

Annex I: three year programme of ECVPH Residency			
	Year 1: 2016	Year 2: 2017	Year 3: 2018
<b>Core (Compulsory) 25% time</b>			
<b>CLUSTER A Systems, products, hazards and controls</b>			
<p><b>A1 Food borne and non-food borne zoonoses</b></p> <p>Introductory aetiology, infectious and non-infectious zoonotic diseases of animals, occurrence and transmission, diagnostics and control, prevention, basics of biosecurity in primary production, inter-relation of pathogens, hosts and environment (including climate), endemic and epidemic infections with zoonotic potential role of animals (pets, wildlife and food animals) in the transmission and epidemiological aspects of zoonotic pathogens (local/systemic, acute/ chronic, apparent/ Inapparent, shedding/ non-shedding, vertical/ horizontal transmission, trans-mission routes: airborne, direct, food, water, environment, arthropod vectors)</p>	<p><b>Block seminar Zoonoses 1</b> Seminar (3003), HGNI<sup>1</sup>; 24 hours Language: English; <u>Aim and Content:</u> The aim is to introduce students to major topics in the field of Animal and Zoonotic Infections.</p> <p><b>Microscopic Slide Seminar, AFIP (winter term)</b> Seminar (3104), HGNI; 14 hours Language: English; <u>Aim and Content:</u> The seminar aims to extend the knowledge of the participants in regard to foreign animal diseases, rare and unusual animal diseases, or emerging animal diseases. The slides provided by AFIP will be presented by participants and subsequently discussed.</p>	<p><b>Block seminar Zoonoses 2</b> Seminar (3003), HGNI; 24 hours Language: English; <u>Aim and Content:</u> The aim is to introduce students to major topics in the field of Animal and Zoonotic Infections.</p> <p><b>Microscopic Slide Seminar, AFIP (winter term)</b> Seminar (3104), HGNI; 14 hours Language: English; <u>Aim and Content:</u> The seminar aims to extend the knowledge of the participants in regard to foreign animal diseases, rare and unusual animal diseases, or emerging animal diseases. The slides provided by AFIP will be presented by participants and subsequently discussed.</p>	<p><b>Microscopic Slide Seminar, AFIP (winter term)</b> Seminar (3104), HGNI; 14 hours Language: English; <u>Aim and Content:</u> The seminar aims to extend the knowledge of the participants in regard to foreign animal diseases, rare and unusual animal diseases, or emerging animal diseases. The slides provided by AFIP will be presented by participants and subsequently discussed.</p>

<sup>1</sup> HGNI - Hannover Graduate School for Veterinary Pathobiology, Neuroinfectiology, and Translational Medicine  
(<http://www.tiho-hannover.de/studium-lehre/graduate-school-hgni/>)

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	<p><b>Seminar on Infection Biology IBS</b> Seminar (3653), HGNI; 14 hours Language: English; <u>Aim and Content:</u> Invited speakers present results of their current research on infectious agents</p>	<p><b>Seminar on Infection Biology IBS</b> Seminar (3653), HGNI; 14 hours Language: English; <u>Aim and Content:</u> Invited speakers present results of their current research on infectious agents</p>	<p><b>Seminar on Infection Biology IBS</b> Seminar (3653), HGNI; 14 hours Language: English; <u>Aim and Content:</u> Invited speakers present results of their current research on infectious agents</p>
<p><b>A2 Animal welfare</b> Aspects of animal production systems related to VPH, optimisation of animal welfare during production, transport and slaughter, welfare assessment of herds, welfare aspects in relation to production systems, welfare of companion animals, welfare aspects in animal breeding</p>	<p><b>Basics in laboratory animal science</b> Workshop, HGNI; 25 hours Language: English; <u>Aim and Content:</u> The course includes two days of theoretical lectures and one practical „hands on“ part. According to requirements of our authority (LAVES) a certification must only be handed out after attending all lessons, the practical training and after passing the written exam with success. <u>Evaluation of Achievement:</u> written examination</p>	<p><b>Benchmarking of herd health and animal welfare at slaughterhouse level for increasing health level in herds</b> Workshop (1309), TiHo<sup>2</sup>; 11 hours. Language: German; <u>Aim and Content:</u> Presentation of Scoring systems and visit of an abattoir demonstrating benchmarking of animal welfare. How can you measure Animal health and welfare based on parameters taken on slaughterhouse level? How positive scoring results can have an impact on herd level. Visit of a pig abattoir participating in the benchmarking system.</p>	<p><b>Reduction of stress by handling herds</b> Workshop (1557), TiHo; 8 hours Language: German; <u>Aim and Content:</u> - Theoretical information about methods of handling with less stress during handling for herds - Training of the theoretical knowledge – practicing with a sheep herd and the individual animal</p> <p><b>Reduction of stress by handling herds 2</b> Workshop (1561), TiHo; 8 hours Language: German; <u>Aim and Content:</u> - advanced training course to course 1 - practicing the knowledge of course 1 in small groups</p>

<sup>2</sup> TiHo – University of Veterinary Medicine Hannover, Foundation (<http://www.tiho-hannover.de/>)

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<p><b>A3 Population medicine</b></p> <p>Concept of population, principles of sampling, causation vs. association, measures of disease frequency such as prevalence and incidence, risk factors and confounding factors, statistical significance versus biological significance, measures of association, 2x2 table analysis, transmission models such as SIR, diagnostic validation, observational study design</p>	<p><b>Veterinary Epidemiology</b> Lecture, HGNI; 16 hours Language: English <u>Aim and Content:</u> Introduction to epidemiological methods for veterinarians. Types of epidemiological studies (cohort-, case- control, cross sectional studies), measures of frequency (prevalence, incidence), measures of association between diseases and risk factors (relative risk, Odds Ratio) Basic statistics (confident intervals, statistic tests) Impact and correction of classification of mistakes Distortion of not representative choice of study population and Confounding</p> <p><b>Journal Club</b> consecutive Group Session (3060), 13 hours, Language: German <u>Aim and Content:</u> The aim of the Journal Club is to support the development of the participants' skills in reading and understanding current publications in the field of veterinary epidemiology and porcine health, aiming at improving writing skills for their own publications simultaneously. The articles will be chosen in consideration of the training within the European College of Veterinary Public Health (ECVPH) and the European College for Porcine Health (ECVPH). Each attendant will present a paper on a rotation basis, followed by a short discussion.</p>	<p><b>Computer-aided Veterinary Biometry and Epidemiology</b> Lecture (3053), HGNI; 20 hours Language: German <u>Aim and Content:</u> - basic methods of computer assisted analysis with SAS</p> <p><b>Validation of diagnostic tests - standardised methods and approach by missing gold standard</b> Workshop (2321), TiHo; 6 hours Language: German <u>Aim and Content:</u> How to continue – when there is no method to measure it. Discussion and a hand on part will give a first idea.</p> <p><b>Journal Club</b> consecutive Group Session (3060), 13 hours, Language: German <u>Aim and Content:</u> The aim of the Journal Club is to support the development of the participants' skills in reading and understanding current publications in the field of veterinary epidemiology and porcine health, aiming at improving writing skills for their own publications simultaneously. The articles will be chosen in consideration of the training within the European College of Veterinary Public Health (ECVPH) and the European College for Porcine Health (ECVPH). Each attendant will present a paper on a rotation basis, followed by a short discussion.</p>	<p><b>Private study</b> <b>Internship at the BfR</b></p> <p><b>Journal Club</b> consecutive Group Session (3060), 13 hours, Language: German <u>Aim and Content:</u> The aim of the Journal Club is to support the development of the participants' skills in reading and understanding current publications in the field of veterinary epidemiology and porcine health, aiming at improving writing skills for their own publications simultaneously. The articles will be chosen in consideration of the training within the European College of Veterinary Public Health (ECVPH) and the European College for Porcine Health (ECVPH). Each attendant will present a paper on a rotation basis, followed by a short discussion.</p>

