Appendix

Self Evaluation Report 2017

for the

European Association of Establishments for Veterinary Education (EAEVE)

Stiftung Tierärztliche Hochschule Hannover
University of Veterinary Medicine Hannover, Foundation

Standard Operating Procedure (SOP)
Version 12 May 2016
valid for the Visitation 15-19 January 2018
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1 Maps of Establishment
1.1 Campus Bünteweg, Hannover

Stiftung Tierärztliche Hochschule Hannover • Lageplan Campus Bünteweg

280/282 Clinic Complex Bünteweg:
Clinic for Small Animals,
Clinic for Small Mammals, Reptiles and Birds,
Clinic for Horses
201 Institute of Animal Breeding and Genetics
203 Institute of Animal Ecology
211 Teehouse (for party)
213 Central workshops
217 Clinic for Poultry,
   Institute of Parasitology, Abteilung für Fischkrankheiten und Fischhaltung,
   Institute of Virology
218 Department of Pharmacology, Toxicology, and Pharmacy
   Institute of Physiological Chemistry,
   Institute of Zoology
219 Building for teaching
229 Institute of Pathology
231 Research Center for Emerging Infections and Zoonoses (RIZ)
238 RIZ, Laboratory for Infection Medicine
241 Unit of Reproductive Medicine of the clinics
260 TiHo-Tower: Administration, Mensa TiHo-Tower, Parent-Child-Room,
   Institute of Biometry, Epidemiology and Information Processing,
   Institute of Animal Welfare and Behaviour (Pet and Laboratory Animals and Horses
261 School for vet.med. technicians
262 Main Library
268 E-Learning-Consulting
1.2 Campus Bischofsholer Damm, Hannover

Stiftung Tierärztliche Hochschule Hannover • Lageplan Campus Bischofsholer Damm

101 Lectures halls „Aula“, „Alter Pylorus“
102 Institute of Physiology,
Institute of General Radiology and Medical Physics
Working Group of Cell Biology
103 Lecture hall „Alte Heizzentrale“
106 Institute of Terrestrial and Aquatic Wildlife Research,
Office of students committee ASA
111 Computer room (self learning)
112 Clinic for Cattle
115 Clinic for Cattle,
Institute of Food Quality and Food Safety
116 Institute of Animal Hygiene, Animal Welfare and Behaviour of Farm Animals,
Clinical Skills Lab
117 Parent-Child-Rooms
118 Mensa Caballus
120 Institute of the History of Veterinary Medicine and Domestic Animal
121 Clinic for Pigs, Small Ruminants and Forensic Medicine, Mobile Clinic
122 Institute of Anatomy,
Immunology Unit
123 Institute of Food Toxicology
124 Institute of Animal Nutrition
126 Institute of Microbiology
130 Office of Employee Committee
134 Gatekeeper
2 Clinics

2.1 Clinic for Cattle

Location
The Clinic for Cattle is located in Buildings 111 and 115 with animal facilities in Buildings 106, 110, 112, 113 and 114. There are 126 hospitalisation places for adults, four of which are suitable for recumbent cows, and 31 for calves.

Staff

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<td>Secretaries</td>
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Teaching responsibilities

Core curriculum:
Bovine internal medicine and surgery (propaedeutics, organ-, infectious and metabolic diseases, surgical procedures, including pain management, diagnostic imaging).
Bovine theriogenology (propaedeutics, diseases of the mammary gland, bovine gynaecology and andrology, obstetrics, neonatology, biotechnology).
Clinical training in bovine internal medicine and surgery, neonatology, andrology, gynaecology, obstetrics and biotechnology.
Bovine herd and production medicine including practical training in herd health management.
Teaching is performed in form of lectures, seminars, self-directed learning and hands-on clinical training.
Additional information is provided by e-learning programmes. Practical skills can further be acquired in the skills lab.
Four mandatory written case reports are submitted by 3rd and 4th year students (two reports each on reproduction medicine and on internal medicine and surgery). Reports are reviewed by the academic staff with feedback for students.
Elective courses are offered in small groups for 3rd or 4th year students (maximum 8 students/group) in form of Practicals, farm visits, seminars and “problem based learning” courses.
The majority of hands-on clinical training is offered for 5th year students during the four courses of 10 weeks of specialized training (maximum 20 students/course). Students rotate through the clinic: orthopaedics and radiology / aseptic surgery and anaesthesia / internal medicine, diagnostic imaging, laboratory medicine / gynaecology, obstetrics and udder diseases/ reproduction biotechnology / herd health management. Students are expected to take (supervised) case responsibility from admission to the clinic until release or referral to the Department of Pathology. Students are expected to join post mortem examinations of their cases and to report results of necropsies to students and clinical staff. Once a week interdisciplinary seminars (5 hours) are organised on subjects of preventive herd health management. Teaching staff from other departments deliver intensive contributions. Interdisciplinary seminars are organized on special topics. To intensify surgical training, cows (rumenotomy; 5 students/cow) and pregnant heifers (caesarean section; 5 students/cow) as well as organs from the slaughterhouse (lower legs, genital tracts, udders, heads, tails) are purchased. 10 to 12 Clinic owned cows are kept for students’ skills training in propaedeutics.

Consultations
The Clinic for Cattle is open all year round and provides a 24h/7d emergency service. The diagnostic laboratory is open for samples from Monday through Saturday.

Other information
The Clinic covers all subjects of buiatrics, and provides harmonized and synchronized teaching of undergraduate and graduate students in bovine medicine. The current case load covers a wide variety of different diseases. Herd health aspects of bovine medicine are well integrated into the curriculum and are taught directly on farms.
The Clinic collaborates intensively with outside practitioners to keep a high case load. The diagnostic laboratory serves the Clinic, research projects, and field practitioners. The results serve educational purposes. The Clinic collaborates intensively with other veterinary faculties (national or international). Students are supported in their efforts to gain extramural international experiences. Veterinary students from Germany and other countries (e.g. ERASMUS+ students) are welcome for training in the clinic.

**Main research activities**
Currently four research groups mainly focus their activities on the transition cow period. On population and herd level, research objectives are risk factors for animal health, disease recording, and management of the dry and transition cow period. On animal, organ and cellular level, lipolysis, ketosis, insulin resistance, stress, the endocrinology as well as embryonic mortality and in vivo and in vitro peripartal uterine contractility are research topics. Other research areas are pain management and techniques of orthopaedic and abdominal surgery, IVP of bovine embryos and diagnostic procedures in bull infertility.
2.2 Clinic for Horses

Location
The main facility (clinic, laboratory, stables, teaching rooms, black smith) is located at Buenteweg 9, 30173 Hannover.
There are 52 hospitalisation places for horses available, including separate isolation wards. In addition, there is a polyclinic for obstetrics of mares at Buenteweg 15, 30173 Hannover.
Premises of the clinic for teaching include one lecture hall with 120 places, and additionally 2 rooms for practical, and 4 rooms for theoretical group work. All examination rooms are also used for teaching activities (see below).
The diagnostic laboratory of the clinic is operated in cooperation with the small animal clinic. Diagnostic work is done for patients of the clinic, for outside patients, and for scientific reasons. For emergencies basic laboratory examinations are performed directly in the clinic for horses (24 hours/day).
Special diagnostics or services (X-ray) are done for other institutions/clinics of the TiHo.
Other rooms: animal reception (1), X-ray (1), computed tomography (1), MRI (1) shared with the small animal clinic, ultrasonography (2), endoscopy (1), surgery (3), dentistry (1), ophthalmologic examinations (1), exercise examination (1), orthopaedics (2), dispensary, sterilisation, photo laboratory, library, secretariat.
A riding hall (20 m x 40 m) and a riding place (20 m x 40 m) also belong to the clinic.

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Teaching responsibilities
Core curriculum: Clinical examination and diagnostic methods (course in animal handling/propaedeutics [11 lectures and 7 exercise courses], basics of clinical X-ray techniques (all species), training of clinical cases, equine medicine, orthopaedics, surgery, anaesthesia, pain management, endoscopy etc.
Interdisciplinary subjects are offered in the 9th semester. The majority of hands-on clinical training is offered for 5th year students during a 10 weeks specialized training, where students rotate through the clinic and the different divisions.
Additional elective subjects: General and special surgery, Anaesthesia, Dentistry

Consultations
The clinic is open 52 weeks a year; Consultation hours are Mon-Fri 8 a.m.- 4 p.m. (additional emergency service Mon-Fri 4 p.m.-8 a.m., and 24 hours on weekends).

Other information
- Areas of clinical specialisation: Internal medicine, Surgery and minimally invasive surgery, anaesthetics, X-ray, ultrasound imaging, Reproductive medicine, obstetrics
- Relationship of the establishment with outside practitioners: Intensive collaboration with external practitioners, continuing education programme is offered 4 times yearly for referring veterinarians.
- Administrative system used for the patients: Currently a commercial computer software is in use “easyVet”, VetZ company.

Main research activities
- Areas of research with significant publication output:
  - Infectious diseases: Projects (Non primate Hepacvi virus) in cooperation with the RIZ that is hosted at the TiHo and the Twincore Centre (Hanover Medical School)
  - Equine metabolic syndrome
  - Ophthalmology: Equine Recurrent Uveitis in cooperation with the RIZ
  - Equine Anaesthesia
  - Upper and lower airway diseases
2.3 Clinic for Small Animals (Small Animal Clinic)

Location

The main facility is Building 280 in the Clinic Complex Bünteweg 9, 30559 Hannover. For clinical service the clinic has more than 45 rooms for consulting, different surgical suites, special rooms for diagnostic imaging (x-ray, ultrasound, computed tomography, magnetic resonance imaging), electrodiagnostics, physiotherapy and 6 waiting areas for clients (separate rooms for cats and dogs, one separate room for small animals with infectious diseases).

There are 83 hospitalisation places for dogs, 42 hospitalisation places for cats; in addition, the Clinic has isolation facilities for 38 animals (30 dogs, 8 cats) and places for 20 dogs and 6 cats for teaching purposes.

