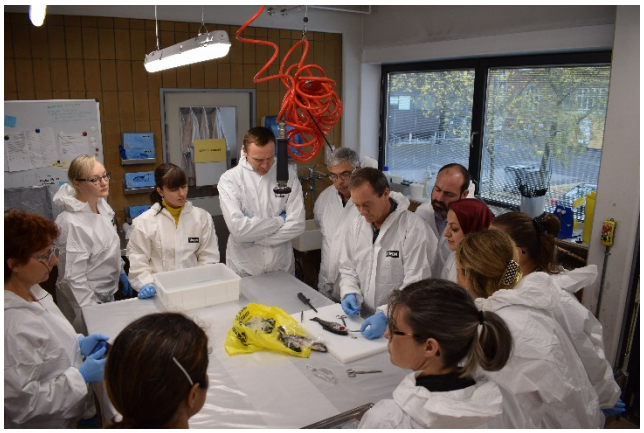
EURL training courses



Copenhagen October 9th - 19th 2017

Hosted by the European Union Reference Laboratory for Fish Diseases

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General introduction

Two training courses were held in 2017. The training courses took place in Kgs. Lyngby at the National Veterinary Institute, Technical University of Denmark, Kemitorvet, building 202, 2800 Kgs. Lyngby, Denmark, from October the 9th to the 19th, 2017. Two courses were prepared: the first one, with nine trainees, was entitled "Methods for implementation of surveillance procedures for listed fish diseases" and took place from 9th to 13th October. The second course was entitled "Introduction to histopathology in fish diseases" and took place from the 16th to 19th October 2017 with 13 participants. A single person participated in both training courses.

The overall purpose of the training courses was to provide an opportunity for the NRLs to send employees for training in techniques relevant when working with fish diseases. Concerning the course on surveillance of listed fish diseases the staff of the EURL provided this training, together with teachers from the Danish Veterinary and Food Administration. For the course, which focused on histopathology, staff from the EURL and DTU VET, in cooperation with NVI-Oslo and Aquapri DK, constituted the tutor team. Knowledge-sharing and discussions between participants and teachers were important parts of both courses.

Course 1: Methods for implementation of surveillance procedures for listed fish diseases

The five day course in "Methods for implementation of surveillance procedures for listed fish diseases" was primarily based on practical work (hands on) in combination with theoretical presentations.

Day 1 was dedicated to a fish farm inspection. Prof. Niels Jørgen Olesen and EURL coordinator Nikolaj Reducha Andersen participated from the EURL**.** As procedure does not allow a visit to a fish farm after working in our laboratory it was decided to meet with the participants at the entrance of their hotel and to drive to the Danish Veterinary and Food Administration offices in Vejen, where we were received by Henrik Korsholm. After the training course introduction by Niels Jørgen Olesen and presentations on Danish surveillance plans for fish diseases held by veterinarian Morten Fruergaard-Andreasen, the participants visited a rainbow trout farm, Vejen Store Vandmølle located five km from Vejen. During the on-site visit, procedures for inspection and sample collection were demonstrated. Participants were taught on how fish necropsy techniques are performed in the field. All participants had the opportunity to perform necropsy on diseased fish collected at the farm. They collected relevant samples and brought them back to the laboratory in Copenhagen for further examination.

On **day 2** a detailed description of the course programme was presented by Niels Jørgen Olesen and discussed with the participants. After the introduction, a lecture on fish virology and the use of cell culture and qPCR for surveillance was given by Niels Jørgen Olesen. In the afternoon, the participants had to process the samples collected in the fish farm the day before. The processing of fish samples was demonstrated before the participants were asked to do it themselves.

Day 3 was allocated to theoretical molecular techniques. The participants attended presentations explaining the theoretical principles behind the different PCR techniques, methods of data analysis and a session addressing troubleshooting and pitfalls in real-time PCR, as well as routines to minimize the risk of (cross-) contamination. Practical exercises for the analysis and interpretation of qPCR results were carried on. During the afternoon session there was a lecture addressing the theory behind Sanger DNA sequencing, as a number of computer exercises where the students could learn how to read and assemble DNA sequences. The session included theoretical and practical (computer) exercises.