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<p><b>A 4 Food science</b></p> <p>Food chain (from animal production to the final product on the shelf), food safety aspects of animal feeding, food production systems, food technology in relation to PH, food microbiology, food preservation, food matrix, biological and chemical hazards, carry-over</p>	<p><b>EFFORT<sup>3</sup> project</b> Field work, TiHo; 25 days <u>Aim and Content:</u> Evaluation of each 20 German pig, broiler, turkey and veal calves farms, including biosecurity, animal health and welfare (including the report for the farmer), as well as the slaughter check data in case of broiler and pigs.</p> <p><b>Case based risk assessment of substances in food and feed</b> Workshop (2342), TiHo; 3 hours <u>Aim and content:</u> See title</p>	<p><b>Colloquium of animal health and food quality</b> Workshop, TiHo; 6 hours Language: German <u>Aim and Content:</u> Introduction of new research results Institut für Lebensmittelqualität und -sicherheit</p> <p><b>Producing and Testing of Cheese</b> TiHo (1313), 12 hours <u>Aim and Content:</u> microbiological and production-related criteria for cheese production as well as practical demonstration of cheese production and different milk products including sensoric testing</p>	<p><b>Private study</b> – studying “Case studies in food microbiology for food safety and quality” (Pawsey, 2002) and other relevant articles/books on food science</p>
<p><b>A5 food safety and control</b></p> <p>Principles of food safety legislation on international and EU level, responsibility of food business and competent authorities, self control and Food Safety Management Systems (FSMS), food inspection, alternative approaches (equivalence), hurdle systems</p>	<p><b>Annual Working group symposium on food hygiene 2015</b> Conference, DVG<sup>4</sup>; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p>	<p><b>Annual Working group symposium on food hygiene 2016</b> Conference, DVG; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p>	<p><b>Annual Working group symposium on food hygiene 2017</b> Conference, DVG; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p>

<sup>3</sup> EFFORT - against antimicrobial resistance (<http://www.effort-against-amr.eu/>)

<sup>4</sup> Deutsche Veterinärmedizinische Gesellschaft ([http://www.uni-giessen.de/cms/fbz/fb10/institute\\_klinikum/institute/nahrungsmittelkunde/institut/dvg](http://www.uni-giessen.de/cms/fbz/fb10/institute_klinikum/institute/nahrungsmittelkunde/institut/dvg))

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<p><b>A6 Non-infectious hazards in food</b></p> <p>Chemical residuals and contaminants in the environment- feed-food chain, biotoxins</p>	<p><b>Toxicological Pathology Training Program</b> Lecture, HGNI; 66 hours Language: English <u>Aim and Content:</u> a general overview on the morphology of organ systems, and examples of pharmacology-based changes examples of toxicity, clinical pathology parameters, biomarkers, carcinogenesis models and induced tumours are presented.. general subjects such as introduction to regulatory toxicology, drug metabolism and pharmacokinetics, new technologies (-omics) and classical examples of toxicologic pathology</p> <p><u>Module 18:</u> "Endocrine organs, mammary gland" <u>Module 14:</u> "Skin, special senses (eye, ear)" Bach, Junker-Walker, Mecklenburg, <u>Module 19:</u> Classic Examples in Toxicologic Pathology</p>	<p><b>Control and Assessment of water in watering places of herds</b> Workshop (2533), TiHo; 2 hours Language: German <u>Aim and Content:</u> VO (EG)Nr. 178/2002 water as feed Considering animal health and welfare How to control drinking water quality Introduction to methods and interpretation of results</p> <p><b>Training course on Controls on contaminants in feed and food</b> Workshop, BTSF – Better Training for safer food<sup>5</sup>; 4 days Language: English Risk assessment Official controls &amp; RASFF Contaminants in Feed Environmental and Industrial contaminants Agriculture contaminants Sampling and analysis, including FVO audits</p>	<p><b>BfR - Summer School on Risk Assessment and Risk Communication in Food Safety</b> Workshop, BfR, 2 weeks <u>Aim and content:</u> Two weeks to focus on food safety and appropriate risk assessment from experts Curriculum: Introduction to risk assessment and risk communication Exposure assessment, data quality and statistics hazard assessment and characterisation workshop risk assessment exercise "contaminants" including risk communication exercise of results analytical challenges and uncertainty/ sensitivity analysis data generation (e.g. genotoxicity studies, reproductive toxicity studies, food consumption studies) and data requirements endocrine disruptors and other and other special aspects Workshop risk assessment exercise "microbial risk" or chemical risk" (choosing options) including risk communication exercise of results</p>

<sup>5</sup> [http://btsf.euroconsultants.be/index.php?option=com\\_content&view=article&id=63&Itemid=88](http://btsf.euroconsultants.be/index.php?option=com_content&view=article&id=63&Itemid=88)

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<b>CLUSTER B Information and data Management</b>			
<p><b>B1 Biostatistics</b></p> <p>Experimental study design, sampling, types of data (discrete, ordinal, continuous) and choice of appropriate statistical tests, estimation of population parameters, confidence intervals, principles of regression analysis</p>	<p><b>Repetition Biometry 1;</b> Lecture (3004), HGNI; 12 hours Language: English <u>Aim and Content:</u> See title</p> <p><b>Data Analysis and Statistical Inference</b> Online Lecture<sup>7</sup>; Duke University; 80 hours/10 weeks Language: English <u>Aim and Content:</u> This course introduces you to the discipline of statistics as a science of understanding and analyzing data. You will learn how to effectively make use of data in the face of uncertainty: how to collect data, how to analyze data, and how to use data to make inferences and conclusions about real world phenomena.</p>	<p><b>Repetition Biometry 2;</b> Lecture (3004), HGNI; 12 hours Language: English <u>Aim and Content:</u> See title</p> <p><b>Bioinformatic Methods I</b> Online lecture<sup>5</sup>; University of Toronto 12 hours <u>Aim and Content:</u> Use of available (mainly web-based) programs for analyzing biological data. This is an introductory course with a strong emphasis on hands-on methods. Some theory is introduced, but the main focus is on using extant bioinformatics tools to analyze data and generate biological hypotheses.</p>	<p><b>Repetition Biometry 3;</b> Lecture (3004), HGNI; 12 hours Language: English <u>Aim and Content:</u> See title</p> <p><b>Bioinformatic Methods II</b> Online lecture<sup>8</sup>; University of Toronto 12 hours <u>Aim and Content:</u> Large-scale biology projects such as the sequencing of the human genome and gene expression surveys using RNA-seq, microarrays and other technologies have created a wealth of data for biologists. However, the challenge facing scientists is analyzing and even accessing these data to extract useful information pertaining to the system being studied. This course focuses on employing existing bioinformatic resources – mainly web-based programs and databases – to access the wealth of data to answer questions relevant to the average biologist, and is highly hands-on. Topics covered include multiple sequence alignments, phylogenetics, gene expression data analysis, and protein interaction networks, in two separate parts.</p>

