resistance in livestock.

## **Impact and innovation**

There is a proud tradition of real-world impact within the research activities of the nine sections within IVH; a tradition that will be supported and strengthened by the research direction and focus on collaboration within the newly created Department. The impact is reflected in the number of external projects attracted from private partners within livestock and pharma, by the attractiveness of our PhD candidates for the industry and by the number of projects grants that the Department obtain from the Innovation Fund Denmark and the Green Development and Demonstration Programme (GUDP), which both put emphasis on the societal importance and relevance of the project they fund (see Appendix 3).

There is diversity in the impact and innovation strategy between the nine sections, but this is not considered a weakness, since the impact to some extent are based on existing external collaborations.

We believe that there is an opportunity to increase the external profile of the new Department even further, and to increase both impact, innovation and public visibility. This is possible as all pre- and paraclinical activities and health and diseases of production animals are now united in one Department, facilitating dialogue and strategic partnerships with industries.

## Strategy for public engagement

Substantial efforts have been made within the Department to engage with the public on a wide variety of topics. Although it is not possible to outline the full spectrum of activities, Table 5 gives a gross indication of the volume of public engagement within the department:

Table 5: Summary of the public communication activities within the department from 2013-2016. The key topics listed are indicative only, and not intended to be exhaustive.

Type of communication	Number of activities 2013-2016	Key Topics
Newspaper articles/feature articles	>90	Animal issues Stem cells Embryo technology Acoustic myography Dog pedigrees and breeding MRSA AMR Vitamin C deficiency Swimmer's itch
Television, radio appearances	>60	Animal welfare Animal issues Stem cells Embryo technology MRSA Vitamin C deficiency Self-infection with <i>T. suis</i>
Popular scientific articles	>100	Animal welfare; scientific evidence Foot pad dermatitis Mycoplasma Stem cells Dog breeding Vitamin C deficiency Genital Schistosomiasis & HIV
Other scientific engagement with society	>150	Debate animal welfare indicators Talks a veterinary and agricultural meetings Stem cells Embryo technology AMR Vitamin C deficiency

In addition to the topics listed above, the Department engage in bridging between research and education of young people and to engage directly with the public, typically by participation in Open

Science events (Culture night, Wine and Science, Nature-Science festival etc) and by accepting visits from high school classes.

### Strategy for societal impact

The Department strongly encourages collaboration with public bodies in all forms, and each of the sections have their own tradition of achieving societal impact in the form that is most relevant for the type of research which they are undertaking. Examples of research translating into practical application is shown in the Table 6 below.

Table 6. Examples of IVH research, according to the four main research areas, translating into practical applications.

Over all topic	Examples of practical applications of research
Animal health and production management	<p>System for systematic recording of data for aggregation in a national animal welfare index for cattle and pigs</p> <p>Analysis of breeding implementation of in vitro embryo production and genomic selection in cattle.</p> <p>Genetic tests for inherited diseases and production traits</p> <p>Development of tools for teaching and extension services within dairy herd health management</p> <p>Direct technology transfer (e.g. validation and implementation of PCR-tests)</p> <p>Combination of video-technology and multivariate statistical methods (cowmometrics) for recordings of cattle behavior.</p>
Infectious Disease control	<p>Systematic framework for strategic planning of disease control and eradication programs (Para-TB and salmonellosis)</p> <p>Online benchmarking platform ('BioSecure') for assessment of biosecurity in dairy farms</p> <p>Methods for reduction of antibiotic treatments in pig production</p> <p>Contribution to antimicrobial treatment guidelines for pigs, cattle and companion animals.</p> <p>Contributions to MRSA policy of Denmark.</p>
Translational and comparative medicine	Pig models of different diseases in infants.



	<p>Biomarkers for human diseases</p> <p>Mouse models for human disease</p> <p>Novel intervention strategies for diseases.</p> <p>A pipeline for testing of phytochemicals with regards to <i>in vitro</i> anthelmintic activity and immune modulation.</p>
One Health and Public Health	<p>Female Genital Schistosomiasis – a pocket atlas for clinical health-care professionals (World health Organisation)</p> <p>The Vicious Worm - a computer-based program – a free shareware throughout the world. (available at <a href="https://theviciousworm.sites.ku.dk">https://theviciousworm.sites.ku.dk</a>)</p> <p>Development of E-learning modules (MOOCs, Virtual labs and Games) for students and the public outside the VetSchool</p> <p>Comprehensive information and teaching material about eight major neglected zoonotic diseases - <a href="#">ADVANZ</a></p>

### **Commercialisation and consultancy**

Researchers are supported during the commercialisation and patent application processes despite the often lengthy and sometimes ultimately unsuccessful nature of these activities. The Department believes in both the direct benefits of commercialisation through societal impact, as well as the secondary benefits in terms of refining and developing research themes and collaborations within and outside the Department. Some examples of the successful commercialisation are spin-out companies, patents, licenses and innovation platforms, developed by staff members of IVH. A list of such commercial activities is given in appendix 9.