Day 4 was dedicated to cell culture and started with the demonstration of the procedure implemented in the laboratory to prepare diagnostic trays with BF-2 and EPC cell cultures. Subsequently, all the participants prepared their own trays and inoculated the trays with the sample prepared at the second day. Titration procedure was also demonstrated and a talk on titre calculation and cell susceptibility test was given. The afternoon was allocated to provide the participants with knowledge in reading different fish cell lines inoculated with different viral pathogens, highlighting features of different cytopathogenic effects (CPE). As practical assignment participants were asked to read titration plates previously prepared, calculate the titre of the virus inoculated, and describe and draw different CPE's on infected cell cultures. The day ended with a series of presentations about the use of BLAST and the most important BLAST parameters, and about how to read, interpret and construct phylogenetic trees. The sessions included theoretical and practical (computer) exercises.

At **day 5** in the morning the participants were divided into two groups. One group were shown bacteriology techniques and visited the EURL facilities and the other group were reading their inoculated cell cultures -the groups thereafter switched. The afternoon was allocated to finalize the course, discussing both results obtained by the participants and different methods for performing surveillance of listed fish diseases in their countries of origin. Finally, a questionnaire for the course evaluation was given and the participants were asked to fill it anonymously.

The methods taught were primarily focused on the protocols given in the EU legislation and on the OIE guidelines from the Manual of Aquatic Animal Diseases, and included how to select proper controls, the typical pitfalls, troubleshooting, etc. Every activity had a team of tutors in order to provide an effective support to the trainees. For the practical cell culture activities Niccolò Vendramin, Didde Hedegaard Sørensen and Christina Flink Desler were assigned.

As get-together, a joint dinner the 10th of October was included.

Course 2: Introduction to histopathology in fish diseases

The four day course in histopathology and immunochemical techniques was divided into theoretical lectures on relevant topics, practical exercises both in necropsy room and microscopy laboratory.

Day 1 started with an introduction to the course and practical information. Each participant had the opportunity to present themselves to the tutors and the other trainees. Practical demonstration on how to sample fish tissues and organs for proper histological examination followed, and each participant thereafter tried the technique on their own fish. Lectures given by Ole Bendik Dahle from NVI-Oslo on the normal histology and artefacts followed after lunch break.

Day 2 was divided between practical observation of slides from confirmed cases at the microscope and theoretical lectures focusing on general pathology. Ole Bendik Dahle and Tine Moesgaard Iburg were in charge of the teaching.

The first part of **day 3** was dedicated to lectures on Immunohistochemistry (IHC) and in situ hybridisation (ISH), the different phases of sample preparation for staining techniques and troubleshooting and pitfalls during the process were discussed. This part of the programme was conducted by Tine Moesgaard Iburg, Torsten Snogdal Boutrup and Tim Kåre Jensen. Theoretical exercises in IHC were used as a platform for discussing.

Day 4, the last day of the course started directly at the microscopy room, diagnostic cases brought by participants were discussed and presented in an open forum, with supervision of tutors Ole Bendik Dahle and

Tine Moesgaard Iburg. After lunch, there was a last round of group work before all the participants met up again for a last discussion about the subjects that had been covered earlier in the day. At the end of the course the participants were provided with a questionnaire to fill in as part of the evaluation. Furthermore, the participants were invited to give their opinions on the course. All in all, the course was very well-received, and the distribution of practical and theoretical lessons seemed well balanced.

Through lectures, exercises, discussions, and knowledge exchange between participants, the knowledge on histopathology, and troubleshooting related to this technique was increased. There was much fruitful discussion among participants and teachers during the course, both during the lectures, the breaks and the theoretical exercises.

As get-together, a dinner event on day 2 was held.