<sup>6</sup> <https://www.coursera.org/learn/bioinformatics-methods-1>

<sup>7</sup> <https://www.coursera.org/course/statistics>

<sup>8</sup> <https://www.coursera.org/learn/bioinfomethods2>

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<p><b>B2 Information systems</b></p> <p>Database development and management, scientific literature data bases, early warning systems (e.g. Promed, RASFF), information management</p>	<p><b>The use of EndNote in bibliographic database management;</b> Workshop (3005), HGNI; 2 hours; Language: English <u>Aim and Content:</u> EndNote enables its users to manage bibliographic data effectively. This includes retrieval and display. It allows reversible changes in format to suit the requirements of journals publishers when submitting a paper. The features of EndNote will be explored by means of various examples.</p> <p><b>Basics Datamenagement</b> Workshop, TiHo ; 7 hours <u>Aim and Content:</u> See title</p>	<p><b>Data Management Planning (DMP)</b> Workshop, WIAS; 6 hours Language: English <u>Aim and Content:</u> Be aware of the importance of good practice in managing research data in general and be able to it within your work context, Be able to organise and document data and its versions efficiently during the course of a project. Be aware of methods to check and assure data quality and consistency Be aware of procedures for short term storage and backup, and for long term archiving and preservation Be aware of privacy and intellectual property rights issues regarding data</p>	<p><b>Sequence analysis and sequence submission to a database</b> Workshop (3586), HGNI; 14 hours Language: English <u>Aim and Content:</u> Learn (I) how to analyse sequence data and to recognize the most common sequence features and (II) how to prepare and submit a DNA sequence to a database and submit a sequence.</p>
<p><b>B3 Systematic review</b></p> <p>Systematic review methodology, question framing, search frame, inclusion and exclusion criteria, publication bias, quality assessment, data collection, evidence synthesis, quantitative summaries (including basic principles of metaanalysis), EFSA guidance document on systematic review</p>	<p><b>How to write and publish a scientific paper;</b> Workshop (3006), HGNI 3 hours Language: English <u>Aim and Content:</u> The seminar aims to provide an overview over the process of preparing a scientific publication. A second emphasis will be put on the organization and procedure of the publishing and printing process (concept of editor/publisher/printer, criteria for the choice of an appropriate journal, article categories, manuscript submission, procedure of peer review, re-submission,</p>	<p><b>Repetition on scientific learning (Winter Lecture)</b> Workshop (3054), HGNI; 4 hours Language: German <u>Aim and Content:</u> Repetition on scientific learning</p> <p><b>Introduction to Systematic Review and Meta-Analysis</b> Coursera seminar<sup>9</sup>, 4 hours/week, 6 weeks <u>Aim and Content:</u> Learn to assess data from clinical trials by performing systematic reviews and meta-analyses.</p>	<p><b>Systematic approaches to reviewing literature (SLR)</b> Workshop, WIRS, 7 hours Language: English <u>Aim and Content:</u></p> <ul style="list-style-type: none"> <li>• Why a systematic approach to reviewing literature in the social sciences is increasingly expected</li> <li>• Where in their PhD trajectory systematic reviews make sense</li> <li>• Which type of review is appropriate for each research question they have</li> <li>• What time and resources each type of review will require</li> </ul>

<sup>9</sup> <https://www.coursera.org/course/systematicreview>

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	reprints, patent/ protected publication, electronic publication). Prework Studies / Literature: Having studied a large number of different kinds of scientific publications. Suggested readings: Robert A. Day. How to write and Publish a Scientific Paper, OryxPres	<b>Weeks 1 and 2</b> <ul style="list-style-type: none"> <li>• Introduction to systematic reviews</li> <li>• Framing the question</li> </ul> <b>Weeks 3 and 4</b> <ul style="list-style-type: none"> <li>• Finding the evidence – searching principles</li> <li>• Assessing the risk of bias in clinical trials</li> <li>• Meta-bias and qualitative syntheses</li> </ul> <b>Weeks 5 and 6</b> <ul style="list-style-type: none"> <li>• Planning the meta-analysis</li> <li>• Statistical methods for meta-analysis</li> </ul> Summary	<ul style="list-style-type: none"> <li>• What can and cannot claim to be known as the result of a given review</li> <li>• How to design and, in the most practical terms, execute a review</li> </ul> <b>Private study of the EFSA guidelines on systematic review</b>
<b>B4 scientific communication and leadership</b>  Scientific writing, scientific communication, presentation techniques, project management, basic skills in rhetoric, negotiation, management of interpersonal conflicts	<b>Graduate School Days 2014</b> Seminar (3011), HGNI; 8 hours Language: English <u>Aim and Content:</u> The GS-Day is an internal congress within the PhD program, which is an obligatory event for all PhD students. Current results of their research is presented by the students.  <b>Time management training</b> Workshop, HGNI; 8 hours Language: English <u>Aim and Content:</u> Introduction: the specific quality of time and the modern concept of time management - Where and how do you waste your time? Getting started with a time log - Goals and objectives and gaining a balance between work and private time	<b>Graduate School Days 2015</b> Seminar (3011), HGNI; 8 hours Language: English <u>Aim and Content:</u> The GS-Day is an internal congress within the PhD program, which is an obligatory event for all PhD students. Current results of their research is presented by the students.  <b>The scientific oral presentation and poster presentation</b> Seminar (3007), HGNI; 2 hours Language: English <u>Aim and Content:</u> This seminar provides general information about the planning and preparation of an oral scientific presentation. Participants will get general information about the transfer of information to an audience. Additionally, principal information is provided for the preparation of a poster presentation.	<b>Graduate School Days 2015</b> Seminar (3011), HGNI; 8 hours Language: English <u>Aim and Content:</u> The GS-Day is an internal congress within the PhD program, which is an obligatory event for all PhD students. Current results of their research is presented by the students.  <b>English lecture and presentation skills</b> Workshop (3008), HGNI; 16 hours Language: English <u>Aim and Content:</u> Oral presentation, manuscripts, structure of an oral presentation, linguistic competence