### **Department's own view on private and public collaboration and on impact and innovation**

The Department has excellent contacts to relevant livestock, food and pharma industry as well as to the Food and Veterinary Administration and the Danish International Development Agency, DANIDA. This forms a solid foundation for both public engagement and for impact through

research-into-practice. The scheme below summarizes the Departments own view on strength, weaknesses and opportunities with regard to these areas.

<b>Strengths</b>	<b>Weaknesses</b>
<ol style="list-style-type: none"> <li>1. Excellent network to industry and authorities.</li> <li>2. All sections pursue public engagement</li> <li>3. Many PhD projects carried out in collaboration with industry</li> <li>4. Many projects from Innovation Fund and GUDP</li> </ol>	<ol style="list-style-type: none"> <li>1. Not all areas/disciplines have solid industrial networks</li> </ol>
<b>Opportunities</b>	<b>Treats</b>
<ol style="list-style-type: none"> <li>1. Higher focus on H2020 societal problem research</li> <li>2. Consultancies to industry could be used for income generation</li> </ol>	<ol style="list-style-type: none"> <li>1. Veterinary advisory service from 2020 may cause lack of confidence in the public (arm’s length has to be observed)</li> </ol>

# Governance and organization

## Governance of the Department

The Department's governance structure can be illustrated as shown below (Figure 11):

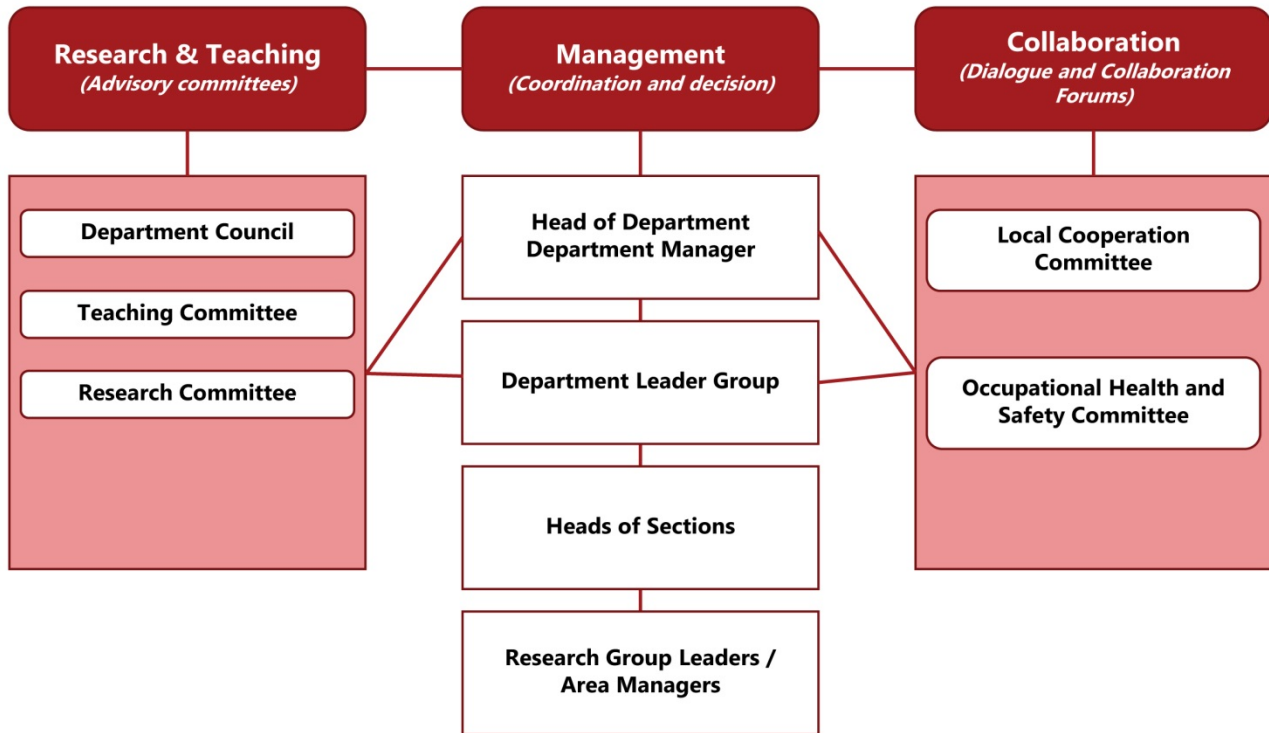


Figure 11. Organizational diagram for IVH.