The Clinic’s teaching facilities include an assigned lecture hall with 100 places. Lectures for the whole semester take place in the central lecture hall “Bayer Lecture Hall” with 238 seats in the same building, which is equipped with modern technology like WLAN, visualizer, symposium (interactive pen display), microphones and equipment for lecture recording. Furthermore, for practical work in small groups (training in clinical examination, practical surgery, cadaver training) there are three rooms (25 – 60 sqm), for theoretical work in small groups the clinic has 4 seminar rooms. Students in the practical year have a staffroom equipped with computers.

The laboratories include facilities for diagnostic purposes, clinical pathology and research in 9 rooms (routine examinations for blood work, urine samples, faeces, cytology, molecular biology, cell culture, flow cytometry etc.). Routine laboratories provide service for small animals and horses, research labs are used for the small animal clinic and for collaborations with other clinics and institutes.

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(1) An additional professor for ophthalmology is present for 3 days per month.

Teaching responsibilities

Core curriculum: clinical examination and diagnostic methods (course in animal handling and examinations, animal handling and treatment (propaedeutics), several repeats), small animal diseases (internal medicine, surgery, cardiology, dermatology, anaesthesiology, neurology, ophthalmology, oncology, diagnostic imaging, etc.). Mandatory report writing is performed during clinical training, 1-2 students are examining one animal per semester, feedback is provided. The majority of hands-on clinical training is offered for 5th year students during 11 weeks specialized training, where students rotate through the clinic and the different divisions. One week prior to the 10 weeks rotation is dedicated for Skills Lab training to prepare for the clinical rotations (Communication skills, anaesthesia, suturing etc). A formative OSCE gives students feedback about their reached competences. Cadaver training for surgery is performed in small groups (1-2 students).

Elective subjects: in all disciplines concerning small animal diseases, blended learning classes are offered, webinars, one interdisciplinary elective in neurosciences with other institutes.

Consultations

The Clinic is open 52 weeks a year with regular opening hours from Mon – Fri 8 a.m. – 5 p.m. and additional emergency service Mon – Fri 5 p.m. – 8 a.m., and 24 hours on weekends.

Consultations are performed as a referral clinic (the proportion of cases that are referrals is 64%). Emergency cases are taken 24 hours a day. Diagnostic and therapeutic procedures are performed the whole day with an intensive care unit, surgery, internal medicine and diagnostic imaging back-up duty. The clinic uses the management system “easyVet”, students have reading rights to gain information for report writing and assessments.
Other information
Areas of clinical specialisation:
Internal medicine, clinical pathology, oncology, surgery, neurology, ophthalmology, anaesthesiology, sports medicine and physiotherapeutics, reproduction.
Continuous education:
The clinic is very engaged in continuous education and provides prerequisites for the education in one of the European Colleges. Every year 9 positions in the structured internship-programme are opened. The residents have possibilities for training in neurology, anaesthesia and reproduction. The assessment for anaesthesia takes place in Hannover to profit from the electronic assessment system used at the TiHo. Furthermore, the clinic provides intensive training for national specialists and is involved in the assessment procedure performed by the Chamber of Veterinarians of Lower Saxony.

Main research activities
Research is focused on anaesthesia and pain management, oncology, clinical pathology, haemostasis, regenerative medicine, surgery/orthopaedics, neurology (neuroimmunology, epilepsy, spinal cord trauma).
2.4 Clinic for Small Mammals, Reptiles and Birds

Location
The clinic contains four examination rooms with two waiting areas, a clinical laboratory, a room for ultrasonography and another room for radiographic examination as well as two wards for keeping stationary patients. It also contains three surgery rooms, one room for animal preparation before surgery, one necropsy room, three rooms for diagnostic imaging (two for radiographic imaging, one for sonographic imaging), four examination rooms with two waiting areas, a clinical laboratory, a pharmacy, a sterilization room, a library and a teaching room for practical clinical laboratory. The clinic comprises a special lecture hall, sixteen hospitalisation facilities, one quarantine facility as well as three additional open space areas and house hospitalisation facilities for outdoors living domestic and wild birds. Hospitalisation rooms: three for small mammals, three for reptiles and ten for birds. Number of places is 35 for small mammals, 24 for reptiles and 60 for birds. The isolation facility is for two up to three animals (one to two bird or birds, one small mammal).

The Clinic’s teaching facilities include one specialised lecture hall with 88 seats, a necropsy room, where practical exercise take place, a laboratory facility and three rooms for seminars or work in small groups. The diagnostic laboratories include facilities for haematology, clinical chemistry, faeces examination and cytology in three rooms. For detailed examination blood samples are sent to the laboratories of the small animal clinic.

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Teaching responsibilities
The core curriculum includes: clinical examination and diagnostic methods (course in animal handling and examinations, animal handling and treatment (propaedeutics), several repeats), diseases of small mammals, reptiles and birds (internal medicine, surgery, dermatology, anaesthesiology, neurology, ophthalmology, oncology, diagnostic imaging, etc.), diseases of exotic animals, clinical training, clinical rotations in the 5th year for 10 weeks (6 students at a time).
There are three elective subjects each semester: surgery in small mammals and reptiles (practical course, 12 students, repeated every second week of the semester), radiographic imaging in small mammals (theoretical and practical course, 12 students, repeated every second week in the semester) and care, rearing and treatment in native and exotic wild mammals (theoretical and practical course, 20 students, repeated every second week in the semester).

Consultations
The clinic is open 52 weeks a year. Regular opening hours are Mon, Tue, Thu and Fri 8 a.m. – 5 p.m., Wed 8 a.m. – 13 a.m., additional emergency service Mon – Fri 5 p.m. – 8 a.m. and 24 hours on weekends is provided. Consultations are performed both as a referral clinic and for first opinion cases.

Other information
Laboratory and diagnostic imaging examinations are available around the clock as are intensive care and surgery services. The back-up duty is performed by experienced clinicians in internal medicine and surgery of every working group of the clinic (small mammals, reptiles and birds). The proportion of cases that are referrals is approximately 40%.
Veterinarians perform procedures of internal medicine, surgery, diagnostic imaging, clinical pathology, oncology, neurology, ophthalmology, anaesthesiology depending on the present case of a patient. A large number of wild animals are presented, especially in the emergency services. The clinic works together with shelters, animal parks and zoological gardens to return cured animals back into the wild.
The relationship of the clinic with outside practitioners consists of referral work, advisory consultations via telephone (even for owners) and seminars.

The clinic for small mammals, reptiles and birds uses computer software programme for case, data and image recording, statistical analysis, final reports and invoices (EasyVet).
2.5 Clinic for Pigs, Small Ruminants and Forensic Medicine

Location
The main facility (clinic, laboratory, stables, teaching rooms, ambulatory service) is building 121; stables of the clinic are also located in building 127 and building 128 on the campus Bischofsholer Damm. The clinic participates in the unit of reproductive medicine of clinics.

There are 32 hospitalisation barns available for small ruminants/south american camelids, 43 hospitalisation barns for pigs and 12 barns alternatively for pigs, small ruminants and south american camelids. Additionally there are 7 barns for accommodation of pigs, small ruminants and South American camelids in an isolation facility and 5 x 4 barns for pigs or small ruminants for research trials.

Premises of the Clinic for teaching include one lecture hall with 82 places, one laboratory for practical work by students with 48 places, one small laboratory with 6 places and 3 rooms for group work with 36 places in all.

The diagnostic laboratory of the clinic includes rooms for haematology/parasitology, cytology, serology, clinical chemistry, PCR diagnostics and AAS lab. Diagnostic work is done for patients of the clinic (pigs, small ruminants) and outside service (all species) as well as for scientific purposes.

Special diagnostics or services for other institutions of the TiHo are available upon inquiry (e.g. X-ray, ultrasonography, computertomography).

Other rooms: X-ray/ultrasonography, endoscopy, computertomography, surgery, dispensary, sterilisation, gnotobiotechnique laboratory.

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Teaching responsibilities
Core curriculum: Clinical examination and diagnostic methods (course, 4 repeats), propaedeutics (animal handling and treatment), laboratory diagnostics (course, 6 repeats), basics of internal medicine (all species), training of clinical cases, swine medicine, small ruminants medicine, veterinary legislation, interdisciplinary subject clinics, herd health management, "practical year" (i.e. 10 weeks for a group of 12 students with reinforced clinical teaching esp. with "hand on patients" in pigs, small ruminants, South American camelids and some teaching units in the mobile clinic, flock health service for small ruminants, Bakum and clinic for poultry, 3 repeats; Skills lab training to prepare surgery classes, OSCE for feedback).

Compulsory elective subjects: herd health management (swine, small ruminants: intramural course, excursion, also see Mobile Clinic), therapeutic and diagnostic training
Examinations: propaedeutics, internal medicine, surgery, reproductive medicine, veterinary legislation

Consultations
The clinic is open 52 weeks a year. Consultation hours are Mon - Fri 8 a.m. - 5 p.m. (additional emergency service Mon - Fri 5 p.m. - 8 a.m., and 24 hours on weekends)

Herd Health Service for Small Ruminants
The herd health service for small ruminants (HHSSR) is part of the Clinic for swine and small ruminants.

The HHSSR offers visits and consultation to small ruminant flocks on a regular base. Actually 92 flocks take part at the HHSSR. They are visited on a regular base, with a minimum of 2 visits per year, and a maximum of 12 visits per year. The service provides routine clinical investigation of the flocks, pregnancy scanning, monitoring of infectious diseases, parasitological monitoring, and monitoring on trace elements. Also vaccination programmes are provided. Emergencies are also treated.

Farm visits are made all over the year (about 48 weeks per year) with 1 to 3 days per week and 1 to 3 farms visited per day. Most of the visits are joined by up to 3 students.
Other information
Additional outside sources of material for clinical training purposes:
Purchase of animals (swine, small ruminants) from outside farms for teaching purposes
Level of clinical service that is offered by the clinic is comparable with outside practices.

Proportion of cases that are primary and referrals: Swine – mostly referred by veterinarians (for diagnostic, not for therapeutic reasons); Small ruminants – brought as primary cases by the owner (70%), referred by the veterinarian (30%) (for diagnostic as well as for therapeutic reasons).