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	<p><b>English grammar</b> Lecture (3044), HGNI; 12 hours Language: English <u>Aim and Content:</u> English grammar: no problem! This workshop aims to provide students with an individual grammar checklist, making writing English texts less of a problem. With help of this crash course the main English grammar pitfalls will be focused on and individual questions will be answered.</p>	<p><b>Scientific English papers workshop II</b> Workshop (3042), HGNI; 12 hours Language: English <u>Aim and Content:</u> This workshop is aimed at all those interested in learning about, or reviewing, the intricacies of writing scientific papers in clear English. There will be opportunities for participants to discuss particular difficulties. Participants are asked to bring along any written drafts either of parts of their PhD thesis or of papers to be submitted for publication.</p>	<p><b>Research – presenting in media</b> Workshop, LUH<sup>10</sup>; 8 hours Language: German <u>Aim and Content:</u> Presenting own research results to the public Training interview techniques and language</p>
<b>CLUSTER C Principles and concepts of veterinary public health</b>			
<p><b>C1 Ethics in VPH</b> Ethics in science, specific ethical issues in VPH, good scientific practice, conflict of interest, professional ethics, ethics in decision making and veterinary practice, role of VPH specialist in the society</p>	<p><b>Fraud, plagiarism and co-authorship (MDDSP)</b> Workshop, WIRS; 6 hours Language: English <u>Aim and Content:</u> Daily practices in academic research confront us with moral dilemmas such as: Decisions of co-authorship (e.g. Why did you agree when one of your supervisors demanded co-authorship while he did not contribute to the paper at all?) Using ideas of others (e.g. What did you do when you discovered that a co-worker picked your brains for his new paper and did not give you the credits?) Choice of and dealing with stakeholders (e.g. What were your choices when</p>	<p><b>Killing of animals – ethical reflection</b> Seminar (2563), TiHo; 12 hours Language: German <u>Aim and Content:</u> Preparation course for slaughterhouse visits, reflecting on about the topic.</p> <p><b>Laboratory animal techniques (FELASA B Category)</b> Workshop (5100), HGNI; 40 hours Language: German <u>Aim and Content:</u> Techniques to handle laboratory animals according to the Animal Protection Law</p>	<p><b>Introduction to ethics of veterinary medicine</b> Workshop (1551), TiHo; 16 hours Language: German <u>Aim and Content:</u> - Fundamental ethical questions linked to veterinary work, like: Different ways of human- animal interaction in society - Moral aspects of this interaction task of the veterinarian</p> <p><b>Slaughterhouse and ethics – how do they connect?</b> Workshop (1563), TiHo; 5 hours Language: German <u>Aim and Content:</u></p>

<sup>10</sup> [http://www.graduiertenakademie.uni-hannover.de/fileadmin/graduiertenakademie/Kursbeschreibungen\\_WS15\\_16/2015\\_35\\_Forschung\\_verstaendlich\\_vermitteln.pdf](http://www.graduiertenakademie.uni-hannover.de/fileadmin/graduiertenakademie/Kursbeschreibungen_WS15_16/2015_35_Forschung_verstaendlich_vermitteln.pdf)

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	<p>participants in your stakeholder meeting entered into a huge debate that nearly became violent?)            Changing research results to your benefit (e. g. changing results to improve the statistical outcome and thus the chance of getting the work published, or changing results when the company involved in the research demanded secrecy and tried to block publication of the research results).            Suspicion of fraud</p>	.	<p>Applied ethics in the context of food production            Reflecting on killing animals overall and in the context of slaughter</p> <p><b>Planning and Managing Laboratory Animals Experiments (FELASA C Category)</b>            Lecture (5101), HGNI; 40 hours            Language: German  <u>Aim and Content:</u>            Design and conduction of animal experiments;            Analysis of scientific literature</p>
<p><b>C2 Science based policy making</b></p> <p>Concepts and role of VPH in one health, eco-health, role of and output from inter-national organisations in the area of food safety, food security, animal health, zoonoses (e.g. WTO, SPS-agreement, WHO, FAO, OIE, Codex Alimentarius, JECFA), precautionary principle, concepts &amp; philosophy of EU legislation, independent scientific assessment (e.g. EFSA and its panels), interoperability and interdisciplinary cooperation, responsibility of the private sector and good practices in all stages of production and supply chains</p>	<p><b>Seminar Environmental Hygiene Hanover Workshop on Veterinary Public Health 2015</b>            Workshop, TiHo; 6 hours            Language: German  <u>Aim and Content:</u>            Veterinary Public Health, Population Medicine, Animal Hygiene</p> <p><b>Symposium: Antimicrobial Resistance along the food chain,</b>            Workshop, BfR<sup>11</sup>; 2 days  <u>Aim and Content:</u>            See title</p>	<p><b>Seminar Environmental Hygiene Hanover Workshop on Veterinary Public Health 2016</b>            Workshop, TiHo; 6 hours            Language: German  <u>Aim and Content:</u>            Veterinary Public Health, Population Medicine, Animal Hygiene</p> <p><b>Seminar: animal disease – todays challenges</b>            Workshop, BfR; 2 days  <u>Aim and Content:</u>            Current topics in disease control for pigs, cattle and poultry as well as minor species</p>	<p><b>Seminar Environmental Hygiene Hanover Workshop on Veterinary Public Health 2017</b>            Workshop, TiHo; 6 hours            Language: German  <u>Aim and Content:</u>            Veterinary Public Health, Population Medicine, Animal Hygiene</p> <p><b>BfR - Summer School on Risk Assessment and Risk Communication in Food Safety</b></p>

<sup>11</sup> Federal Institute for risk assessment (BfR) (<http://www.bfr.bund.de/en/home.html>)