All strategic decisions and decisions affecting more than one section or area are made by the Departments leader group which consist of the nine section heads, the Department Administrator and the Head of Department. In general, we strive for transparency and legitimacy in decision-making, and therefore all major decisions on i.e. budget model, strategy, action plans for i.e. improved working environment, etc. are made following discussions in the Local Collaboration Committee, the Local Occupational Health and Safety Committee and/or at section level. The teaching and research committees are consulted in issues related to teaching and research respectively.

Since the Department was established in January 2017, the year 2017 is a year of transition, where we have discussed and decided a new model for distribution of the future department budget to the sections. For the sections, the budget model provides equal incentives to both teaching and research activities and the research part include two-years past performance measured as number of publications, external funding including overhead from external funding. High impact publications are a priority at the Department, but due to huge differences in mean impact between different research areas, this is not included in the budget model. Although the leader group has agreed on a budget model, there is also an agreement that the Department Head in dialogue with the leader group may take strategic decisions on budget allocation for specific purposes to ensure the overall coherence at the Department level, including ensuring that the core curriculum of our educational programs are science-based.

All employees at the Department have an allocated line manager (Head of Section, research group leader or other) with whom they will have an annual performance and development review. Based on this, together they will draw up a development plan focusing on skills development and wellbeing, including mutual expectations in relation to performance and career. In addition, all employees are offered a dialogue on salary with their line manager prior to the yearly salary negotiations. The criteria for asking for an increase in salary are agreed on between the management team and the collaboration committee.

### **Organization of the Department**

As previously mentioned, the Department is organized in nine sections. The number of academic staff, incl. PhD students can be seen in the next table (Table 7).

## UNIVERSITY OF COPENHAGEN

Table 7. Academic staff and full time employees including affiliated PhD's in each section (headcount as per June 2017).

	30368200	30368500	30368600	30368700	30369200	30369300	30369400	30369700	30369900	30368100	
SECTION/ENTITY	Food Safety and Zoonoses	Veterinary Clinical Microbiology	Parasitology and Aquatic Pathobiology	Experimental Animal Models	Production, Nutrition and Health	Animal Welfare and Disease Control	Comparative Pediatrics and Nutrition	Animal Genetics, Bioinformatics and Breeding	Anatomy, Biochemistry and Physiology	IVH, Secretariat	TOTAL
Head of Section	Hanne Ingmer	John Elmerdahl Olsen	Stig Milan Thamsborg	Axel Kornerup Hansen	Jens Peter Nielsen	Hans Houe	Per Torp Sangild	Merete Fredholm	Preben Dybdahl Thomsen	Søren Fløe Jensen	
Research Groups (Y/N)	Y	Y	Y	Y	N	N	Y	Y	N	NA	
No. of Research Groups	4	3	4	7			1	2			
<b>FACULTY</b>	<b>6</b>	<b>8</b>	<b>8</b>	<b>11</b>	<b>11</b>	<b>8</b>	<b>3</b>	<b>6</b>	<b>11</b>		<b>72</b>
Professors	3	4	4	6	4	4	1	3	3		32
Assoc. Professors	3	4	4	5	7	4	2	3	8		40
<b>JUNIOR SCIENTISTS</b>	<b>9</b>	<b>10</b>	<b>7</b>	<b>17</b>	<b>8</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>72</b>
Assistant Professors	2	3	2	2	1	3	2	2			17
Post Docs	5	4	3	6	5	1	1	2	4		31
Other	2	3	2	9	2	2	2	1		1	24
PhD students	<b>17</b>	<b>19</b>	<b>11</b>	<b>34</b>	<b>16</b>	<b>6</b>	<b>8</b>	<b>4</b>	<b>8</b>		<b>123</b>
Employed	6	8	8	26	9	4	3	3	3		70
Other supervised (main)	11	11	3	8	7	2	5	1	5		53
<b>TECHNICAL/ADMIN.</b>	<b>7</b>	<b>9</b>	<b>3</b>	<b>16</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>8</b>	<b>17</b>	<b>77</b>
Technical/admin. staff	7	9	3	16	4	4	4	5	8	17	77
	<b>39</b>	<b>46</b>	<b>29</b>	<b>78</b>	<b>39</b>	<b>24</b>	<b>20</b>	<b>20</b>	<b>31</b>	<b>18</b>	<b>344</b>

