



## Established and novel approaches for teaching and learning of veterinary parasitology in Berlin



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### ABSTRACT

The teaching of veterinary parasitology to the large number of students at the Freie Universität Berlin is mainly limited to conventional face-to-face lectures, supplemented by practical classes. Extensive parasite descriptions and diagnostic techniques are at the core of the practical classes, which are also intended to emphasise key biological and veterinary aspects covered in lectures. Further in-depth and specific learning is achieved within a detailed framework of elective courses, with defined learning outcomes for small groups of students, focusing on themes such as 'diagnosis and treatment of ectoparasites in companion animals' or 'zoonotic parasites'. Additionally, structured excursions are designed to offer experience through collaborative international investigations. Organ-based approaches are also an integral part of our veterinary parasitology teaching, done in collaboration with the clinical and para-clinical departments, either via face-to-face interactions or online. Wide-ranging themes, such as 'causes of colic in horses' or 'atopic dermatitis in dogs' are covered. Recently, diverse blended learning elements were introduced into the curriculum (e.g., QuerVet), which makes teaching and learning more flexible, in terms of time and space, and fosters self-directed learning and participation among the students. A new platform to provide online lectures for students, termed VET Talks, was launched in 2015 by the International Veterinary Student's Association (IVSA), and is as a publicly available educational support system for students. Provided free to veterinary students throughout the world, this platform offers students the opportunity to access lectures on interesting topics by outstanding speakers who are nominated by their students. Finally, continuing education (CE) opportunities are provided through specific Masters courses (Master of Equine Medicine, Master of Small Animal Sciences), classical seminars and recent webinars.

### 1. Freie Universität Berlin

The Freie Universität Berlin (<http://www.fu-berlin.de/en/>) was founded by students on December 4, 1948, with support of the American Allies and local politicians, in response to the persecution of students critical of the system at the former 'Universität Unter den Linden' in the Soviet sector of the divided city of Berlin. Nearly seventy years later, the University now has 11 Departments, including the Department of Veterinary Medicine, and enrolls ~28,750 students in 171 subject areas. Of the students enrolled in MSc programs, ~18% come from abroad, as do 25% of its doctoral students (Freie Universität Berlin, 2013) (Box 1).

After the fall of the Berlin Wall in 1989, the two veterinary schools of the 'Universität Unter den Linden' (Humboldt-Universität zu Berlin) and the Freie Universität Berlin were merged in 1992, resulting in the current Department of Veterinary Medicine under the management of

the Freie Universität Berlin. Approximately 170 students are admitted to the veterinary programme each year. In the summer semester of 2017, a total of 903 students were enrolled, 86% of which were female. Today, the Department of Veterinary Medicine (<http://www.vetmed.fu-berlin.de/en/index.html>) has 14 institutes and 5 clinical centres.

### 2. The Institute for Parasitology and Tropical Veterinary Medicine

The Institute for Parasitology and Tropical Veterinary Medicine at the Department of Veterinary Medicine of the Freie Universität Berlin focuses on the field of Parasitology in veterinary education and research. The institute also teaches and conducts research on tropical veterinary medicine and offers a broad range of classical as well as advanced molecular diagnostics assays to the veterinary sector. The laboratories are fully equipped to perform numerous classic-parasitological, molecular, serological and cell-biological methods.

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**Box 1**

## Facts and figures - Freie Universität Berlin

Students: ~28,750; Professors: 336; Departments and Central Institutes: 11 Academic Departments, 1 joint Medical School with Humboldt-Universität, 3 Central Institutes; Degree Programs: 171; Doctoral programs: 21; Government Subsidies: 302 million euros per annum; Expended External Funds: 112 million euros per annum (Freie Universität Berlin, 2013).

**2.1. Teaching profile**

The basics of veterinary parasitology are presented to veterinary students during their fifth semester through a lecture series of 2 h per week per semester. During these lectures, the most important representatives from the major branches of Parasitology (helminths, arthropods and protozoa) are introduced, which includes descriptions of their morphology, biology, epidemiology, pathogenesis and clinical presentations. The principles of diagnostic methods and the fundamental principles of therapeutics and control are also discussed. The material presented in the lectures is further reinforced during obligatory practical classes, which take place in the sixth semester (4.5 h per week over 7 weeks). Additional elective courses for smaller groups of students ( $n = 10$  to 30) are given to provide them with in-depth exposure to particular parasitological subjects, such as parasites of exotic animals, as well as global issues including tropical veterinary medicine, the potential impact of globalisation and climate change on parasites and the One Health concept.

**2.2. Approaches in veterinary parasitology education****2.2.1. Face-to-face lecture series supplemented by practical classes**

The teaching of veterinary parasitology to students is limited mainly to conventional face-to-face lectures complemented by practical classes. Core aspects of the practical course are the hands-on practice with classical parasitological techniques, such as coprological and haematological examinations and parasite identification. For the latter purpose, each student receives a box containing 78 microscope slides for examination using a microscope during class, while the lecturer provides background information. Additional fresh protozoal and helminth specimens, as well as mounted arthropods and helminths preserved in ethanol are also available for the students to explore. This is further

assisted by monitors displaying real-time images from a digital microscope to emphasise and discuss specific morphological characteristics (Fig. 1).

Following the lecture series and practical courses, the students should know the principles of the identification, treatment and control of common parasitic infections and diseases of farm and companion animals.

**2.2.2. Elective courses**

In-depth and more specific learning is achieved through elective courses with defined learning outcomes. During the elective courses, which usually represent a total of 9–16 hours of teaching per course, active participation by students is stimulated through practical assignments and student presentations. A selection of elective courses is presented in Box 2.

**2.2.3. Structured excursions**

Exchange visits are organised, allowing interested students to obtain experience in international collaborative research. This can be exemplified by the six-week visits of 10–12 veterinary students from Berlin to Mongolia to perform parasitological field studies, organised for the third time in 2015. The visit and field work are preceded by an extensive preparation period, in which the students may, for instance, participate in a Mongolian language course, undertake elective courses in animal health and livestock production in Mongolia, and participate in tailored practical parasitology courses. During the field study in 2015, small groups of 3–4 students examined faecal samples from local Mongolian sheep from different herds using the McMaster technique (Coles et al. 1992) (Fig. 2).

Sheep were also examined for the presence of ectoparasites, and farmers were interviewed using questionnaires. Sheep with a gastrointestinal nematode egg count of > 150 eggs per gram (EPG) faeces



Fig. 1. Example of a practical parasitology class. Students examining mosquito specimens by microscopy, while the lecturer provides background information. Several monitors display the real-time images from a digital microscope to highlight different morphological characteristics, allowing for a dynamic interaction between the students and lecturer (Photo kindly provided by Michael Fahrng).

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