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<p><b>C3 Applied economics</b></p> <p>General concepts for assessing costs and benefit of interventions related to VPH along the food chain, micro vs. macro-economy, disease burden measures (YLL, DALY, QALY)</p>	<p><b>Design and Statistical Analysis of Animal Experiments</b> weekly Seminar (3058), HGNI; Language: German <u>Aim and Content:</u> - Good clinical practice - standards in experimental designs - basic statistical models - sample size calculation</p> <p><b>Design and Statistical Analysis of Animal Experiments - Group Session</b> weekly Group Session (3059), HGNI; 2 hours Language: German <u>Aim and Content:</u> - Good clinical practice - standards in experimental designs - basic statistical models - sample size calculation</p>	<p><b>Grant writing: From the thought to the final proposal</b> Seminar (3462), HGNI; 4 hours Language: English <u>Aim and Content:</u> Development of grant writing skills</p> <p><b>How to design an experiment</b> Seminar, HGNI; 12 hours Language: English <u>Aim and Content:</u> General introduction in the principles of the design of a scientific experiment; Interactive problem-based learning in small groups to elaborate designs of experiments for a given scientific objective/clinical problem. Aim is to improve theoretical scientific skills.</p> <p><b>Private Study</b> - studying “Global Burden of Disease and Risk Factors” (Lopez AD, Mathers CD, Ezzati M, et al., editors. Washington (DC): World Bank; 2006) and other relevant articles/books</p>	<p><b>Applied economic modelling for the veterinary sciences</b> Seminar, Utrecht<sup>12</sup>; 84 hours/ 6 weeks Language: English <u>Aim and content:</u> Economic modeling underpins decision-making in the entire field of animal health economics, so a good understanding of the issues and tools involved is vital. The aim of this hands-on course is to enable you to become familiar with using the relevant tools so that you can become more actively involved in economic decision-making, particularly with regard to disease control. Many economic tools have been developed and are currently being applied to support decisions concerning animal health. These include basic methods such as partial budgeting, cost-benefit analysis and decision analysis, but also more advanced methodologies such as linear programming, the Markov chain and Monte Carlo simulation. You will learn about all of these, together with how to detail the critical steps in a systems analysis and choose appropriate modeling types and techniques.</p>
<p><b>C4 Risk analysis</b></p> <p>Principles and concepts of risk analysis, international regulations (WTO, SPS), technical standards (Codex,</p>	<p><b>Introduction to Risk Analysis</b> Workshop, WHO collab. Centre; 12 hours Language: German <u>Aim and Content:</u> Introduction to how risk assessment is done, different methods being explained.</p>	<p><b>Risk assessment in Food and Feed: Advanced Examples</b> Workshop (2342), TiHo; 3 hours Language: German <u>Aim and Content:</u> Introduction and applied calculation for</p>	<p><b>Risk Assessment of Infectious Agents</b> Workshop, Utrecht University; 5 days<sup>13</sup> Languages: English <u>Aim and Content:</u> The objectives of this course are to understand</p>

<sup>12</sup> <http://elevatehealth.eu/course/applied-economic-modeling-veterinary-sciences>

<sup>13</sup> <http://www.utrechtsummerschool.nl/courses/life-sciences/risk-assessment-of-infectious-agents>

<b>Annex I: three year programme of ECVPH Residency</b>			
	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
OIE), risk assessment approaches, management, communication	<b>Private study</b> - studying “Risk Analysis- a quantitative guide” (Heenekens, 1997) and other relevant articles/ books	RA in Food and Feed <b>Internship at the BfR</b>	the modelling principles of microbial risk assessment and to be able to implement the risk assessment process in practice. The focus will be on a bottom-up approach, where measurements in food chains and in the environment are used to assess the risk at exposure, but also attention will be paid to the top-down approaches of observational epidemiology and source attribution.  <b>EFFORT Project –</b> analysis of risk factors regarding the emergence of ESBL producing <i>E. coli</i> correlating with health and welfare
<b>C5 Applied social sciences</b> Understanding stakeholders and consumer behaviour, communication with media, stakeholders, target-oriented communication (risk managers, media, the public, stakeholders), risk perception, dealing with expert opinion	<b>Annual Meeting EFFORT 2015</b> Conference, 2 days <u>Aim and content:</u> The current state of the project is presented by each working group to the advisory board and other experts. Decisions regarding the project, e.g. communication to public and stakeholder are made.	<b>Annual Meeting EFFORT 2016</b> Conference, 2 days <u>Aim and content:</u> The current state of the project is presented by each working group to the advisory board and other experts. Decisions regarding the project, e.g. communication to public and stakeholder are made.  <b>Developing leadership competences</b> Seminar, LUH <sup>14</sup> , 4 Weekends <u>Aim and content:</u> Definition of roles in a team Communication skills with team members/ experts, Leadership skills Conflict management	<b>Annual Meeting EFFORT 2017</b> Conference, 2 days <u>Aim and content:</u> The current state of the project is presented by each working group to the advisory board and other experts. Decisions regarding the project, e.g. communication to public and stakeholder are made.

<sup>14</sup> [http://www.uni-hannover.de/fileadmin/luh/content/dezernat1/fuehrungsleitlinien/Modulprogramm\\_Uebersicht.pdf](http://www.uni-hannover.de/fileadmin/luh/content/dezernat1/fuehrungsleitlinien/Modulprogramm_Uebersicht.pdf)

<b>Annex I: three year programme of ECVPH Residency</b>			
	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<p><b>C6 Surveillance and monitoring</b></p> <p>Principles (e.g. active and passive approaches) and applications (e.g. freedom from disease, early de-tection, rapid alert), risk-based approaches</p>	<p><b>Epidemiology and control of parasites</b></p> <p>Workshop (3351), HGNI; 50 hours Language: English <u>Aim and Content:</u> Training in techniques to diagnose parasites, training in questions related to epidemiological aspects and control of parasites</p>	<p><b>Epidemiology of parasites in the tropics and zoonoses</b></p> <p>Seminar (3356), HGNI; 28 hours Language: English <u>Aim and Content:</u> Postgraduates and invited speakers present relevant tropical and zoonotic parasitoses. Topics will be announced at the notice board of the Institute for Parasitology</p>	<p><b>Prevention is better than acting: Vaccination/-programme</b></p> <p>Workshop (2385), TiHo; 12 hours Language: German <u>Aim and Content:</u> Common vaccination/-programmes being discussed – what kind of support do they provide?</p> <p><b>Private Study</b> - WHO/FAO/OIE guidelines for the surveillance, prevention and control</p>
<b>Sub-speciality Food Science (Compulsory) 25% time</b>			
<b>Cluster A Food hygiene, foodborne and waterborne hazards</b>			
<p><b>A1 Biological hazards in the food safety context</b></p> <p>Aetiology, epidemiology, prevention and control of foodborne diseases (bacteria, parasites, fungi, viruses, prions)</p>	<p><b>New and re-emerging diseases in avian species</b></p> <p>Seminar (3452), HGNI; 3 hours Language: English <u>Aim and Content:</u> Infectious diseases such as Avian Influenza, West Nile Virus infection, Infectious bronchitis, avian Metapneumovirus and Ornithobacterium rhinotracheale infection as well as others will be covered. A specific focus will be on poultry species but also examples in pet birds will be covered such as Bornavirus infection.</p> <p><b>SafePork 2015 Porto</b></p> <p>Conference; 2 days Language: English <u>Aim and content:</u> focusing in the epidemiology and control of foodborne pathogens and antimicrobial resistance in pigs and pork along all production chain</p>	<p><b>Control and management of outbreaks of notifiable diseases in poultry</b></p> <p>Workshop (3460), HGNI; 5 hours Language: English <u>Aim and Content:</u> Workshop with field trip Control of Newcastle disease and Avian Influenza in poultry operations: Challenges and limitations</p>	<p><b>Management structures of poultry operations and applied population medicine</b></p> <p>Workshop, HGNI; 5 hours Language: English <u>Aim and Content:</u> Different management structures of various poultry species will be presented and discussed. Challenges of diagnostics in poultry production will be evaluated. A field trip will be part of this workshop.</p> <p><b>SafePork 2017</b></p> <p>Conference; 2 days Language: English</p>