Areas of clinical specialisation:
- Internal medicine/laboratory investigations
- Surgery, anaesthesics, X-ray, ultrasound imaging, endoscopy techniques
- Reproductive medicine, obstetrics
- Resident education within ECPHM and ECSRHM

Relationship of the clinic with outside practitioners:
- Intensive collaboration with outside practitioners by diagnostic services (swine and small ruminants) and referral work (small ruminants)
- Other relationships with outside organisations:
  Collaboration with pig and sheep health organisations

Administrative system used for the patients:
- A commercial centralised software system (EasyVet) for clinics and institutes of the veterinary school is installed and in use for case and data recording as well as for writing final reports and invoices. The system is also accessible for students (case information). Within the Lab a special software systems (Labcontrol) is used.

Main research activities
The main research of the clinic covers a broad range from epidemiology, physiology, pathophysiology, laboratory diagnostics, infectious diseases, animal welfare and surgical procedures. Detailed list of projects see homepage thi (TIHoDozis)

Within the field of swine medicine the main research topics are:
- Locomotive disorders: Influence of bone mineralisation on locomotor system
- Pathophysiology, diagnostics and therapy of different infectious diseases (e.g. swine dysentery, proliferative enteropathy, A. pp., enzootic pneumonia, Campylobacter spp. / Yersinia spp., sarcotic mange)
- Pathogenesis, diagnostics and therapy of reproductive and peripartal disorders
- Animal health and welfare with regard to pig housing systems, tail biting
- Pain management during piglet castration; euthanasia of non-viable suckling pigs
- Development of protocols for long-term anaesthesia
- Diagnostic thermography
- Measures for reduction of antibiotic use

Within the field of small ruminants and south american camelids disorders the research activities focus on:
- Systemic diseases:
  - Pathophysiology, diagnostics and therapy of different infectious diseases (Maedi-Visna, Adenomatosi, Paratuberculosis, Listeriosis, Q-fever, Bluetongue, Mycoplasmosis)
  - Diagnostic of infections of erythrocytes like Mycoplasma spp., Anaplasma spp., Babesia spp.
  - Monitoring and treatment of endoparasitic infestations in small ruminants
  - Diagnostics, pathogenesis and therapy trace element disorders (copper, cobalt, selenium)
  - Calcium metabolism, deficiency and intoxication in south american camelids
  - Pathogenesis and therapy of pregnancy toxicosis of sheep
  - Long term anaesthesia in sheep
  - Diagnostic of renal insufficiency in different species (swine, small ruminants, horses, cattle)
2.6 Clinic for Poultry

Location
The Clinic for Poultry is located on the campus Bünteweg (buildings 217 and 214). This unit is responsible for teaching, research, and services (extension service and diagnostic services including necropsy) related to commercial as well as backyard poultry (e.g., chicken, turkeys, ducks, geese), and pigeons. In addition teaching, research and diagnostic services may also address pet- and feral bird species for selected topics.

Staff

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Teaching responsibilities
Teaching of avian including poultry diseases and related topics is done in close cooperation with the Clinic for small mammals, reptiles and birds. This includes lectures, practical trainings (electives, clinical training, practical year) as well as the examinations in accordance with the governmental and veterinary board regulations for training and licensing of veterinarians as laid out in the TAppV, § 42.

Core curriculum: Propaedeutics in avian medicine (poultry, pet, wild and zoo birds), principles and interpretation of laboratory diagnostic findings (incl. practical training), interdisciplinary subject teaching directed to food hygiene and safety, post-mortem examination of avian species with a special emphasis on poultry, diagnostic strategies and population medicine on the flock level including sampling procedures, vaccination methods; case studies (Quote); conventional lectures on specific issues in avian medicine.

Selective subjects: seminars and field trips (including GESEVO as an example for measures undertaken in epidemic situations; to the coast in cooperation with the fish unit of the University) on selected chapters of avian medicine (poultry, pet birds, wild and zoo birds)

Practical year: Cooperation with the Clinic for Swine, Small Ruminants and Forensic Medicine offering clinical rotations in the respective subunits of both institutions including the field station Bakum. In addition the Clinic for poultry also offers clinical rotations for individuals not involved in the mentioned cycle with the specific emphasis on poultry diseases. Students involved in this cycle are guided through a small research project.

PhD-Studies: The Clinic is involved in the curricula of the PhD-programmes “Veterinary Research and Animal Biology” as well as “Animal and zoonotic infections” with seminars, laboratory classes and field trips.

Doctoral students: For PhD- and doctoral students the clinic offers “Journal Clubs” as well as training of presentation skills, data analyses and research during “Research Meetings”.

Interns and residents: For interns and residents (within the European College of Poultry Veterinary Science) as well as for the applicants for the “Facharzterz” (Certified Specialists in Poultry Disease as well as in Microbiology) the clinic offers seminars, invited lectures, field trips and guided research projects.

Consultations
Opening hours: generally Monday - Thursday from 7.45 am to 4.15 pm; Friday from 7.45 am 4.00 pm. On call continuously throughout the week and on weekends.

Other information
Studies on efficacy and safety of vaccines and drugs under controlled laboratory and field conditions; Investigations on frequency, significance and control of important pathogens of poultry, pet birds and wild birds (zoonotic infections, epizootic diseases, food-borne infections); Clinical and immunobiological examinations of poultry, pet and feral birds; Characteristics of immunosuppressive pathogens of poultry Husbandry systems, animal welfare and animal health of poultry
2.7 Mobile Clinic (Ambulatory Service)

Location
The Mobile Clinic (Ambulatory Service) is organizationally attached to the Clinic for Pigs, Small Ruminants, Forensic Medicine and Ambulatory Services, Building 121 located on the campus “Bischofsholer Damm”. Daily practice is offered for farms and riding stables within a one-hour drive from the TiHo (cattle, swine, small ruminants, horses). Additionally, herd health services are offered for cattle (by staff of the Mobile Clinic and of the Clinic for Cattle), for swine, for small ruminants and south american camelids (by staff of the Clinic for Pigs and Small Ruminants and of the Field Station for Epidemiology – only pigs). See also figure below.

Rooms: dispensary, preparation room (instruments, sterilisation), room for group work

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Teaching responsibilities
Core curriculum: Mobile clinic excursion (10-12 students, 5 hours/day, 3 busses)
Elective subjects: Herd health management (cattle, excursions, also see Clinic for Swine, Small Ruminants, Forensic Medicine and Ambulatory Services)

Consultations
The Mobile Clinic operates 52 weeks a year, operation hours are Mon – Fri 8 a.m. – 5 p.m. (additional emergency service Mon – Fri 5 p.m. – 8 a.m., and 24 hours on weekends).
Herd health services operate regularly and on request.

Other information
Level of clinical service that is offered by the establishment compares with outside practices.
Administrative system used for the patients:
A commercial centralised software system (EasyVet) for clinics and institutes of the TiHo is installed and in use for case and data recording as well as for writing final reports and invoices.
Another commercial computer software is in use for regular herd health service on cattle farms (Boviconcept).

Cooperation with the Clinic for Cattle and the Field Station for Epidemiology
- Regularly exchange of knowledge
- Case discussions between institutions
- Computer-based data analysis (bovine: "Boviconcept"; swine: "db-Planer")

"Mobile Clinic" of the University of Veterinary Medicine Hannover
Involved institutions:
- A) Clinic for Swine, Small Ruminants, Forensic Medicine and Ambulatory Services
- B) Clinic for Cattle
- C) Field Station for Epidemiology, Bakum

[Diagram of Veterinary Herd Health Management, Ambulatory Service, and Veterinary Consultancy]
2.8 Unit of Reproductive Medicine of the clinics

Organisation and location
The ‘Unit for Reproductive Medicine’ is located at Buenteweg 15, and affiliated with the different clinics of the TiHo. The Unit is an interdisciplinary centre, which is involved in teaching and research in themes related with reproductive medicine and associated biotechnological applications. In addition, there are clinical services provided for large farm (horses, cattle, pigs, sheep and goat) and small pet (dogs, cats) animals. The Unit includes an accredited ‘Central Lab for Spermatology and Biotechnology’, with state-of-the-art equipment. Furthermore, it has an EU-licensed Equine and Small Ruminant AI-centre, and EU-licensed Equine ET-centre. The Unit closely cooperates with members of the ‘Virtual Centre for Reproductive Medicine Lower Saxony’, including the ‘Institute of Animal Breeding’ in Mariensee, the ‘National Stud of Lower Saxony’ in Celle, as well as animal breeding associations, and AI- and ET-organizations. These efforts should support long-term competitiveness of animal production in Germany.

Within the ‘Unit for Reproductive Medicine’, different professorships are responsible for small animals, cattle, horse, pig and small ruminants. Administrative affairs are conducted by the professor responsible for equine reproduction.

The main building (administration, clinic, diagnostic laboratory, spermatology research laboratories, lecture hall, stables, EU-Equine AI- & ET-centre, pasture) is designated as Building 241.

Teaching facilities include one lecture hall with 90 seats including an area for animal demonstration, four rooms for working with animals in small groups, two seminar rooms with eight seats each, two rooms for preparation and semen collection and -handling, as well as one course room equipped with 25 microscopes and 25 seats (Building 261).

The diagnostic laboratory consists of two rooms; one for semen processing and spermatological analyses and one for cytological examinations. There are two consultation rooms for small animals (dog and cat), equipped with endoscopy and ultrasound devices, which are used both for clinical and research purposes. Furthermore, two rooms are available for surgery in pigs and small ruminants. A separated area is available for stallion semen collections, which is used for teaching and diagnostic purposes. The EU-licensed centres for artificial inseminations and embryo transfers were built in 2006, and include (separated stables, areas for clinical examinations and facilities for quarantine, semen collection, disinfection, and laboratories for sperm and embryo handling.

The Institut owns 15 to 20 dogs, 3 stallions, 6 mares, 6 boars, 4-10 gilts, 3 rams. These are kept around Building 241, and are held for teaching and research purposes.

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Teaching responsibilities
Core curriculum: Teaching of clinical and laboratory methods in reproductive medicine as well as biotechnological applications in dogs, horses, pigs and sheep. Especially artificial insemination and embryo transfer techniques are educated. In addition to lectures, clinical training, interdisciplinary clinics, and lab courses are given.