Participant List

Surname	Name	Country	Affiliation	Course 1	Course 2
Ekaterina	Mileva	Bulgaria	National Diagnostic & Research Veterinary Institute	x	x
Lubomir	Pojezdal	Czech Republic	Veterinary Research Institute, Brno	x	
Thorbjorg	Einarsdóttir	Iceland	Institute for Experimental Pathology, University of Iceland	x	
Nastaran	Shahbazian	Iran	Iran Veterinary organization	x	
Miriam	Abbadi	Italy	Italian health authority and research organization for animal health and food safety	x	
Monique	Oosterhof	Netherlands	Wageningen Bioveterinary Research (former CVI) of Wageningen UR	x	
Jorge	Freitas	Portugal	Madeira University, Madeira Chemical Center (CQM)	x	
Regula	Hirschi	Switzerland	National Fish Disease Laboratory, Centre for Fish and Wildlife Health (FIWI)	x	
Ava	Waine	United Kingdom	Centre for Environment, Fisheries & Aquaculture Science (CEFAS)	x	
Svetlina	Kirova	Bulgaria	National Diagnostic & Research Veterinary Institute		x
Catherine	Graham	Canada	Animal Health Laboratory, Nova Scotia Department of Agriculture		x
Kateřina	Matějíčková	Czech Republic	Veterinary Research Institute, Brno		x
Sofie	Bjørnholt Binzer	Denmark	University of Copenhagen, Marine Biological Section		x
Tuulia	Enbom	Finland	Finnish Food Safety Authority Evira		x
Seifory	Parvaneh	Iran	Veterinary organization of Iran		x
Nooshin	Zamannejad	Iran	Shahid Beheshti University Tehran Iran		x
Liga	Ansonska	Latvia	Institute of Food Safety, Animal Health and Environment "BIOR"		x
Darius	Nienius	Lithuania	National Food and Veterinary Risk Assessment Institute		x
Paulo	Carvalho	Portugal	Pathology Department of the National Institute for Agrarian and Veterinary Research (INIAV)		x
Silvia	Soares	Scotland	Marine Scotland Science		x
Matthew	Green	United Kingdom	Centre for Environment, Fisheries and Aquaculture Science (Cefas)		x

Course description: Methods for implementation of surveillance procedures for listed fish diseases

Course content

This 5 day course is primarily based on practical work (hands on) in combination with theoretical presentations. This year the course will focus on the comparison between diagnostic techniques for listed fish diseases by evaluating pros and cons of cell culture and Real-Time PCR methods.

At the first day of the course all participants will take part in a fish farm visit. The trip will be supervised by the Danish Veterinary and Food Administration, Section for Aquaculture, that will provide guidelines and protocols for inspection, necropsy and sample collection. Organ material will be collected on site for processing in the lab the following days. During the farm visit sampling procedures will be demonstrated and afterwards conducted by each participant. Starting from day 2, theoretical class room teaching will be given on methodologies, pitfalls and troubleshooting. After the introduction, the participants will be divided into groups. Each group will start processing the samples collected at the farm. This process will include cell culture preparation, inoculation on monolayers, observation of cell culture and assessment of cytopathogenic effect. All cell cultures used for isolation of the listed viruses will be demonstrated and procedures will be conducted by the participants.

Participants will initially be introduced to basic cell culture work: 24-well plate preparation for diagnostic purpose as well as 96-well plate for titration and flask maintenance will be demonstrated and subsequently prepared by the participants. Inoculation of diagnostic samples on cell cultures will be practised. The CPE of different viruses will be shown and the participant will practise reading of diagnostic trays. Titration procedures will be demonstrated and afterwards participants will have the opportunity to practise by themselves. Finally, course participants will calculate virus titres.

The application of novel validated and accredited Real-Time PCR protocols suitable for surveillance will presented and discussed with the participants. This year there will be more focus on genetic characterization of listed fish viruses with theoretical lectures and practical exercises on sequencing, Blast tool and phylogenetic analysis. For this reason each participant is required to bring his/her own laptop.

The course is dialogue based and sufficient time will be given for discussions throughout the course and for evaluation of test results. Quality assurance, cleaning, disinfection, etc. will be an integral part of the practical demonstrations. The taught methods will primarily focus on the protocols given within the EU legislation and OIE guidelines from the Manual of Aquatic Animal Diseases, and include how to select proper controls, the typical pitfalls and troubleshooting, etc. A social dinner will be organized on the second evening. Further details are provided in the invitation letter.

General course objectives

The course aims to provide the participants with knowledge on the most used methods for diagnosis of important fish viruses. The course will focus on; 1) basic cell cultivation techniques, production of cells for different purposes (IFAT, diagnostic trays, titration, etc.), cell susceptibility testing, inoculation of samples and sub-cultivation procedures, reading of cell cultures (including CPE) and virus titration, 2) providing the participants with knowledge on the most used methods for diagnosis of important fish pathogens, 3) Real-Time PCR protocols validated for surveillance of listed fish diseases, 4) genotyping the most important viral pathogens by sequencing and blasting and 5) information on the underlying principles of the tests and how to critically review them in order to assess pitfalls.

