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Balancing knowledge and basic principles in veterinary parasitology: Competencies for future Danish veterinary graduates

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ABSTRACT

Veterinary parasitology has always been considered to be relevant and interesting by the Danish veterinary students. Students have to acquaint themselves with many new, small creatures with complicated and varied life cycles and with intricate Latin names that are difficult to pronounce, as only a few parasites have Danish names. In our veterinary curriculum, zoology has disappeared as a discipline, and parasitology has gradually moved from the third year to the beginning of the second year, which implies that, for example, pathology and pharmacology are "unknown fields". The number of contact hours in veterinary parasitology has been gradually cut to 24 lectures (35 min each) and practical exercises (24 h), including 9 h on coprology. The course is taught and examined jointly with bacteriology and virology in a 8-week course. As a comprehensive course, it has become increasingly difficult to get students to acquire enough active knowledge of the most common parasites and an understanding of the basic principles in relation to, for example, transmission and control. Even though information is readily accessible through books and on-line resources, we still believe that a competent clinician should know a range of parasites by heart as an active resource for their work. The dilemma has been tackled (partly) by introducing a veterinary paraclinical refresher course of 18 h (half practicals and half lectures) in the fourth study year. The focus here is on host(herd)-oriented clinical and diagnostic parasitology. The students can also now select a One Health track for six months in which zoonotic parasites are obviously a relevant topic.

1. Introduction

Veterinary parasitology has always been considered to be relevant and interesting but apparently challenging for Danish veterinary students to learn. By learning about parasites, as well as bacteria and viruses, curious students learn, for the first time, about animal diseases (etiology, transmission, pathogenesis and basic clinical manifestation), and most students are excited about acquiring this new knowledge. If they are later able to mobilize this knowledge in a relevant context, they are well placed in the clinics. On the flipside, students have to acquaint themselves with a lot of new, small creatures with complicated and varied life cycles and with intricate Latin names that are difficult to pronounce, only a few of which have Danish names. At the same time, numerous other pathogens are also introduced – all related to diseases that are covered for the first time. The systematic parasitology – getting to know a vast range of genera and species – leaves little space in a busy curriculum for themes that span across subjects/disciplines. Gaining a more fundamental understanding is challenging, and students easily get confused and find it difficult to get an overview. This paper discusses ways of balancing active knowledge (or learning by rote) and basic principles in veterinary parasitology, in order to increase the competencies of future Danish veterinary graduates. We have no final answers, but are constantly trying to get the right balance in our curriculum.

2. Veterinary parasitology at bachelor level: focus on systematics and basic diagnostics

Our faculty implemented the Bologna concepts in 2005 and "streamlined" the veterinary curriculum into a 3-year Bachelor and 2.5-year Master degree (Jensen, 2006). At the same time, the annual intake of new students was increased from 140 to 180, and all teaching in an academic year (equivalent to 60 European Credit Transfer and Accumulation System [ECTS] points) was allotted to four 8-week periods

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(terms) (15 ECTS points each), separated by 2-week periods of examinations and a break. Also a final year assignment (worth 30 ECTS points) was introduced. The students are also required to select one of six possible topics for six months, but all graduates are still able, and in legal terms eligible, to work in any area of veterinary medicine.

In our veterinary curriculum, zoology has disappeared as a distinct discipline, and parasitology has been moved from the third year to the beginning of the second year, which implies that, for example, special pathology and pharmacology are "unknown disciplines" when the students embark on learning about parasitology. Consequently, the students lack some essential knowledge and skills that would help them understand critical aspects of parasitology. In 2010, parasitology was merged with bacteriology and virology to form Infection Microbiology, covering two half terms (15 ECTS credits; i.e. 5 for parasitology). Direct student contact time has gradually been reduced to 24 lectures (35 min each) and practical sessions (8 × 3 h), making it challenging to cover all of the important topics. The parasitology examination used to be oral (2010–2016) but this was abandoned due to the costs of engaging external examiners. Following all practical sessions, assessment is now by a written-practical test (36 min) on microscopic and macroscopic specimens and parasitological methods. This assessment is followed by a written questions-and-answers test (on-line), jointly with bacteriology and virology following the whole course. In an attempt to better integrate the three disciplines (parasitology, virology and bacteriology), we have introduced case studies (3 h) on e.g., respiratory disease in pigs, diarrhoea in kittens, and cattle abortion. All teaching is optional for students to attend.

Our approach in lectures is traditional and systematic – protozoa, helminths and arthropods with teachers mainly representing their own field of research. We think that this approach ensures that teaching is infused with research as a core feature of our university. All lecturers contribute to our compendia in the mentioned three disciplines. The compendia, which are written in Danish and adapted to the local context, are updated regularly with new local (or basic) information targeting the main Danish parasite problems. The compendia are well received by the students, but we are aware their quality needs to be enhanced (in terms of layout, illustrations and photos). The 8 practical sessions include demonstrations of relevant specimens representing endoparasites of ruminants and monogastrics, ectoparasites, systematic entomology, zoonotic parasites and three days of standard coprology on helminths and selected protozoa. The practical sessions are supported by a set of printed notes, updated every year, and an older on-line Parasitology Photo Atlas that we plan to update with new material (http://atlas.sund.ku.dk/parasiteatlas/).