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	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<p><b>A2 Detection of microorganisms in the food chain</b></p> <p>Examination, diagnostics and monitoring of microbial contamination of food of animal origin or related to animals, bacterial, viral and parasitic aetiology, sampling, testing and VPH relevance of contamination in water systems and plants, classical food microbiology, relevance of and systems for typing methods, microbial ecology of foodborne pathogens and spoilage microorganisms</p>	<p><b>Novel and unusual resistance genes in livestock-associated methicillin-resistant Staphylococcus aureus (MRSA)</b></p> <p>Workshop (3759), HGNI; 6 hours Language: English <u>Aim and Content:</u> The identification of resistance pheno- and genotypes in MRSA ST398. Learn about different methods for the detection of novel genes, their more detailed investigation and the analysis of their genetic environment. Examples of recently identified novel resistance genes will be presented.</p>	<p><b>Cloning techniques in bacteria</b></p> <p>Workshop (3583), HGNI; 40 hours Language: English <u>Aim and Content:</u> Learn about different possibilities of cloning of bacterial DNA and the identification of correct clones.</p> <p><b>Introduction into the analysis of bacterial plasmids</b></p> <p>Workshop (3589), HGNI; 24 hours Language: English <u>Aim and Content:</u> Learn about different possibilities how to extract, transfer and analyse plasmid DNA.</p>	<p><b>Typing of bacteria basics, new developments and introduction into practical typing work</b></p> <p>Workshop (3585), HGNI; 40 hours Language: German <u>Aim and Content:</u> Introduction to different methods of typing bacteria including practical work and assessment of the pro a contra of different methods.</p>
<p><b>A3 Chemical hazards in the food safety context</b></p> <p>Residues of veterinary medicinal products, residues of pesticides, dioxins, PCBs, PAHs, radionuclides, mycotoxins, shellfish biotoxins toxicological aspects (e.g. ADI ArfD), human health effects, mechanisms of action, prevention and control, EU and Codex legislation e.g. MRLs), Pre- and post-harvest food safety</p>	<p><b>Dioxins, PCB &amp; Co. – current research topics</b></p> <p>Weekly, TiHo 2 hours Language: German <u>Aim and Content:</u> Presentation of the Max-Rubner-Institute, Residues and contamination risk assessment and consumer protection Introduction, background information, risk assessment Contamination: enrichment along the food chain Dioxin; hormonal-acting substances, mycotoxine, heavy metals; drugs, VO 2377/90, NRKP, LM-Monitoring; current problems of food safety –</p>	<p><b>Food toxicology, residues and contaminants: risks and consumer protection</b></p> <p>Weekly course (0722), TiHo; 1 hour Language: German <u>Aim and Content:</u> residues of dioxins, PCBs, mycotoxins, residues in meat and plants, as well as through treatment</p>	<p><b>New Challenges and Developments in Food/Consumer Safety</b></p> <p>SKLM<sup>15</sup>, 8 hours <u>Aim and Content:</u> The DFG Senate Commission on Food Safety (SKLM) regularly holds meetings on current aspects of major importance in the field of food safety. The purpose of these meetings is to review and assess the state of knowledge in a specific field. The forthcoming scientific symposium “New Challenges and Developments in Food/Consumer Safety” will be held on the 18th of November 2015 in Bonn, Germany, with an outstanding faculty of internationally renowned experts in the field.</p>

<sup>15</sup> <http://www.fei-bonn.de/veranstaltungen-termine/sonstige-veranstaltungen/va-2015-11-18-sklm-symposium>

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	<p>presented by the BfR Toxikokinetik and metabolism and accumulation of foreign matter visit of LAVES /Hannover Acrylamide; legal foundations and assessment of pharmacological residues Analytic I: background information Analytic II: application, legal consequences Genetic and molecular bases of the effect of residues Contamination and ingredients/ additive</p>		
<p><b>A4 Antimicrobial resistance</b> Occurrence, sources/attribution, diagnostics, impact, transmission, epidemiological aspects</p>	<p><b>Methicillin-resistant Staphylococcus aureus current status</b> Seminar (3590), HGNI; 6 hours Language: English <u>Aim and Content:</u> Learn about the identification, typing and antimicrobial resistance properties of MRSA. Understand the difference and similarities between different MRSA strains identified to date.</p> <p><b>Molecular basis and different types of extended spectrum <math>\beta</math>-lactamases (ESBLs)</b> Workshop (3592), HGNI; 6 hours Language: English <u>Aim and Content:</u> Learn about the identification of ESBLs, the different types of ESBLs and how to investigate their genetic environment. Differences and similarities of ESBL from different bacterial species (e.g. <i>Escherichia coli</i> or <i>Klebsiella</i> spp.) and from bacteria of different origins (e.g. isolated from humans or animals).</p>	<p><b>Molecular diagnostic of food of animal- origin</b> Workshop (2301), TiHo; 3 hours Language: German <u>Aim and Content:</u> Introduction to Molecular diagnostic methods of food microbiology</p> <p><b>2nd Workshop on Q Fever</b> Workshop, FLI; 7 hours <u>Aim and Content:</u> Q Fever – a zoonosis: state of knowledge and prevalence in Germany</p>	<p><b>Molecular basis of antimicrobial action and resistance</b> Workshop (3580), TiHo; 12 hours Language: English <u>Aim and Content:</u> Understand how antimicrobial agents inhibit bacteria and which ways bacteria have developed to escape inhibitory effects.</p>

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	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<b>Cluster B Food control, surveillance and risk analysis</b>			
<p><b>B1 Hygiene and sanitation in the food chain</b></p> <p>Management of hygiene and sanitation in the food chain, personal hygiene, cleaning/disinfection, pest control, GHP, CIP, HACCP, all prerequisites for establishing an effective HACCP system</p>	<p><b>Direct marketing of meat and meat products</b></p> <p>Workshop, TiHo; 2 hours Language: German <u>Aim and Content:</u> Introduction to topics of direct marketing, focussing on specific hygienic and economic aspects</p>	<p><b>Dosch Symposium</b></p> <p>Workshop, Austrian Society for Hygiene, Microbiology and Preventive Medicine; 2 days <u>Aim and Content:</u> Hygiene in hospitals – results and development</p>	<p><b>EFFORT - Participation in excursions to food plants (3 days)</b></p> <p>Language: German <u>Aim and Content:</u> Sampling along the food chain to evaluate risks – go along with a risk analysis as well as checking of the HACCP concept</p>
<p><b>B2 Food safety risk analysis</b></p> <p>Codex risk analysis principles and terminology, microbiological predictive modelling, ALOP principle, concept FSO, PC, PO</p>	<p><b>Diagnostic methods under trial: approach to assess the capability Presented as an example of serology in zoonotic diagnostics</b></p> <p>Workshop (1325), TiHo; 6 hours Language: German <u>Aim and Content:</u> Epidemiological and statically funded assessment and diagnostic tests</p>	<p><b>Internship at the Federal Institute for Risk Assessment 4 Week placement</b></p>	<p><b>Private study on EFSA guidelines on Biohazards and the Codex alimentarius as well as other relevant documents</b></p>
<p><b>B3 International, EU and national food regulatory aspects</b></p> <p>Basic food legislation related to food quality, food safety, food standards, consumer protection, animal welfare, environmental aspects, interrelation EU/national legislation, legal foundation of EFSA</p>	<p><b>ECVPH Meeting 2015</b></p> <p>Conference, 2 days Language: English <u>Aim and Content:</u> Current topics on new legislation, as well as issues regarding food safety, food quality and control, guided by a conference specific topic.</p>	<p><b>ECVPH Meeting 2016</b></p> <p>Conference, 2 days Language: English <u>Aim and Content:</u> Current topics on new legislation, as well as issues regarding food safety, food quality and control, guided by a conference specific topic.</p>	<p><b>ECVPH Meeting 2017</b></p> <p>Conference, 2 days Language: English <u>Aim and Content:</u> Current topics on new legislation, as well as issues regarding food safety, food quality and control, guided by a conference specific topic.</p>