Learning objectives
The participants that have followed all the course objectives will be able to;

- maintain, cultivate, inoculate and read most used cell lines (BF-2, EPC, CCB and ASK) for fish disease diagnostic purposes
- prepare cell cultures for different purposes, e.g. diagnosis, IFAT and virus titration
- inoculate and sub-cultivate diagnostic samples
- read diagnostic trays
- titrate virus
- apply Real-Time PCR for surveillance purposes
- genotype important viral isolates by sequencing and blasting
- assess pitfalls and errors in test performances and designs.

The major focus will be on the viral fish diseases using VHS as model. The course will provide a forum where pre-knowledge, experience and examples can be discussed between participants and teachers, and hereby raise the awareness of pitfalls when using the various techniques.

Intended learning outcomes
To increase the practical and theoretical knowledge of cell culture based and bio-molecular techniques used in fish virus diagnostics. The course also aims at providing a forum where (good and bad) experiences can be discussed among participants and teachers.

The core elements
Fish cell line cultivation
PCR / Real-Time PCR
Sequence analysis and use of BLAST tool
Identification and discussion of pitfalls and how to perform troubleshooting

Assessment
Each day will end with a short result and discussion follow-up in order to evaluate whether the participants picked up the treated core elements. Their results will be discussed. At the end of the course a questionnaire for course evaluation will be delivered to all participants.

The course material
Protocol for the hands-on exercises, PowerPoint presentations as well as the original scientific papers describing the applied assays/techniques is included in the course binder. The supervisors will collect the generated results and provide shared data overviews to be starting point of discussions.

The course participants

Since course attendants can come with very different backgrounds, during the general introduction (day 1), researchers and technicians will be asked to introduce themselves, their pre-experience in the laboratory and their expectations to the course in order to target the course content optimally, especially during the theoretical and discussion workshops. Their starting point will therefore be mixed as some may have limited theoretical or practical experience, while others may be highly experienced in some or all disciplines.

Course supervisors

Prof. Niels Jørgen Olesen (DVM, PhD) >15 years of experience in fish virology
Henrik Korsholm (DVM, PhD) >15 years of experience in aquaculture surveillance plan (will be in charge of the farm visit).
Niccolò Vendramin (DVM): Cell culture preparation and reading.
Nikolaj G. Andersen, M.Sc., PhD (course coordinator): Sampling and processing.
Lone Madsen (DVM, PhD): Diagnostic fish bacteriology.
Argelia Cuenca Navarro (M.Sc., PhD): Molecular methods.

Technical help and assistance for running the laboratory courses will be given by

Christina Flink Desler (sample preparation and cell culture techniques)
Didde Hedegaard Sørensen (sample preparation and cell culture techniques)

Day 1	Day 2	Day 3	Day 4	Day 5
Section 1 **Visit to fish farm and DVFA in Jutland**	**Section 2** **Laboratory introduction**	**Section 3** **qPCR analysis**	**Section 4** **Cell culture and phylogeny**	**Section 5** **Cell culture /bacteriology and evaluation**
8:00 – 11:00 **Transport by car to Danish Veterinary and Food Administration in Jutland** **11:00 – 12:15** **Surveillance and control of fish diseases in Denmark**	**9:00 - 10:30** **Participants will be introduced to the laboratory** **Coffee break 10:30 - 10:50** **10:50 - 12:15** **Theoretical introduction to the use of cell culture and qPCR for surveillance programs for non-exotic listed fish disease in Europe**	**9:00 - 12:15** **PCR and Real Time-PCR theory** **Results analysis** **Coffee break 10:30 - 10:50** **Practical exercises** **PCR and Real Time PCR Troubleshooting**	**9:00 - 10:00** **Cell culture preparation for diagnostic purpose, titration and IFAT** **Coffee break 10:30 - 10:50** **10:50 - 12:15** **Titration procedure, viral titre calculation**	**9:00 - 12:10** **(Split in to two teams)** **Team 1 - Cell observation** **Team 2 - Fish bacteriology demonstration** **Coffee break 10:30 - 10:50** **Team 2 - Cell observation** **Team 1 - Fish bacteriology demonstration**
Lunch: 12:15 – 13:00	**Lunch: 12:15 - 13:00**	**Lunch: 12:15 - 13:00**	**Lunch: 12:15 - 13:00**	**Lunch: 12:15 - 13:00**
13:00 – 15:00 **Visit to Vejen Mølle fish farm for sampling** **15:00 – 18:00** **Transport by car to hotel Cabinn**	**13:00 - 15:00** **Sample preparation for different diagnostics procedures (Cell culture and PCR)** **Coffee break 14:30 - 15:00** **19:00** **Social dinner**	**13:00- 15:00** **The diagnostic laboratory – PCR Flow** **Coffee break 14:30 - 15:00** **15:00 - 16:30** **Sequencing theory and practical exercises**	**13:00- 13:30** **Use of cell culture in fish virology** **13:30 – 17:00** **Blast analysis and practical exercise** **Coffee break 14:30 - 15:00** **Introduction to phylogenetic analysis**	**13:00 - 15:00** **Scientific discussion and recommendations** **Conclusion** **Course evaluation**