Furthermore, lectures and practical training is offered for MSc students in ‘Animal Biology and Biomedical Sciences’, as well as AI and ET technicians. Post-graduate training is provided to veterinarians and specialists. The ‘Unit for Reproductive Medicine’ participates in the residency programme of the ‘European College of Animal Reproduction’ (ECAR), for cattle, horses, dog and cat, pigs and small ruminants. The ‘Unit for Reproductive Medicine’ is involved in the the newly established PhD Focus-programme “Reproduction” within the PhD programme “Veterinary Research and Animal Biology” at TiHo.

Elective curriculum: Seminars and practical training in reproductive medicine and biotechnology.
Consultations
- For small animals, services in andrology, gynaecology and artificial insemination are offered. Consultation hours are: Mon – Fri, 8 a.m. – 1 p.m. Students participate in consultations.
- For horses, services in andrology, gynaecology, artificial insemination and embryotransfer are offered. Consultation hours are: Mon – Fri, 8 a.m. – 1 p.m. Students participate in consultations.

Spermatological diagnostics of samples from different species (pig, horse, cattle, dog); which are sent to the Unit by artificial insemination centres, veterinarians and breeders.
Semen preservation for small animals, pigs and horses and development of preservation methods. Consultation of veterinarians from commercial centres for artificial insemination and embryo transfer, as well as private practices, and of breeders.
3 Institutes

3.1 Institute of Anatomy

Location
The Institute’s main site is in Building 122 (Bischofsholer Damm campus). Rooms for teaching (anatomy) comprise one lecture theatre (114 seats), two dissection halls with visualizer, computer and video projection (46 dissection tables with 5-6 places each), a seminar room (“Studio”, with computer and video projection, video microscope; 49 seats), a museum (60 seats; for self study purposes). Histology is taught on the premises of the Institute of Pathology (Bünteweg campus). The main lectures on anatomy and embryology take place in the Institute of Physiology (270 seats) which is equipped with visualizer and computer projection (Building 102).

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Teaching responsibilities
The institute’s staff teaches anatomy, histology, and embryology for students in their first and second years with many practical classes. Formative assessment gives feedback to students achieved competences. Histology courses are given twice, due to the large student numbers and the intended intensity of training.

In the anatomical dissection classes, 5-6 students per dissection table form one group. The students’ practical work is supported by visualizer guided dissection and setting priorities on clinically relevant structures in teaching. Interdisciplinary electives are given with teachers from the clinics.

Main research activities
Research activities have been focussed on the reproductive tissues of female and male, with emphasis on the development of in vitro systems for placenta cells and functional analysis with transgenic mice (spermatogenesis), as well as lympho-reticular tissues with respect to their significance as Specific Risk Material (BSE) and craniometry. Besides, a variety of clinically driven research projects are conducted in collaboration with the respective clinical institutions.
3.2 Institute of Animal Breeding and Genetics

Location
The Institute is located in Building 201 on the campus Bünteweg. Premises for teaching include one lecture theatre for 120 students, one demonstration room for 50 students, one seminar room for 30 students. The molecular genetic S1 laboratory is regularly used for courses held for small groups of students (5-10 students per course); it includes facilities for Next-Generation Sequencing (MiSeq and NextSeq500), DNA Sanger sequencing (Life Technologies), DNA fragment analysis, PCR, genotyping of SNPs, realtime PCR for quantitative DNA and RNA analyses and two local workstations for bioinformatic work.

The cytogenetic laboratory is regularly used for courses with five students. A computerised research microscope equipped for fluorescence is available, and the laboratory includes a room for preparation of chromosomes and cell culturing including a laminar flow. There are three computer rooms open to individual undergraduate and graduate students.

In addition, we have two rooms for biobanking including blood, tissue, RNAlater, DNA and RNA samples. Our actual capacity provides storage for approximately 50,000 samples.

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Teaching responsibilities
The core curriculum in animal breeding and genetics is taught three hours per week in the winter term. In the summer term the course for judging of breeding animals (horses, dairy cattle, beef cattle, sheep, goats, dogs) and introduction into recording and diagnosing congenital anomalies (each repeated 12 times) and the seminar on genetic anomalies, genetically caused complex diseases, prediction of breeding values, breeding programmes and genetic consulting for small and large animals is given 3 hours per week (each of the six seminars are repeated 2 times).

Consultations
We are doing consultations for breeding organizations (cattle, horse, sheep, goat, dog, cat), private breeders, veterinary organizations, veterinary clinics and practitioners. The main focus aims at improvement breeding for health, genetic management of populations, awareness for breed-related conditions and how to reduce them, avoiding increase of inbreeding and use of modern genomic technology.

Other information
We are giving presentations and courses for veterinarians, breeders and breeding organizations on weekends. We provide a PC programme for genetic population management.

Main research activities
Population, cytogenetic and molecular genetic analysis of congenital anomalies and complex traits with emphasis on diseases and fertility, their interactions with production traits and production/housing environment in horses, cattle, pigs, sheep, goats, dogs, cats and poultry. Genome-wide association analyses, next-generation sequencing of genomes (DNASEq and RNASEq) and bioinformatic as well as population genetic analyses. Genetic testing for Mendelian traits. Genomic breeding for complex traits. Development of software solutions and pipelines for genomics.
3.3 Institute of Animal Ecology

Location
The institute is located in the building 203 at Bünteweg 17d and uses a DNA laboratory (S1), a computer room, a library, and three animal culture rooms for graduate and post-graduate education. The labs are available to graduate students and undergraduates for lab rotation periods of 3 to 12 weeks.

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Teaching responsibilities
Several lectures, seminars and lab courses in molecular ecology and evolution are offered to veterinary medicine students. The major part of teaching is done for students of biology (FüBa, bachelor, PhD, and masters programmes).

Other information
Our teaching of state-of-the-art molecular techniques in ecology and evolution is fueled by the below mentioned collaborations. Student exchange programmes between the collaborating institutions favor both teaching and research.

Main research activities
Our institute combines ecology, evolution and molecular genetics to study current issues of modern biology. Long term research projects include conservation genetic studies of biodiversity (e.g. genetic diversity of dragonflies and damselflies), comparative phylogenetic studies in Invertebrate Animals (e.g. early phylogenetic branching pattern within Pterygota; deep phylogenetic relationships in basal metazoans: Placozoa, Porifera, Cnidaria, Ctenophora), developmental biology in diploblasts and odonates and the development of new DNA technologies for ecological and evolutionary research. Many projects profit from intensive and long term collaboration with the Yale University, the American Museum of Natural History in New York, Oxford University and several other associations.
3.4 Institute of Animal Hygiene, Animal Welfare and Behaviour of Farm Animals

Location
The Institute is located on the campus Bischofsholer Damm in Building 116 on 2nd floor onwards above the Clinical Skills Lb. Laboratories (including microbiological laboratory L2-status) and offices are situated on the second floor, and the rest of the building on 2.5th, 3rd and 4th floor includes offices, social rooms and the respective infrastructure.

The diagnostic laboratory is open to individual undergraduates; it focuses on cultural and molecular biological diagnostics; about 5,000 microbial samples (from animals and air, water, soil etc.) are handled p.a. from current ITTN research projects.

Premises for teaching comprise one seminar room for up to 30 students and one auditorium for up to 110 persons.

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1) Including applied ethics in vet. med.

Teaching responsibilities

The core curriculum in animal husbandry and animal hygiene is fully taught by ITTN. Teaching in animal welfare and animal behaviour is divided equally between ITTN and the Institute of Animal Welfare and Ethology (pet and laboratory animals, horses). A wide variety of compulsory courses is offered in the fields of animal hygiene and welfare of farm and laboratory animals and ethics.

Other information

ITTN is an approved location for advanced training for certified veterinary specialists in animal hygiene, microbiology and animal welfare.

Main research activities

Key knowledge areas of ITTN are the biological, physical and chemical principles and the living conditions of livestock. Applied methods include the analysis of animal behavior via video or direct observations, and, in the field of animal hygiene, a combination of classical analysis of hygienic practices with modern molecular biological methods. The generated knowledge is used to improve animal health and welfare in farm animals whilst also maintaining performance in modern animal production systems. Animal production systems with a high level of animal welfare are tested, and, if successful, brought to commercial farming practices.

Research fields include:

- Animal hygiene
  - interactions between animals, humans and the environment
  - improvement of hygiene practices
  - analysis of spreading and transmission routes of pathogenic and indicator bacteria

- Animal health and welfare
  - definition and measurement of the physical, chemical and biological environment of animals

- Animals welfare and behaviour
  - evaluation of alternative husbandry systems
  - environmental enrichment for poultry and pigs

- Environmental protection: farming environment and emissions
  - e. g. impact of airborne emissions from livestock production on humans, animals and the environment
  - reduction of bioaerosol emissions by aerosol disinfecting
3.5 Institute of Animal Nutrition

Location
Campus Bischofsholer Damm; Bischofsholer Damm 15; D-30173 Hannover

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Teaching responsibilities

**Lectures:** The institute offers lectures in the fourth and seventh semester (2 h/week). In the fourth semester, topics of lectures are basics of feed science, principals of animal nutrition, risks of feedstuffs for health and food safety and last but not least feed legislation, whereas in the 7th semester the feeding of the different species of food producing as well as of companion animals is the main subject. In the first and second semester the students are taught in basic (2 h/week) and applied botany (3 h/week), respectively, inclusive regular excursions to let students experience the diversity of feed, poisonous and medical plant species in their natural habitat.

**Mandatory seminars:** During the entire semester, the semester (~ 250 students) is divided into five groups à 50. Each of these groups is taught for 2 hours per week. The topics are based on the contents of the lectures, for example: in the lecture with a focus on the preservation → in the mandatory seminar: visual appraisal of silage quality.

**Elective courses:** During the entire semester, elective courses are offered every week (2 courses, 2 h each). The contents of the courses are related to the contents of the lectures, too. In addition to lecturers from the institute, colleagues from other institutions and presentations from extramural institutions (including feed industry) are invited. Additionally, there are special offers for practical skills in botany (e.g. identifying of plant species in hay) during winter and summer (2 h/week).