At a defined skills level, the students should be able (i) to independently perform basic diagnostic procedures on samples (including morphological examination of invertebrates) from animals to identify possible parasitic causes of diseases, and (ii) to identify, seek relevant information and communicate about parasitic problems using appropriate scientific terms. Competencies within Infection Microbiology include a general understanding of the control of infectious diseases and how these infections/diseases relate to animal husbandry and production facilities. The clinical aspects of parasitic diseases, treatments, and drug-based prevention are key parts of the clinical teaching in the university veterinary hospitals, and we, as parasitologists, are usually not actively engaged in the clinic. Similarly, aspects of biosecurity and food safety are covered elsewhere.

3. Introduction of veterinary paraclinics at the Master's level

With the comprehensive course in Infection Microbiology, it has become increasingly difficult for students to have enough time to acquire knowledge of the most common parasites of livestock and companion animals and an understanding of the basic principles of, for example, the transmission and ecology of free-living stages of parasites, immunity and parasite control based on epidemiology. Furthermore, there is insufficient time to cover deeper aspects of diagnostic tests and the interpretation of test results and of anti-parasitic drugs in the second year due to time constraints and students' knowledge gaps. These dilemmas were tackled (partly) in 2013 by introducing a clinical parasitology course of 18 h (half practicals and lectures/colloquia) in the fourth study year (3 ECTS credits). The course is called Veterinary Paraclinics and is combined with clinical pathology (40 h) and clinical bacteriology (24 h). It runs each term (i.e. four times a year with 45 students).

The overall purpose is for students to acquire the knowledge, skills and competences required to study a case, and to collect, appraise and interpret laboratory findings generated within the university context as well as those produced by other laboratories. The aim is to use this information as a basis for a diagnostic and therapeutic plan for the case - the Day 1 practice-based veterinary competencies (European Association of Establishments for Veterinary Education, EAEVE). The course includes a very brief clinically-oriented update, based on host species (dogs, cats, pigs, horses, cattle and sheep), herd-oriented diagnostics, zoonotic parasites in clinical practice, exotic infections of companion animals, prudent use of drugs, and principles and diagnosis of drug resistance. In an afternoon, the students perform a parasitological examination of internal organs of sheep (or pigs); in two afternoons, they examine and discuss referred clinical cases or test results.

The learning outcomes include how to: (i) behave in a proper and safe way in a laboratory; (ii) present clear case reports, (iii) choose the correct samples and methods for laboratory analysis of the case. The student has to attend > 80% of the time to pass. Unfortunately, due to the large number of students (= 45) we have not been able to align the final examination with the teaching, and the examination includes only four multiple choice questions (MCQ). This situation has been reflected in the evaluations by students, whereas they are content with the actual teaching. An oral, a practical or a longer case-oriented essay-type examination would be far more appropriate to achieve the teaching and learning outcomes required (Biggs and Tang, 2011).

4. One health initiatives related to zoonotic parasites and other parasitology courses

Summer schools have become an alternative way to obtain extra curricula knowledge and ECTS credits. At the University of Copenhagen, in the past four years, we have offered a One Health International Summer Course, aiming to provide knowledge, skills and competencies to achieve solutions to global challenges to human, animal and environmental health through cross-disciplinary research, education and collaborations between relevant institutions and stakeholders. The course primarily focuses on zoonoses (in particular parasitic zoonoses), emerging diseases and emerging health-related problems. The course is taught as a five-week on-line plus a one-week on-campus course and attracts students from around the world. Veterinary students can also now select a One Health track for half a year in which parasitic zoonoses are included; after completion of this course, the veterinary students continue to undertake their Master projects (30 ECTS credits), and many choose to continue studying parasites.

Our Parasitology group is also involved in 4 MSc level courses: Basic Parasitology (7.5 ECTS credits), Parasitic Zoonoses and One Health control (7.5 ECTS credits), Human Parasitology (7.5 ECTS credits) and Animal Parasitology (7.5 or 15 ECTS credits). The courses used to constitute our MSc in Parasitology (terminated in 2016) but are now implemented in the Animal Science or Biology educational programs. They are available to veterinary students as optional courses, but are very difficult to fit into their curriculum. Each course runs for a term, i.e. 8 weeks, and involves a variable number of lectures and colloquia, while Animal Parasitology also includes substantial laboratory work and an experimental assignment. Because these courses are more specialized and students are highly motivated and focused on parasitology,