Evaluation: Methods for implementation of surveillance procedures for listed fish diseases

Table 1-3 and figure 1-3 showing participant satisfaction level for each respective section. The calculations are based on returned evaluation schemes from nine participants.

Table 1. Evaluation of the training course activities for the fish farm inspection, calculated as percentage

Fish Farm Inspection	Very Low	Low	Average	Good	Very Good
Teachers preparedness	0	0	0	11	89
Course relevance for you	0	0	11	11	78
Increase of your knowledge	0	0	13	25	63
Overall opinion of course	0	0	0	22	78

Table 2. Evaluation of the training course activities for the real time PCR session, calculated as percentage

Real Time PCR	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	13	88
Teachers preparedness	0	0	0	0	100
Course relevance for you	0	0	0	22	78
Increase of your knowledge	0	0	0	22	78
Overall opinion of course	0	0	0	11	89

Table 3. Evaluation of the training course activities for the cell culture session, calculated as percentage

Cell culture	Very Low	Low	Average	Good	Very Good
Teachers expertise	0	0	0	0	100
Teachers preparedness	0	0	0	0	100
Course relevance for you:	0	0	22	33	44
Basic cell culture techniques	0	0	11	44	44
Inoculation and subcultivation procedures	0	0	11	0	89
Virus titration	0	0	11	22	67
Reading of plates (CPE, toxic effect etc.)	0	0	0	0	100

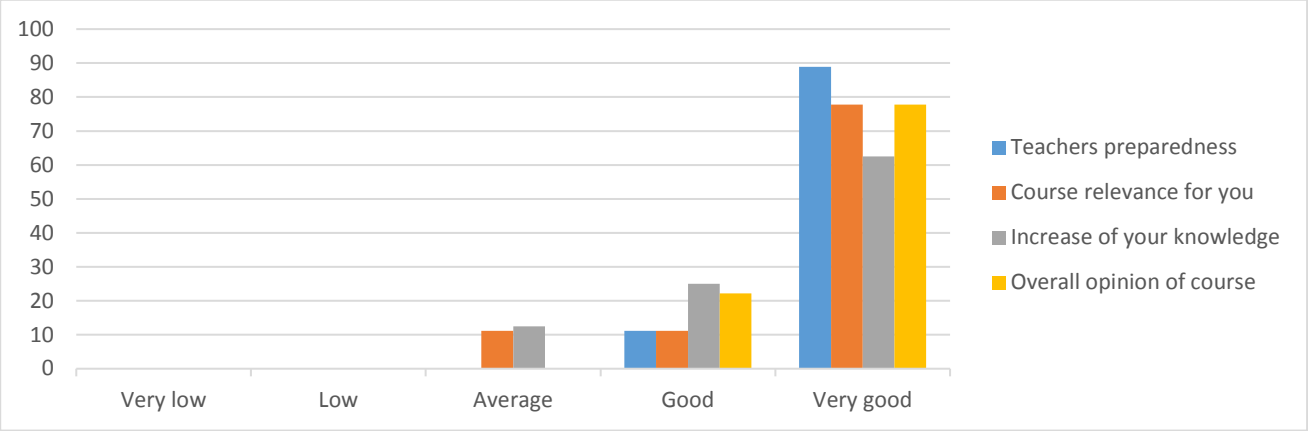

Figure 1. Evaluation of the training course activities for the fish farm inspection, calculated as percentage