Further organization within each section varies. Some of the sections are organized with formalized research groups, others have subdivisions according to different disciplines or subjects, while the smallest section “Comparative paediatrics and nutrition” do not have any further subgrouping. Thus, the sections varies in both size and homogeneity of disciplines. This is partly because it was a deliberately choice not to make reorganizations at the section level when IVH was “born” with sections from three former departments. There is a good collaboration across sections. However, this collaboration could be intensified through dedicated efforts to increase knowledge of ongoing research across the different sections. Generally, there is a well-balanced distribution of staff members according to age and gender, and there are more females than males in the group of Post Docs, Assistant Professors and Assoc. Professors. Still, two third of full professors are males and only one third females (Figure 12). Generation succession should be ensured in all sections and areas, and this topic is included in the annual performance and development review between head of department and the head of sections.

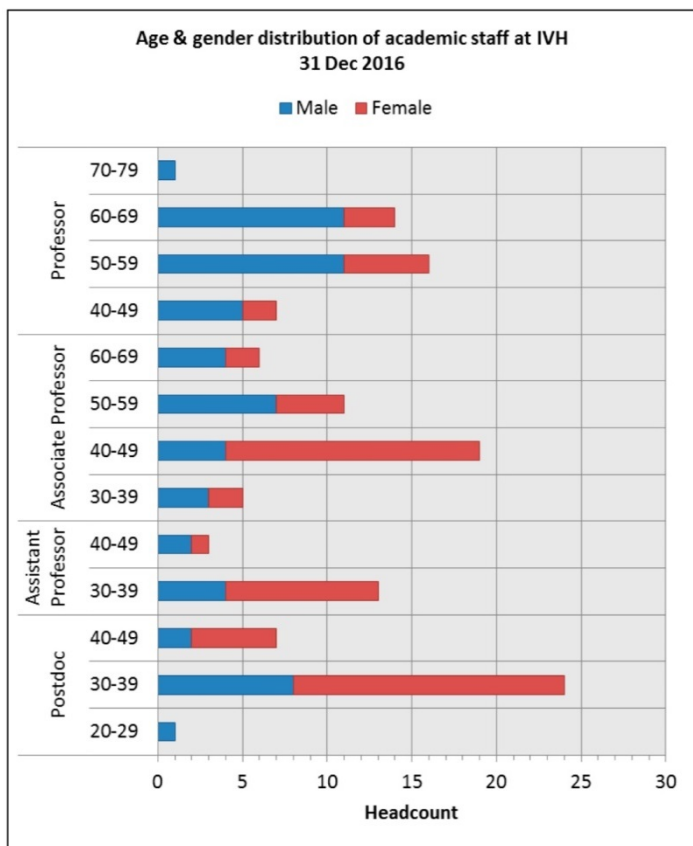


Figure 12. Age and gender distribution of staff at IVH.

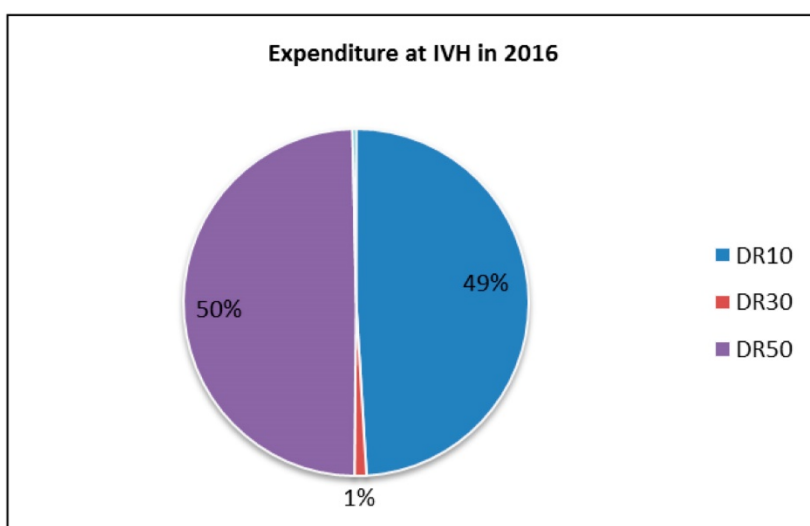
## Resources and capacity

The Department's budget covers salaries, consumables and equipment for carrying out research teaching and department administration. Excluded are housing costs, facility management, IT and HR services, carried out and financed at the Faculty level.