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	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<p><b>B4 Inspection of food of animal origin</b></p> <p>Classical and alternative ante-mortem and post-mortem meat inspection, inspection of other products of animal origin (incl. meat products, milk and milk products, eggs and egg products, fish and shellfish), inspection of conditions of public health relevance in the food chain including primary production, responsibilities of the OVS, EFSA opinions on these subjects</p>	<p><b>Dairy day 2015</b> <b>TiHo Hannover</b> Workshop, TiHo; 6 hours Language: German Aim and content: Current topics in dairy production, including diagnostics.</p> <p><b>Process of slaughtering and Animal welfare</b> Workshop (1326), TiHo; 12 hours Language: German <u>Aim and Content:</u> Visit of an abattoir and teaching how to about animal welfare including animal keeping, transportation and slaughtering (pig, poultry and bovine) recording to the VO (EG) 1099/09 and national legislation</p>	<p><b>Introduction into Molecular Biology</b> Lecture, HGNI; 16 hours Language: English <u>Aim and Content:</u> DNA, RNA, proteins, cloning, PCR; Expression, purification and analysis of recombinant proteins; Molecular mechanisms of intracellular trafficking; stress response, cell death and signalling <u>Evaluation of Achievement:</u> oral examination</p>	<p><b>Stinking in pig meat – boar smelling</b> Workshop, TiHo; 3 hours Language: German <u>Aim and Content:</u> How to identify boar scent, problems and chances of boar fattening.</p> <p><b>Private study</b> of Encyclopedia of Meat Sciences (Editors-in-Chief: Carrick Devine and Michael Dikeman)</p>
<p><b>B5 Investigating and Managing foodborne outbreaks</b></p> <p>Outbreak detection/ management (response teams), backwards/ forwards tracing, identification of the vehicle and the source, sampling strategies, molecular epidemiology, questionnaires, role of epidemiology and food safety sector to identify the source and vehicle, predict the epidemic and optimise control/ intervention measures, approaches for evaluation and intervention, crisis management, communication</p>	<p><b>Control and management of outbreaks of notifiable diseases in poultry</b> Workshop (3453), HGNI; 5 hours Language: English <u>Aim and Content:</u> Workshop with field trip Control of Newcastle disease and Avian Influenza in poultry operations: Challenges and limitations</p>	<p><b>Case – based learning: Outbreak simulation</b> Workshop, TiHo; 4 hours Language: German <u>Aim and Content:</u> Simulation of an MKS Outbreak in Lower Saxony</p>	<p><b>Epidemiological investigation for identification of food as vehicle in outbreaks</b> Workshop (2324), TiHo, 2 hours Language: German <u>Aim and Content:</u> See title</p>

<b>Annex I: three year programme of ECVPH Residency</b>			
	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<b>Cluster C Hygiene and technology of food production, processing and distribution</b>			
<p><b>C1 Food quality control</b></p> <p>Good Practices for quality and safety management and control along the food chain (feed, pre-harvest, slaughter hygiene, post-harvest), TQM, GMP, HACCP, relevant ISO Standards, auditing, meat quality attributes including biochemical and sensorial, basic aspects of meat biochemistry, factors affecting meat/milk/egg quality</p>	<p><b>GCP in experimental research</b> Seminar (3354), HGNI; 25 hours Language: German <u>Aim and Content:</u> Design, writing of protocols, participation in GCP studies and recording of data in trial reports</p>	<p><b>GCP in experimental research</b> Seminar (3354), HGNI; 25 hours Language: German <u>Aim and Content:</u> Design, writing of protocols, participation in GCP studies and recording of data in trial reports</p>	<p><b>GCP in experimental research</b> Seminar (3354), HGNI; 25 hours Language: German <u>Aim and Content:</u> Design, writing of protocols, participation in GCP studies and recording of data in trial reports</p>
<p><b>C2 Food hygiene and technology</b></p> <p>Basics of food technology in view of food quality, hygiene and safety, preservation techn., packaging, modified atmosph., curing, fermentation, heat treatment, antimicrobial treatment, cold preservation, curing, fermentation, high pressure, other emerging food preservation and sanitation methods, postmortem biochemistry and factors affecting meat quality characteristics, meat quality attributes incl. biochem. and sensorial</p>	<p><b>Annual Working group symposium on food hygiene 2015</b> Conference, DVG<sup>16</sup>; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p> <p><b>Placement at the Institute for Food quality and safety</b> TiHo (1302), 2 weeks</p>	<p><b>Annual Working group symposium on food hygiene 2016</b> Conference, DVG<sup>17</sup>; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p> <p><b>Private study</b></p>	<p><b>Annual Working group symposium on food hygiene 2017</b> Conference, DVG<sup>18</sup>; 2 days Language: German <u>Aim and Content:</u> Current topics on new legislation (EU and national), as well as issues regarding food safety and control</p> <p><b>Private study</b> of Encyclopedia of Meat Sciences (Editors-in-Chief: Carrick Devine and Michael Dikeman)</p>

<sup>16</sup> Deutsche Veterinärmedizinische Gesellschaft ([http://www.uni-giessen.de/cms/fbz/fb10/institute\\_klinikum/institute/nahrungsmittelkunde/institut/dvg](http://www.uni-giessen.de/cms/fbz/fb10/institute_klinikum/institute/nahrungsmittelkunde/institut/dvg))

<sup>17</sup> Deutsche Veterinärmedizinische Gesellschaft ([http://www.uni-giessen.de/cms/fbz/fb10/institute\\_klinikum/institute/nahrungsmittelkunde/institut/dvg](http://www.uni-giessen.de/cms/fbz/fb10/institute_klinikum/institute/nahrungsmittelkunde/institut/dvg))