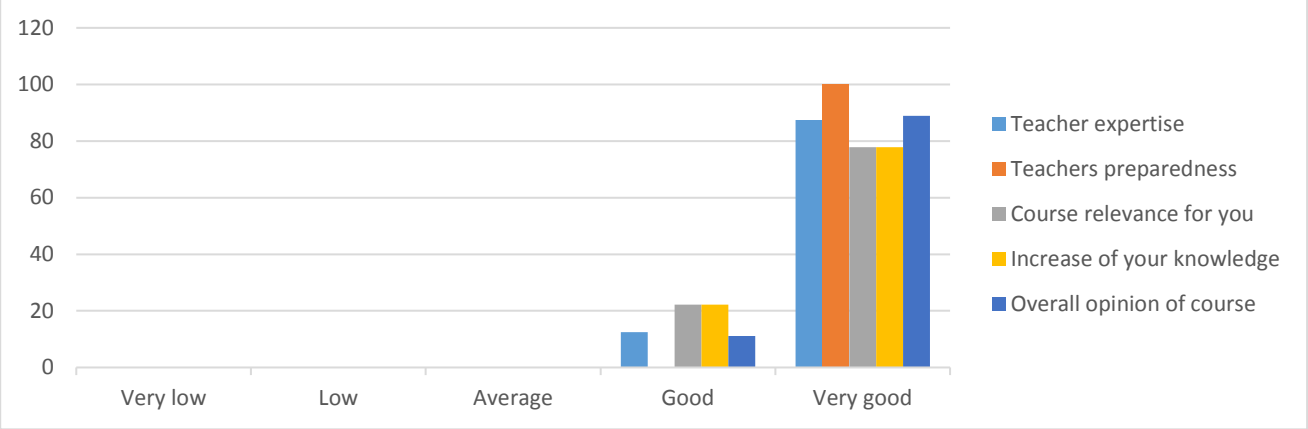

Figure 2. Evaluation of the training course activities for the real time PCR session, calculated as percentage

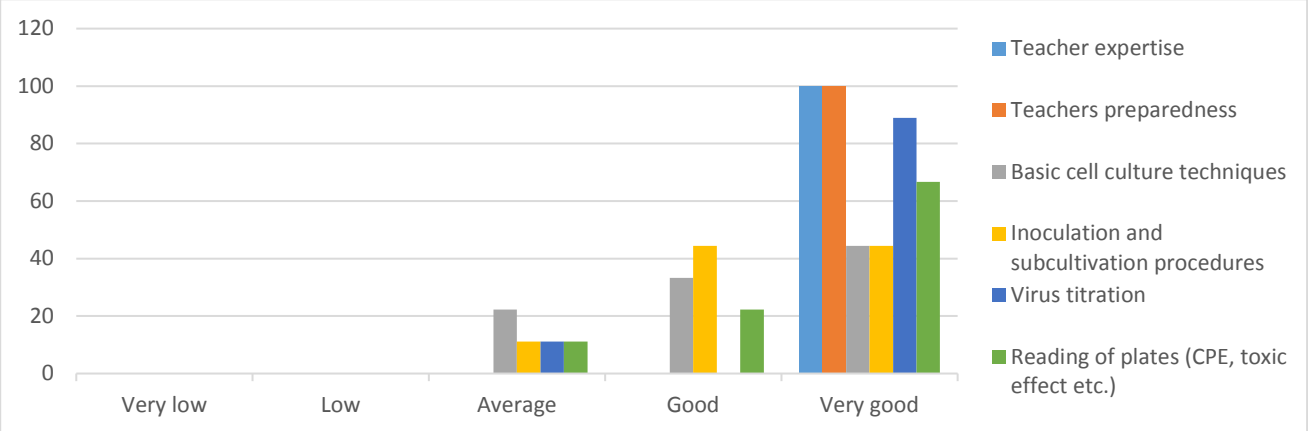

Figure 3. Evaluation of the training course activities for the cell culture session, calculated as percentage

Course description: Introduction to histopathology in fish diseases

Course content

The 4-days course is primarily based on a combination of practical work (hands on) and theoretical presentations.

This course will focus on the use of histopathology in fish diseases, combining a general histopathological approach with pathogen specific techniques such as Immunohistochemistry (IHC) and in situ hybridization (ISH).

The first day participants will be shown how to take optimal samples for histopathological evaluation, considering different tissues and fish sizes. In the afternoon, lectures in pathology and histopathology will begin.

During the next days, the participants will continue the training track with a combination of lectures and practical work and will be introduced to special staining methods or pathogen detecting techniques like IHC.