Consultations
The institute offers a wide range of consulting services. Questions about the nutrition of all animal species are on the focus. A large repertoire of diagnostic services, inclusive botanical expertise about feed and poisonous plants, is available. Both, questions concerning the nutrition of individual companion animals as well as questions concerning the nutritional problems on the herd level are on the agenda. In individual cases (herd-health-problems; impaired

Other information
In comparison to other institutes of animal nutrition in Europe the peculiarity at Hanover is the role of the established service including analytical work as well as consultations. Samples (feed, water, feces, urine, blood, tissues) related to actual cases of disease, prevention of disease or dietetic purposes are sent to the institute by veterinarians, owners of animals or public authorities for problem orientated analysis or require instructions, comments or advice in feeding, particular food producing animals but also in companion animals. Students can have insight in those cases and the information gathered in the service is integrated in lectures and courses (e.g. samples of feeds, case reports). The regular analytical consultation service in nutrition by members of the staff is a unique background in education. Finally the spectrum of species recognized by nutritional point of view (pet birds up to horses and fish) and the emphasis of veterinary aspects is the main part of the profile of the Hannover Nutrition Institute.

Main research activities
About two thirds of research activities are focused on species of food producing animals, one third is related to species of companion animals.

Objectives in farm animals:
Pigs: dietary effects on gastric ulcer; prevalence and spread of Salmonella; skeleton health and phosphorus supply; roughages in pregnant sows; dietary prevention of periparturient disorders; body composition of newborn piglets; feeding concepts for pigs’ welfare; feed additives and health; Poultry: dietary effects on foot pad health as well as on spread of zoonotic pathogens (Salmonella/Campylobacter); role of excreta quality regarding prevalence of antibiotic resistance; amino acid supply and skin health; feeding concepts for turkeys and aggressive behaviour; Cattle: effect of dietary sulphur/sulfate intake via roughages and concentrates; new by-products as feed resources; optimizing dietary management of the transition period; trace element supply and health; selection of plant species on year-long pastures. Horses: Ecological context of feed borne horse diseases (e.g. Atypical Myopathy due to maple fruits); plant-based deworming (e.g. anthelminthic properties of certain plant species) Goats: Long-term survey of natural diet (browse, herbs) during the year in a seasonal environment; basic research with “professionals”: Strategies of experienced goats to deal with poisonous plants as feed Objectives in companion animals Dogs: feed technology for slaughter by-products; Birds: energy and nutrient requirements during laying/breeding period and for nestlings’ growth in ornamental bird species Small rodents: dietary effects on teeth growth; formation of urinary stones.
3.6 Institute of Animal Welfare and Behaviour (Pet and Laboratory Animals and Horses)

Location
The institute is located on the eighth floor of the TiHo tower (Building 260). Another building is used for the therapy of behavioural disorders of dogs; it includes a fenced outdoor area of 700 m². The institute will be closed by September 2018 and integrated in the Institute of Animal Hygiene and Animal Welfare. Premises for teaching include one seminar room and one experimental laboratory (in the Central Teaching Building I - Building 219).

Service includes scientific consultations and advice for all animal welfare problems of veterinary practitioners, veterinary administrations, animal protection organisations, and private persons, as well, and this frequently requires research work.

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Teaching responsibilities
The core curricula in animal welfare and animal behaviour are taught in co-operation with the Institute of Animal Hygiene and Animal Welfare with a total of 56 hours for the first subject and 28 hours for the last. Electives are offered on “Normal behaviour of horses” and "Behavioural disorders of horses and their therapy” as well as a seminar on “Special topics of animal welfare” every winter semester.
3.7 Institute of Biometry, Epidemiology and Information Processing

(WHO Collaborating Centre for Health at the Human-Animal-Environment Interface (WHO-HAEI))

Location
IBEI, which is designated by WHO for its One-Health activities as a Collaborating Centre is located on two floors in Building 260, Bünteweg 2. Premises for teaching include two seminar rooms (20 / 10 students), and a specialised library. In addition to being used for seminars and teaching classes the seminar rooms are also used by students in free working groups (self directed studies). Other rooms are available to individual undergraduates for practical periods of up to six months as well as to graduate students.

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Teaching responsibilities
Biometry is part of the curriculum in the second year of veterinary medicine, in the second year of biology, in the first year of animal biology and for all PhD students. Veterinary epidemiology is part of the curriculum in the fourth year of veterinary medicine as it is included in the lecture on epizootic diseases. In addition, special courses are offered in veterinary epidemiology, animal experiments and statistical models for veterinary surgeons, for biologists and for PhD students. Classes on methods in Evidence based Medicine with a special emphasis on techniques of meta-analyses are offered, as well.

Consultations
IBEI is responsible for statistical and epidemiological consulting of all research students preparing their theses as well as other scientists and projects. Here, small classes are taught half-yearly and/or individual consulting is provided (case-load in 2016 approx. 100 cases). Within this service IBEI includes the design of study protocols, randomisation of cases and sample size determinations as well as specialised statistical analyses following international Standard Operating Procedures of Good Clinical Studies (EMA protocols).

Other information
IBEI is designated by the WHO for its One-Health activities as a Collaborating Centre for Health at the Human-Animal-Environment Interface (WHO-CC HAEI Hannover). In agreement with the WHO, the terms of reference (TOR) for the (WHO-CC HAEI Hannover) were structured into three fields of training and research activities, namely:

TOR (i) Studying antibiotics use and resistance in animal populations to assess its impact on resistance in humans
TOR (ii) Studying animal health and animal welfare as the basis for improving human health (with a focus on food-borne infections in humans)
TOR (iii) Methods for regional, national and global strategies for surveillance, prevention and control of zoonoses and foodborne infections

These TOR are the basis of the updated work plan for the years 2016 to 2019.

Main research activities
IBEI is structured into two working groups "Animal Health, Well Being and Behaviour" and "One Health / Zoonoses" with a common methodological background in epidemiology, biometry and (medical) documentation. The research tasks of IBEI concern studies in veterinary epidemiology and biometry. Main methodological subjects of interest are surveillance and monitoring, diagnostic techniques and risk (factor) analysis of animal diseases. Special focus lies on zoonoses, antibiotic consumption and antibiotic resistance as well as on animal health and welfare in German livestock populations. IBEI was/is a member of a huge research consortium on food borne infections (www.fbi-zoo.de), dairy cattle health (www.praeri.de), Q-fever in the
human and small ruminant population (Q-GAPS consortium) and coordinator of a research consortium on ESBL-resistance in humans and animals (www.reset-verbund.de). In addition IBEI is the principal investigator of VetCAb, the scientific research project on antibiotic consumption in farm animals in Germany. Other examples of scientific work are investigation of a dual use genetic of laying hens in an integrated housing system with special focus on biosecurity, development of animal welfare scores and integrative studies combing secondary use data on animal health and others.
3.8 Institute of Food Quality and Food Safety

Location
The institute is located in Building 115 on the campus Bischofsholer Damm 15, 30173 Hannover. Within this building, the institute occupies half of the basement, the complete ground floor, half of the first floor, 4 rooms at the second floor and the entire third floor.

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Teaching responsibilities
The core curriculum contains lectures and courses in the following subjects:
- Food science
- Food microbiology
- Red and white meat hygiene
- Milk hygiene and milking techniques
- Meat inspection (Course)
- Food investigation (Course)
- Milk hygiene and sampling (partly held at the farm in Ruthe, course)

Courses have to be repeated three to four times per week due to the large number of veterinary students. The interdisciplinary teaching units involve shared seminars with clinics (Clinic for Cattle, Clinic for Pigs and Small Ruminants) and the Institutes for Pathology, Parasitology and Microbiology as well as contributions from external experts working at state authorities or private establishments.

Core elective course teaching (Wahlpflicht) is offered for various subjects. The institute is also involved in the teaching of veterinary technical assistances (VMTA) and veterinarians prepared for official authoritative duties (Referendare).

Consultations
For students: every working day between 10.00 – 11.00 h and after the lectures and courses. In addition: At any time upon prior appointment

Other information
Two laboratories of the institute (Laboratory for food molecular biology and food microbiology) are accredited according to ISO/IEC 17025.

Main research activities
Food microbiology
- Campylobacter: Molecular tracing throughout food chain; Salmonella in pork and poultry
- Intervention strategies (e.g. use of bacteriophages in food production); Antimicrobial resistance
Food technology
- Packaging technology; Meat processing and food (bio)chemistry
- Non-thermal food preservation methods (e.g., cold plasma, high pressure)
Molecular food biology
- Molecular basis of antimicrobial resistance and biocide tolerance
- Epidemiology of food pathogens and reservoirs (wild animals)
- Molecular tools for the detection and quantification of food pathogens
Milk hygiene
- Mastitis agents; Composition of milk
3.9 Institute of Food Toxicology

Location
The institute is located in the building 123 at Bischofsholer Damm 15. A cell-culture laboratory (S2) and a molecular biology laboratory (S1) can be used for teaching cell- and molecular biology techniques in small groups. An additional course room (S1) for bigger groups of students is available. Thus there are many possibilities to integrate students for practical training in the Institute. Further, the animal housing unit of the Institute is located in building 124, the Institute of Anatomy, directly in front of the Institute. The Institute houses a library, a seminar room and a lecture hall for additional teaching activities in various group sizes.

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Teaching responsibilities
The Institute covers important fields in the Veterinary Education: To start with Chemistry, followed by Food Toxicology and Alternatives/Complementary Methods to animal experiments. In the 1st and 2nd semester Chemistry courses start with anorganic and organic Chemistry specially adapted for the needs of veterinarians. There are lectures (2h/week), as well as compulsory, interactive seminars (2h/week) in smaller groups and elective courses (2h/week) to deepen the expertise of interested students.

Food Toxicology is taught as lecture in the 6th Semester (1h/week) and as compulsory practical course in the 8th Semester (6h in total). Another related interdisciplinary lecture is organized in cooperation with the Institute of Food Quality and Food Safety (3h/week) to discuss current issues in food science with speakers from different Institutes as well as external experts. Elective courses are available to deepen the knowledge in Food Toxicology, partly offered by external experts.