### Attracting external funding

IVH has a very good track record for attracting external funding and half of the total budget is comprised of external funding (DR 50) including funding with overhead from a wide range of both public and private funding bodies. In the sections below, we summarize the expenditure budget for the Department as a whole (Figure 13), while summary of research grants attracted by each section has been presented earlier as a part of evaluation of the research environment.

### An overview of the total expenditures at IVH



#### Distribution of expenditure type at IVH in 2016.<sup>1,2,3</sup>

DR10 is basic activities – for education and research from annual finance act.  
 DR30 is commercial activities.  
 DR40 is forensic medicine services and  
 DR50-60 is activities financed by external funding.

See numbers in the table below.

#### Distribution of expenditure type at IVH in 2012-2016 (mill DKK)

IVH	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	139.1	56%	95.2	51%	113.2	53%	108.5	50%	104.1	49%
DR30	3.8	2%	1.3	1%	0.3	0%	0.1	0%	2.6	1%
DR40		0%	0.0	0%		0%		0%		0%
DR50	92.8	37%	88.8	47%	98.0	46%	107.2	49%	104.3	50%
DR60	14.4	6%	1.9	1%	1.1	1%	1.1	1%	0.7	0%
<b>Total</b>	<b>250.0</b>	<b>100%</b>	<b>187.2</b>	<b>100%</b>	<b>212.6</b>	<b>100%</b>	<b>216.9</b>	<b>100%</b>	<b>211.8</b>	<b>100%</b>

Figure 13 (previous page). Overview of total expenditure budget at IVH. Please note that "DR10" figures above include overhead coverage from external funding. This income is thus reported twice, actual level being 23 mill DKK.

The income to the Department is summarized in Table 8 below. 25% of the academic staff is responsible for attracting 80% of the external funding, which is a quite good distribution compared to several other departments, where only very few people are involved in the fund raising.

Table 8. Budgeted Income to IVH by source, 2017

Year	Appropriations from Faculty, fixed and incentives (mill DKK)	Other internal UCPH income (mill DKK)	External research income, excluding OH (mill DKK)	Overhead from External funding (mill DKK)	Other external income (mill DKK)	Total Income (mill DKK)
2017	70,7	11,5	77,6	22,8	4,6	187,2

### Recruitment and career paths at the Department

Generally at the Department, we have no problems in recruiting talented PhD and Post Docs both from Denmark and internationally. The ability of the Department to recruit and maintain talented researchers at Associate Professor and Professor level, however varies much between different areas and disciplines. Especially within areas like pathology and herd health, we have competition from the pharmaceutical industry and private practitioners/ Food and Agricultural Council, respectively. We use internal mentoring of our young promising researchers, and we use tenure track positions in areas where relevant. Still, it is recognized that we need to improve strategic planning in generational succession. All new positions at the tenure –track, Associate Professor and Professor level are agreed on in the leader group, and although the employment of these is formally approved and executed by the Dean, we are not currently facing any challenges in these recruitment procedures.



## Infrastructure

Although the Department generally harbors state of the art infrastructure (good laboratories, state-of-the-art equipment) it is under discussion to invest in major infrastructures, e.g. specific imaging equipment for use in studies of infection pathogenesis, high throughput screening facilities for bioactive substances, and equipment to study cells *in vivo*, since this could attract collaboration from national as well as international partners. On the other hand, the Department recognizes that some equipment, and in particular the support in terms of manpower needed to operate such equipment, is too costly for individual Departments, and the Department supports the formation of core facilities for such equipment.

## Department's own view on governance, organization, resources and capacity

The scheme below summarizes the Departments own view on strengths and weaknesses related to Governance, Organization, Resources and Capacity

Strengths:	Weaknesses/Threats:
<ul style="list-style-type: none"> <li>• Very dedicated high-performing employees</li> <li>• Flat governance structure</li> <li>• Positive collaboration culture</li> <li>• Both basic and applied research</li> <li>• Many researchers are involved in attracting external funding</li> <li>• Applied research fits well into the “growth and development” agenda</li> <li>• Funding attracted from a wide range of funding bodies</li> </ul>	<ul style="list-style-type: none"> <li>• Basic funding for so-called Ordinary Activities (DR 10) is volatile, as only 50% are fixed appropriations (54,7 mill. DKR in 2017). The rest varies with performance i.e. OH from external funding and enrolment of PhD students. This makes the department highly sensitive to changes in performance.</li> <li>• Lack of large speicalized equipments that could attract collaboration with international partners</li> <li>• Decreasing possibilities for large animal experimental facilities</li> <li>• The limited number of staff on basic state funding (DR10) results in insufficient recruitment/generational succession in certain areas</li> <li>• Further decrease in research budgets of National funding bodies</li> </ul>