<sup>18</sup> Deutsche Veterinärmedizinische Gesellschaft ([http://www.uni-giessen.de/cms/fbz/fb10/institute\\_klinikum/institute/nahrungsmittelkunde/institut/dvg](http://www.uni-giessen.de/cms/fbz/fb10/institute_klinikum/institute/nahrungsmittelkunde/institut/dvg))

<b>Annex I: three year programme of ECVPH Residency</b>			
	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
<b>Cluster D Trade, one health, eco-medicine and models</b>			
<p><b>D1 Trade, food security and one health</b></p> <p>Food safety aspects of international trade of animal feed and food, animal health and food safety (FAO literature), global food availability and food safety, role of WHO, FAO, Codex Alimentarius</p>	<p><b>4<sup>th</sup> International One Health Conference</b> Conference; 3 days <u>Aim and Content:</u> Prevention at the source is key in controlling (infectious) diseases that have a growing impact on humans, animals and their ecosystems. The 3rd International One Health Congress will therefore focus on how science can help in preventing emerging and re-emerging (infectious) diseases. Through a special Science Policy Interface policy makers and international organizations may translate the latest scientific advancements into preventive measures.</p>	<p><b>Private Study</b> - studying relevant articles of FAO, EFSA and the European Commission</p>	<p><b>Internship at the OIE</b></p>
<p><b>D2 Environmental hygiene in the animal production food chain</b></p> <p>Environmental hygiene including water hygiene and waste management in the animal production food chain</p>	<p><b>Environmental Impact Assessment of Livestock Systems<sup>19</sup></b> Workshop, 5 days; WIAS<sup>19</sup> Language: English <u>Aim and Content:</u> Feeding nine billion people in 2050 within the carrying capacity of the earth is perhaps the greatest challenge mankind has ever faced. An important aspect of the debate about feeding the world is the role of livestock production. The demand for livestock products is expected to increase significantly. Without major changes, therefore, the above described environmental concerns about the livestock sector will increase only further.</p>	<p><b>Practical examples of risk assessment of substances in food and feed</b> Workshop, TiHo; 3 hours Language: German <u>Aim and Content:</u> Presentation of current topics and research results</p>	<p><b>Health out of the grocery store – benefit – risk – assessment of functional food</b> Workshop (2346), TiHo; 2 hours Language: German <u>Aim and Content:</u> Functional food – help or pain for human society? How to deal with the trend of buying health.</p>

<sup>19</sup> <https://www.wageningenur.nl/en/activity/Environmental-Impact-Assessment-of-Livestock-Systems.htm>

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	<p>So we are facing an urgent question: how to reduce the environmental impact of production of animal-source food? To gain insight into future options and limitations of reducing the environmental impact of livestock production, we need sound environmental impact assessment tools. The aim of this course is to provide participants with advanced knowledge, both theoretical and practical, on the environmental impact assessment of livestock systems.</p> <p>Key issues addressed are: how to incorporate consequences of land use change in an assessment? How to perform an uncertainty or sensitivity analysis? How to assess land use efficiency of livestock systems? Which water footprint method is appropriate? Which metrics should we use to determine emissions of greenhouse gases? What's the difference between a nutrient flow analysis and a life cycle assessment (LCA)? What's the difference between an attributional or consequential LCA, and when to apply what method? How to assess the impact of livestock production on biodiversity?</p>		
<p><b>D3 Mathematical models in Food safety</b></p> <p>Application case studies (focus on FS): research or management question, conceptual model, predictive</p>	<p><b>Microbiology Seminar</b> Seminar, HGNI; 12 hours Language: German <u>Aim and Content:</u> Presentation of current research projects and diagnostic case reports</p>	<p><b>Epidemiological diagnostics of food borne outbreaks with the help of examples</b> Workshop (1328), TiHo; 2 hours Language: German <u>Aim and Content:</u> See Title</p>	<p><b>Current issues in food microbiology</b> Workshop, HGNI; 2 hours Language: English <u>Aim and Content:</u> Current topics will be presented and discussed.</p>

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	<b>Year 1: 2016</b>	<b>Year 2: 2017</b>	<b>Year 3: 2018</b>
microbiology, shelf life, inactivation, dose-response models for hazard characterisation, compartmental models (toxikokinetics) (topics of D 4 may be covered in other clusters such as B2)	<b>Presentation of quantitative risk assessment with the help of an example</b> Workshop (2305), TiHo; 2 hours Language: German <u>Aim and Content:</u> See Title		
<u>Module 1:</u> Outbreak - investigation and molecular epidemiology	EFFORT Project	EFFORT Project	EFFORT Project
<u>Module 2:</u> Impact of animal health, farming and feeding on food safety	EFFORT Project	EFFORT Project	EFFORT Project
Research in an Institute	EFFORT Project	EFFORT Project	EFFORT Project

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	Year 1: 2016	Year 2: 2017	Year 3: 2018
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### III Advanced topics

MSc Epidemiology, Course at Utrecht University: Exposure Assessment in Epidemiology<sup>20</sup> (3 ECTS)

MSc Epidemiology, Course at Utrecht University: Fundamentals of Global Health<sup>20</sup> (1,5 ECTS)

Epidemics, Pandemics and Outbreaks - <https://www.coursera.org/learn/epidemic-pandemic-outbreak> (6 ECTS)

Summer school Utrecht: Toxicology and Environmental Health<sup>20</sup> (3 ECTS)

In-depth study of the Encyclopedia of Meat Sciences (Editors-in-Chief: Carrick Devine and Michael Dikeman) (6,5 ECTS)

### IV PhD project: EFFORT – Ecology from Farm to Fork Of microbial Resistance and Transmission (<http://www.effort-against-amr.eu/>) –

In-depth study of epidemiology of ESBL-producing *E. coli* along the food chain

- Analyze, track and trace the dissemination source and route of ESBL-producing *E. coli* along the food chain by geno- and phenotypically analysis
- Identify the key risk factors involved in the zoonotic transmission of ESBL-producing *E.coli* from poultry to humans within the food chain
- Contribute to the performance of an updated risk assessment of ESBL-producing *E.coli* in the food chain based on statistically analysed current data and results of the EFFORT research project.

### V Electives

MSc Epidemiology, Course at Utrecht University: Environmental and occupational epidemiology 20 (3 ECTS)

Literature review on metagenomic data-analysis (12,5 ECTS)

Seminar „Basics in R” at the Federal Ministry of Risk Assessment, Berlin (Germany) (1,5 ECTS)

MSc Epidemiology, Course at Utrecht University: Mathematical modelling of infectious diseases<sup>21</sup> (3 ECW)

<sup>20</sup> <http://www.summerschoolsineurope.eu/course/159/toxicology-and-environmental-health>

<sup>21</sup> [https://epidemiology-education.nl/pluginfile.php/7021/block\\_html/content/Course%20schedule%202015-2016%20%28sorted%20by%20date%29.pdf](https://epidemiology-education.nl/pluginfile.php/7021/block_html/content/Course%20schedule%202015-2016%20%28sorted%20by%20date%29.pdf) - <https://epidemiology-education.nl>