Students interested in Replacement/Complementary Methods to Animal Testing in the field of Toxicology can join elective seminars in small groups in the 6th and 8th Semester. Moreover two students/year get the opportunity to spend 10 weeks of their practical year to learn cell- and molecular biology techniques. The students contribute to ongoing projects to obtain practical skills and to broaden their view on the possibilities of veterinary research fields.

Members of the scientific staff further participate in courses of other fields/Institutes, like an elective course on doping issues in horses, in cooperation with the Institute of Physiology and the Department of Pharmacology, Toxicology and Pharmacy.

Main research activities
In the field of Food Toxicology the Institute is active in investigations concerning molecular mechanisms of colon cancer formation with regard to endogenously formed N-nitroso compounds from red meat and the involvement of different bacterial strains in colon cancer formation. Further there is an investigation on safety assessment of genetically modified maize.

In the unit for Bioanalytics and Metabolomics analytics of parasitic fatty acid pattern and the impact of food ingredients and contaminants on endogenous inflammation mediators are performed by targeted metabolomics of the eicosanoid pathway.

Apart from this the institute is involved in the Development of Alternative and Complementary Methods for Animal Testing in the field of Neurotoxicology, human cell transformation assays and the investigation of pathogenic mechanisms of intestinal disorders caused by zoonotic agents in vitro.

In this framework there are ongoing scientific collaborations with different Institutes of the TiHo as well as national and international Universities/Institutes.
3.10 Institute of General Radiology and Medical Physics

Location

The Institute is located on the campus Bischofsholer Damm in Building 102. The auditorium of the Building 102 is used for lecture courses in physics and general radiology. Practical exercises in both subjects are held in rooms of the same Building. Our X-ray diagnostic lab with conventional as well as digital X-ray equipment including a digital luminescence radiography system is used for education of students in small groups. Besides we have labs for simulation of mechanical, thermal and electrical processes in animals using the finite element analysis on a Dell Precision Workstation 7910, for measurement of ionising radiation as well as radioactivity (gamma radiation) in specimens of food, and a workshop for electronics.

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Teaching responsibilities

The core curriculum comprises teaching of the fundamentals of physics (56 hours) as well as general radiology (42 hours); in both subjects, mandatory practical exercises are taught in small groups. Students are divided into small groups of 20 students each. As each experiment has to be presented five times, small groups of four students are assigned to the experimental apparatus.

In addition, the Institute is responsible for the examination in experimental physics and general radiology. Furthermore different elective courses (Principles of electrocardiogram, Principles of Ultrasonic Diagnosis, Principles of Diagnostic Radiology), various lectures for PhD students and courses of radiation protection for veterinarians conforming with German X-ray regulations are offered.

Main research activities

The research of the Institute includes themes from General Radiology and Medical Physics in Veterinary Medicine. There are three main activities:

Use and Optimisation of Imaging Methods in Veterinary Medicine

These research projects are often carried out in cooperation with the clinics (e.g. Small Animal Clinic; Clinic for Horses; Clinic for Pets, Reptiles, Pet and Feral Birds; Clinic for Small Ruminants, Clinic for Cattle).

They occur in the areas of imaging with ionising radiation (Digital Radiography, Computer Tomography (CT), Micro-CT), Magnetic Resonance Tomography (MRT), including functional MRT, and Infrared Tomography (IRT).

Use of the Finite Element Analysis (FEA) in Veterinary Medical Issues

In order to a better understanding of fundamental physical processes within living creatures, within the scope of interdisciplinary research projects mechanical, thermal and electrical processes in animals are simulated with the aid of FEA in computers. These research projects are often carried out in cooperation with other institutions (e.g. Institute of Anatomy, Clinic for Small Ruminants, Department for Fish Diseases and Fish Farming). They concern, above all, simulations of

- mechanical stress and deformations in the equine jaw during chewing,
- heat dispersion and distribution in equine teeth during dental treatment,
- animal welfare-friendly stunning and killing of fish (e.g. simulation of current density distribution in the brain during electrical stunning),
- animal welfare-friendly stunning and killing of piglets (e.g. simulation of current density distribution in the brain and heart when using electrical current).

Alongside a better understanding of physiological and pathological processes in animals the simulations also lead to a limitation in the variation of relevant parameters in animal experiments and thereby to a reduction in the number of animal experiments.
Research in the Areas of Radiation Protection and Dosimetry of Ionising Radiation
Through the increasing application of imaging methods with ionising radiation in veterinary medicine on the one hand, and the continuing tendency of a lowering of the dose limits for persons exposed to radiation at work on the other hand, the following questions arise in view of radiation protection and dosimetry of ionising radiation. Research projects are frequently carried out in cooperation with the clinics (e.g. Small Animal Clinic; Clinic for Horses; Clinic for Pets, Reptiles, Pet and Feral Birds). They occur above all in the areas
- Radiation exposure of personnel in radiology and those accompanying animals during radiological investigations and
- Optimisation of physical-technical parameters in the evaluation of dosimeters (e.g. thermoluminescent dosimeters).

The aims of this research are the evaluation and improvement of the radiation protection situation when using imaging methods (e.g. with X-rays).
3.11 Institute of the History of Veterinary Medicine and Domestic Animal

Location
The institute is located on the campus at Bischofsholer Damm (building 120). Associated with the institute is a "Museum for Veterinary History" (~ 6,000 objects, including a special military collection) as well as the "University Archives" (~ 650 shelf meters). For lectures, a historical auditorium from 1899 (126 places) and for seminars a room of the library (~ 5,000 volumes, 85 manuscripts) and a new seminar room (20 places each) are available.

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Teaching responsibilities
The first lectures on veterinary history were offered in Hannover 1881. Nowadays, the core curriculum has expanded and includes 1st a course on medical terminology, 2nd a lecture on veterinary history, and 3rd lectures in professional knowledge and the Human-Animal-Relationships. The multiple possibilities of the veterinary profession are shown in an interdisciplinary classroom. In addition, electives are offered, e. g. on the methods of veterinary medical historiography.

Consultations
The unit provides a significant number of services including the determination/documentation of historical objects/books and of estates, expert reports on historical instruments/documents and guided tours through the museum, important aspects of public relations.

Other information
The historic trias, mentioned above, the TiHo has a unique feature among all the veterinary universities in Europe. Since 1992 regular national and international meetings have been held to mediate new professional history and the promotion of young academics. The results are published in the form of conference reports. The head of the institute is also head of the section "History" of the German Veterinary Medical Society and board member of the World Association for the History of Veterinary Medicine.

Main research activities
Research is mainly fundamentally oriented, and the focus is on the history of the veterinary profession. Chronologically, the spectrum ranges from the first traditions in Ancient Mesopotamia to research projects on the role of veterinary medicine in National Socialism or in the GDR and more and more on current problems of the Human-Animal-Relationships.
3.12 Immunology Unit

Location
The Immunology Unit is currently located in building no. 122 on the "Bischofsholer Damm" campus. In addition, the Immunology Unit holds lab space in the recently established Research Center for Emerging Infections and Zoonoses (building no. 231 on the “Bünteweg” campus). The premises for regular teaching on the “Bischofsholer Damm” campus include a lecture theatre for 100 students, a library for 20 students, and a seminar room for 8 students. Special training is provided for small groups of maximal 12 students in our immunodiagnostic laboratory that handles about 1,500 samples per year submitted from clinics and practitioners all over Germany and Austria. The unit has a biochemical laboratory, a C3-laboratory; licensed to work with isotopes), a molecular biology laboratory, an ELISA laboratory, and a sterile tissue culture laboratory. By the middle of 2018, the Immunology Unit will move from the “Bischofsholer Damm” campus into newly refurbished labs in building no. 261 on the “Bünteweg” campus. The new location will include six state-of-the-art laboratories for molecular biology, biochemistry, and immunology studies as well as office space. The move will further strengthen joint research activities in the field of infection medicine and zoonosis research.

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Teaching responsibilities
The core curriculum including basic training in immunology is focused on the 3rd year of studies. We provide the curriculum in "General infectiology (Immunology)" and “Special infectiology (immunology)”. "Diagnostics of auto-aggressive immune diseases" is taught together with the Clinic for Pigs, Small Ruminants, and Forensic Medicine. Thus, the Immunology Unit contributes to hands-on training courses (“Infektionsdiagnostischer & Labordiagnostischer Kurs”) in which veterinary students are trained on practical aspects of immune-related diseases. Immunological aspects of selected topics or diseases are taught and discussed together with various clinics and institutes in interdisciplinary subjects as well as in elective courses, such as an infection immunology seminar.

Other information
A diagnostic service is offered that focuses on the analysis of samples related to allergic and autoimmune diseases of dogs and horses. Students learn from these cases, and the entire diagnostic service is integrated into training (e.g. case reports).

Main research activities
The main research interest of the Immunology Unit is innate immunity, particularly the role of cell subsets of the innate immune system in pathogen recognition and immune homeostasis. For instance, one main research focus is on the functions and the regulation of myeloid cells (monocytes, macrophages, neutrophils). This includes, in particular, innate receptors such as Toll-like receptors and C-type lectin receptors. The roles of innate cell subsets and receptors in immunity are investigated in murine models of infections and inflammation and also postpartal infectious diseases of cows (mastitis, metritis). Since targeting of innate immune receptors on antigen-presenting cells is a promising strategy to modulate immune responses, the Immunology Unit exploits such receptors for cell-specific antigen delivery to increase the efficacy of vaccines. In conclusion, the Immunology Unit combines mechanistic immunological studies (in transgenic cell culture and mouse models) with clinical veterinary immunology (mainly in cows).
3.13 Institute of Microbiology

Location
The Institute is located in Buildings 125 and 126 on the campus Bischofsholer Damm. Premises for teaching include one large laboratory allowing practical classes for up to 85 students, one lecture theatre for 90 students, one seminar room for 14 students and a library for 10 students. The diagnostic unit is open to individual undergraduates; it focuses on cultural processing of diagnostic samples and receives approximately 12,000 samples per year from within and outside the TiHo. Other rooms, including media preparation room and two research laboratories are open to individual undergraduates for practical periods of 3 to 12 weeks as well as to graduate students.

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Teaching responsibilities
The core curriculum: Microbiology, Infectious Diseases and Epidemic Diseases. The latter are taught together with the Institutes for Virology and Immunology. “Notifiable animal diseases” (comprising a part of the subject “State veterinary medicine”) is taught together with the Institutes for Virology and Epidemiology. Laboratory classes (4 hours/week in the winter term) have to be repeated three times due to the number of students.

Other information
Founding of a department (“Zentrum für Infektionsmedizin”) has improved communication benefiting the co-ordination of teaching, diagnostic work, and research.

Main research activities
Our research activities focus on bacterial pathogens relevant in veterinary medicine, including identification of virulence factors, elucidation of host-pathogen interactions, and their application for development of improved diagnostics and preventive measures, such as vaccines. Current projects are on Streptococcus suis, Mycoplasma spp., Mycobacterium avium subsp. Paratuberculosis and Brachyspira spp. funded by grants.
3.14 Institute of Parasitology

Location
The Institute of Parasitology is located in Building 217 on the new campus area Westfalenhof (Bünteweg 17). It consists of three storeys in that building and the adjacent animal house, where there are facilities for the housing of horses, cattle, pigs, sheep and goats, chicken, cats, dogs and mice/rats/gerbils. Premises for teaching include a post mortem room allowing clinical training and practical classes for 25 students and a library for 25 students as a seminar room. The diagnostic laboratory is open to individual undergraduates. It focuses on coproscopical examinations but also offers serological and PCR diagnostic including environmental samples (grass, water, soil, slurry, etc.) Other rooms including several research laboratories (S1, S2) are open to individual undergraduates for practical periods of up to three months and to graduate students.

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Teaching responsibilities
Parasitology is part of the curriculum in infectiology. The practical classes are repeated two times in order to provide favourable supervisor/student ratio in the course.

Main research activities
Molecular Helminthology, Parasitic zoonoses, Vector-borne diseases, Epidemiology and Control of Parasitic Diseases
3.15 Institute of Parasitology, Fish Disease Research Unit

Location
This institution is an independent working group, which is associated to the Institute of Parasitology. It is located at Bünteweg 17, Building 217 (2nd upper floor) and building 227

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Teaching responsibilities
Fish Medicine, Fish Diseases
This includes: Basic aspects of fish anatomy, fish physiology and histology; introduction into aquaculture systems; fish diseases and basic procedures for the diagnosis of diseases in fish and shrimps; procedures of virus diagnostic from fish samples.

Consultations
Diseases in farmed and ornamental fishes; clinical diagnosis of diseases, advisory service on aspects of fish keeping, on animal welfare in fish during farming, stunning and killing, and on treatments of fish diseases (incl. vaccination programmes); health assistance for large ornamental aquariums (e.g. Sea Life, Aqua Zoo Düsseldorf, Zoo Hamburg, Hanover, Bremerhaven); service for fish farms (carp, salmonids, pike perch, sturgeon, catfish), for ornamentals from whole sale trader and private aquariums and garden ponds as well as research institutes (zebrafish, *Nothobranchius* species, sea bream, turbot, sharks). Approx. 1000 consultation cases per annum

Other information
Diagnostic surveys on viruses pathogenic to carp and eel and on pathogens in mussel cultures. The consultations are used for training of students and of post graduates in order to achieve the degree of a fish health specialist (European College of Aquatic Animal Health, German degree of Fachtierärztin/Fachtierarzt für Fische). The consultations include clinical examinations and the evaluation of bacteriological, histological and virological examinations. In addition chemical water parameters are assessed for an advice on keeping conditions of fish.

Main research activities
Research activities concentrate on investigations into pathogen related diseases and into safeguarding of animal welfare in aquaculture. In particular the following topics are investigated:
- Innate immune responses of carp from different genetic lines in response to infections with various carp pathogenic viruses (cyprinid herpesvirus 3, spring viremia of carp virus, a novel paramyxovirus, carp edema virus) with a focus on the impact of type I interferon responses on the outcome of the infection
- Innate immune responses of cells and carp individuals to genetically engineered CyHV-3 virus variants as basis for the development of an efficient vaccine
- Identification of components from the mucosal barrier in carp and an assessment of their role for the protection of carp from pathogen infection
- Response of the microbial community in fish tanks and biofilters to water quality as possible reservoir for fish pathogenic bacteria
- Safeguarding animal welfare during stunning and killing of rainbow trout, carp and African catfish, modelling of electric currents during electric stunning of fish.
3.16 Institute of Pathology

Location
University of Veterinary Medicine, Foundation, Department of Pathology, Bünteweg 17, D-30559 Hannover, Germany

The Department of Pathology is located on the Bünteweg campus in Buildings 228-230 and excellently equipped.

Premises for teaching include one large lecture hall for 288 students, two rooms for group work for 98 and 32 students, respectively, and six rooms for practical work for 142, 36, 60, 20, 10 and 10 students, respectively. The diagnostic unit (necropsy area, 1,200 m²) is open to individual undergraduates; it focuses on necropsies (app. 1,500 p.a.) and evaluation of surgical biopsy samples (app. 9,000 p.a.) from within and outside the TiHo. Approximately 300 locker units allow hygienic storage of students’ clothes and personal belongings before they enter the necropsy area.

Other rooms: offices, diagnostic service room, student preparation and study room, research laboratories, storage rooms, secretariats, library, autoclave room, refrigerated rooms for storage of carcasses, diagnostic laboratories.

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Teaching responsibilities

The core curriculum in pathology contains lectures on general and systemic pathology, a seminar on general as well as on systemic pathology, courses in histopathology, necropsy and organ demonstrations. Electives (Wahlpflichtveranstaltungen) are offered on various subjects in systemic pathology that change annually, some electives with various clinics (clinicopathological correlation).

Consultations

Opening hours: Daily throughout the year 7:30 a.m. to 6:00 p.m.
Consulting hours: Daily from 2:30 p.m. to 4:30 p.m.
Delivery of carcasses: possible at any time of the day.

Main research activities

- Neuropathology, neuroimmunology and neuroimmunopathology: Canine distemper virus; Theliler virus encephalomyelitis, Rift-valley fever virus, Zika virus, spinal cord injury, epilepsy, storage diseases, cell transplantation, in vitro macroglia cell characterization, mechanisms of de- and remyelination,
- Oncology: oncolytic potential of canine distemper virus infection
- Diagnostic pathology: virus discovery and pathogenesis, congenital tremor of pigs, MERS-Coronavirus
- Immunopathology: studies on the immunopathogenesis of canine and feline inflammatory bowel disease; pathogenesis of *Mycoplasma bovis*-induced lung alterations in calves; keratin expression and pathogenesis of epidermal proliferative lesions in draft horses with chronic pastern dermatitis; pathology of junctional epidermolysis bullosa in sheep and pathogenesis of ruptur of the anterior cruciate ligament in dogs
3.17 Institute of Pharmacology, Toxicology, and Pharmacy

Location
The institute is located in building 218 on campus Bünteweg.

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Teaching responsibilities
The institute offers lectures in pharmacology and toxicology (3 hours per week in the winter and summer terms) and in drug law and galenics (2 hours/week in the winter term as lectures and 1 hour/week as a practical course). Additionally, the institute is involved in teaching interdisciplinary clinical and food hygiene courses and in various elective seminars, including a course in experimental pharmacology (2 hours/week in the summer term).

Other information
Involved in activities of:
- Virtual Center for Systems Neuroscience (CSN)
- Virtual Center for Replacement - Complementary Methods to Animal Testing
- Several interdisciplinary research collaborations (N-RENN, EPITARGET, DBU Project “Antibacterials in the Environment and Bacterial Resistance”).

Main research activities
Epilepsy research; dermatopharmacology, antibacterials and resistance
3.18 Institute of Physiology

Location
The Institute is located in Building 102 on the campus Bischofsholer Damm.

Premises for teaching: Lecture theatre for 270 students, seven rooms for practical courses or seminars (3 rooms for 24 students and 2 rooms for 12 students). There are two rooms for practical courses within the stable tract for each 12 students. There is a library for ten students.

Other rooms: Five research laboratories are open to individual undergraduates for practical periods of 3 to 12 weeks and for research projects; these facilities are also open to graduate students.

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Teaching responsibilities
Core curriculum in physiology including lectures (3 hours/week in the winter term, 4 hours/week in the summer term) and practical courses (3 hours/week per student winter and summer; three or four courses are run in parallel due to the large number of students); “Comprehensive Physiology I and II” (22 hours each in winter and summer term for 48/48 students); Case-oriented learning: Pathophysiology of gastrointestinal tract and liver (22 hours in winter and summer term for 8 students); contribution to interdisciplinary teaching units in the Clinic for Pigs and Small Ruminants, Clinic for Cattle and Clinic for Horses; “Physiological seminar” (1 hour/week for students and postgraduates in the winter term).

Main research activities
Gastrointestinal physiology and pathophysiology in rodents and farm animals: Epithelial mechanisms and regulation of nutrient and electrolyte transport systems;
Physiology and regulation of nutrient homeostasis in farm animals;
Metabolism and structure of microbial populations in rumen and colon;
Neurogastroenterology: study of the electrophysiological, neurochemical, pharmacological and functional properties of enteric neurons responsible for the sensory-motor control of the gastrointestinal functions.
3.19 Institute of Physiological Chemistry

Location
The Institute is located in Building 218 (3rd and 4th floor) on the campus Bündeweg 17 and is closely connected with its animal facility (Building 225). Premises for teaching include one large laboratory, shared with the Institute of Pharmacology allowing practical classes for up to 85 students, and a library for 20 students in the same building (Building 218). The diagnostic unit is open to individual undergraduates; it focuses on analysis of micro-nutrients and activities of intestinal disaccharidases. It receives approximately 500 blood, food and tissue samples per year from within and outside the TiHo. The general laboratories, including animal facilities and four research laboratories are open to individual undergraduates for practical training periods of 3 to 12 weeks as well as to graduate students. Furthermore, the Research Group Biochemistry of Infection of the institute is using labs in the new Research Center for Emerging Infections and Zoonoses (RIZ). These labs are also open to individual undergraduates for practical training periods of 3 to 12 weeks as well as to graduate students under supervision of the senior scientists.

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Teaching responsibilities
The core curriculum in Biochemistry for students in Veterinary Medicine is taught (3 hours/week in the winter and summer terms), laboratory classes (1 week – 5 full days – in the winter term) have to be repeated three times due to the number of students. Additionally, the Institute is involved in teaching Master students within its own programme “Animal Biology and Biomedical Sciences” and cooperate with Leibniz University Hannover and the Medical School Hannover in teaching and instructing Bachelor students in the Biology and Biochemistry programmes. Finally, the Institute is involved in several teaching activities with the three PhD programmes at the TiHo (HGN).  

Main research activities
Research at the Institute of Physiological Chemistry links the pathophysiology of several diseases of human and animals with the cell biology of membrane and protein transport. The research group “Biochemistry and pathobiochemistry of membrane and protein transport” focuses on the molecular mechanisms underlying membrane and protein trafficking in health and disease. The cellular and molecular biology of the gastrointestinal tract constitute a central research area, which deals on the elucidation of the molecular basis of intestinal malabsorption disorders in genetically-determined disaccharidases deficiencies, structure-function, biosynthesis and trafficking of intestinal brush border membrane glycoproteins as well as membrane alterations during chronic inflammatory bowel disease (colitis). The implication of the trafficking of mutants of lysosomal proteins in the pathogenesis of lysosomal storage diseases, such as Niemann-Pick Type C or Fabry disease is another major field of research.  

The research group “Infection Biochemistry” investigates new therapeutic options to support the innate immune system against infections. Despite the extensive use of antibiotics and vaccination programmes, infectious diseases continue to be a leading cause of morbidity and mortality worldwide. Especially, the emergence of multi-drug resistant bacteria generates increasing public health concern and economic loss. The goal of the research group Infection Biochemistry is to combine two of the most active areas of biomedical research to search for novel anti-bacterial strategies: the molecular and cellular basis of microbial pathogenesis, and the nature and manipulation of the host immune defence. The research focuses on the understanding of the cellular biochemical mechanisms e.g. cellular membrane composition and protein signalling events leading to host cell manipulation or host cell death during host-pathogen interactions.
3.20 Institute of Virology

Location
The Institute of Virology is located on the Bünteweg campus in the fifth and sixth floors of Building 217. In general the laboratories are equipped to meet the standards of biosafety level L2. With respect to German regulations concerning work with genetically modified organisms (GMO), some laboratories are equipped to meet biosafety level S1. A second facility, Building 224, houses the isolation station with of stables suitable for farm animals including storage room for feed, of laboratory space and of office space. The isolation station is operated under negative air pressure and meets the requirements for biosafety level L3. GMOs can be handled up to biosafety level S2. The Institute of virology is place of the EU- and OIE-Reference-Laboratory for classical swine fever. The Institute provides a diagnostic service for detection of various viral diseases of domestic and wildlife animals.

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Teaching responsibilities
The core curriculum in virology contains lectures in general and special virology. The general part, also including a practical course, is performed together with the Institutes for Microbiology and Immunology. Together with the Institute of Microbiology, the Institute of Virology is involved in teaching control measures against notifiable animal diseases. All lectures and courses are performed outside the Institute in central facilities since there is no lecture theatre in the virology facility. Furthermore, the Institute is involved in teaching interdisciplinar subjects with different clinics and the Department of Food Sciences and offers electives on various subjects – in part together with the Institute of Microbiology. The department (“Zentrum für Infektionsmedizin”) has improved communication benefiting the co-ordination of teaching, diagnostic work, and research.

Main research activities
- Pestiviruses (bovine viral diarrhea virus, classical swine fever virus and atypical pestiviruses)
- Biological significance and mechanism of genetic variability of RNA viruses
- Identification and characterization of new viruses from domestic and wild animals and investigation of their zoonotic potential
- Development of vaccines and diagnostic assays
- Characterization of cellular virus receptors
- Viral-bacterial co-infections
- Interaction of viruses with polaried epithelial cells
- Pathogenesis of virus infections in the respiratory tract
- Paramyxoviruses of bats
3.21 Institute of Terrestrial and Aquatic Wildlife Research

Location
The University of Veterinary Medicine Hanover, Foundation, (TiHo) has reorganized and expanded its wildlife research: TiHo Scientists at the special field station in Büsum, Schleswig-Holstein near the North Sea, are now working on marine mammals, including harbor seals, gray seals, harbor porpoises, dolphins and minke whales. Extensive research efforts target not only the North and Baltic Seas but also other European waters and Polar Regions. Domestic terrestrial wild animals, such as hoofed game, pheasants, black grouse, hares, wolves, wisents, lynx and wildcats, have been a focus of TiHo’s Hanover facilities for many years and are now joined by marine mammals. To merge these two research areas, the University of Veterinary Medicine Hanover, Foundation, established a new institute, named the Institute of Terrestrial and Aquatic Wildlife Research (ITAW).

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Teaching responsibilities
The Institute offers unique educational opportunities in the field of wildlife research for PhD programmes and doctoral, master and bachelor theses in the specialties of veterinary medicine, biology, landscape conservation and forestry. The Institute is integrated in the course curriculum of the University of Veterinary Medicine and, in addition, offers lectures and internships in wildlife biology to students matriculated in biology programmes.

Other information
It is the first facility in Germany accredited by the European College of Zoological Medicine to offer specialized education in wildlife population health. The research conducted at the ITAW serves for several national and international agreements and political decisions.

Main research activities
Within the discipline of wildlife biology, ITAW focuses on basic research, applied research and monitoring. Research is concentrated on diseases in wild animals and diseases transmittable between humans and animals, so-called zoonoses. Other areas of interest include habitat use, bioacoustics, wildlife behavior, nutrition and management, as well as the ecology of wild animals as it relates to issues of environmental protection and conservation. ITAW aims to elucidate the biology and ecology of wild animals and to investigate the influence of anthropogenic activities on wildlife.
3.22 Institute of Zoology

Location
The Institute is located in Building 218 (fifth and sixth floor) on the campus Bünteweg. Premises for teaching are one room allowing practical classes for up to 30 students and a library for 10 students and the Aula (Bischofsholer Damm) with 430 seats. The research laboratories (behavioural phenotyping, bioacoustics, cellular neurophysiology, cognitive phenotyping, conservation genetics, psychoacoustics) as well as the small mammal animal house provide the basis for research oriented teaching and the possibility to offer small research projects to undergraduate and graduate students.

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Teaching responsibilities
Obligatory for undergraduate students in Veterinary Medicine:
The practical coursework and connected basic lectures constitute the core curriculum in Zoology. Special Electives are offered for undergraduates in Veterinary Science and graduates in Veterinary Science.

Other information
The institute is responsible for teaching zoology to students in veterinary medicine (240 students, 1st year), and for teaching zoology to students in biology (150 Bachelor students, 2nd year), as well as for teaching behavioural and evolutionary biology, sensory biology, neurophysiology and primatology to students in biology.

Main research activities
The institute works in the research field of Zoology with special emphasis to Behavioral and Evolutionary Biology, Neurobiology and Sensory Biology with financial support of DAAD, DFG, EU/BMBF, VW, Small Rufford Fund and further private foundations. The institute is further involved in several national and international research networks in the field of Zoology.
3.23 Working Group of Cell Biology

Location
The Working group of cell biology is located in the Institute of Physiology, Bischofsholer Damm 15, Building 102. The lab space comprises a cell lab, microscopy facility and electrophysiology setups.

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Teaching responsibilities
Major teaching responsibilities for B.Sc. Biology in Cell- and Developmental Biology. For M.Sc. Animal Biology and Biomedical Sciences / Ph.D. Systems Neuroscience lab courses and lectures in cell biology of the brain and cellular signalling. For veterinary students participation in electives on canine neuroscience.

Other information
The group is member of the Center for Systems Neuroscience Hannover, the Virtual Center for Alternative Methods at the University of Veterinary Medicine Hannover, and the Consortium of Veterinary Neuroscience in Europe (CVNE).

Main research activities
Our group investigates the role of cellular signal molecules in brain development. To this end, we analyze simple nervous system of invertebrates and networks of human model neurons in culture. One focus is on signal transduction through the gaseous messenger nitric oxide (NO). We study the role of NO and also other neuroactive substances, e.g. biogenic amines, in regulation of cell migration, neurite outgrowth, microglial phagocytosis and other aspects of brain development and regeneration. An ongoing collaboration with the Laser Zentrum Hannover e.V. about biomedical technology resulted in the development of a novel 3D imaging technique, the scanning laser optical tomography (SLOT).
4 Field Station

4.1 Field Station for Epidemiology in Bakum

Location
The Field Station for Epidemiology of the TiHo is located in the village of Bakum (population of about 6,000), which is situated in the district of Vechta, with one of the highest densities of food animals (pigs, poultry) in Europe (> 2000 pigs per 100 acre). The primary task of the Field Station is teaching and research in preventive veterinary medicine (“taking the students to the farm”). The Field Station offers a broad spectrum of diagnostic services and co-operates closely with herd veterinarians and pork producers in the region. A “Laboratory Consortium” consisting of practising veterinarians that co-operate very closely with the Field Station has been founded some years ago. Premises for teaching include one seminar room (10 to 15 people), one library, four spacious laboratories and a very spacious necropsy hall.

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Teaching responsibilities
Groups of three or four students (4th year) stays for two weeks at the Field Station (there is a rented house near the Field Station to host the students during their stay in Bakum). These groups are instructed in preventive veterinary medicine, pre-harvest food safety and herd health management during the week, with the focus on farm visits and on the diagnostics for those farms that are visited.

Other Information
Despite the physical distance of Bakum to Hannover (185 km west), there is continuous communication between the TiHo’s administration and faculty on the one hand and the Field Station on the other by using modern communication tools, e-learning and conference calls. The location facilitates close cooperation with farms and veterinary practitioners in the intensive farming area.