The course gives an introduction to general pathology and the specific histopathological lesions and lesion pattern that occur as a consequence of disease. Focus is put on the understanding of general pathological processes and on training in histopathological diagnostic skills.

The course is dialogue based and sufficient time will be given for discussion under way.

A social dinner will be organized the second evening. Further details are provided in the invitation letter.

General course objectives

The course aims to introduce participants to the use of histopathology in fish diseases, combining technical knowledge on how to process samples including collection, fixation and the detection and description of lesions that can be observed during different disease stages of systemic infections.

The course will be structured on two main pillars: an overarching part on how to approach histopathology and combine theoretical knowledge on specific lesions to diseases patterns and a more specific part on Immunohistochemistry and In situ hybridization describing pitfalls and application of these techniques to specific pathogens.

Lectures will include descriptions of the techniques with major focus on their application, pitfalls and trouble shooting. Practical sessions and show-and-tell sessions will allow participants to spend time on the microscope individually observing prepared slides, open discussion as well as one-to-one supervision with the tutors.

Participants are encouraged to bring their own slides to discuss the case with the other participants and tutors. If slides for the last day with open discussion have not been sent beforehand they should be handed in on the first day.

Learning objectives

This course aims to introduce the students to pathology and histopathology of fish with the main focus on the systemic infections in farmed fish.

The participants that will have completed the entire course and fulfilled the course's objectives:

Will be able to:

- sample organs and tissue for histopathological examination and submit them in a correct way

Will have gained knowledge:

- on how to discriminate between normal histology and artefacts that occurred during fixation and processing
- on how to detect and describe pathological changes and patterns in a systematic and uniform way
- on the technology for preparing IHC and ISH and how to assess pitfalls and errors in staining processes.

Overall the course will allow participants to understand the underlying principles of the histopathology and specific techniques such as IHC and ISH, thus increasing the ability to evaluate histological slides and critically review results based on histopathological examination. Furthermore the course will allow the participants to obtain a better understanding of specific staining methods thus increasing the ability to critically review these methods in order to assess pitfalls and to correctly interpret them

The major focus will be on systemic infections including listed fish diseases.
The course will provide a forum where pre-knowledge, experience and examples can be discussed between participants and teachers, and hereby raise the awareness of pitfalls when using the various techniques.

Intended learning outcomes
To increase the practical and theoretical knowledge of histopathology of systemic fish diseases including listed diseases. The course also aims at providing a forum where (good and bad) experiences can be discussed among participants and teachers.

The core elements
Histopathology of fish diseases
IHC applied to fish tissue
ISH applied to fish tissue

Assessment
During each day participants are encouraged to take part in the discussions on the subjects presented.
A specific session at the end of the course is allocated for discussion and evaluation of the course and at the end of the course a questionnaire for course evaluation will be delivered to all participants.

The course material
A course binder with practical information will be provided. The course binder will also be used for collection of hand-outs from the various lectures.

The course participants
Since course attendants can come from very different experiences, during the general introduction (day 1), researchers and technicians will be asked to introduce themselves, their pre-experience in the laboratory and their expectations to the course in order to target the course content optimally, especially during the theoretical- and discussion workshops. Their starting point will therefore be mixed as some may have limited theoretical or practical experience, while others may be highly experienced in some or all disciplines.

Course supervisors
Ole Bendik Dale, tutor responsible for pathology and histopathology
Torsten Snogdal Boutrup tutor responsible on IHC
Tim Kåre Jensen, tutor responsible on ISH
Tine Moesgaard Iburg, tutor and course facilitator
Nikolaj Gedsted Andersen, course facilitator

Day 1	Day 2	Day 3	Day 4
Section 1	**Section 2**	**Section 3**	**Section 4**
8:00-9:45 **Course introduction Participants will present themselves…** **Place: Audtorium** **Coffee Break 9:45-10:15** **Walk to necropsy room at DTU VET - FRB 15 min** **10:30-12:00** **Sampling for histopathological examination. Theory and Practice** **Place: Necropsy room DTU Vet** **Walk back to KU 15 min**	**8:00-9:30** **Lecture on pathology and histopathology** **Place: Auditorium** **Coffee Break 9:30-10:00** **10:00-11:30** **Microscopy room I** **Practical exercise**	**8:00-9:30** **Lecture on IHC I** **Place: Auditorium** **Coffee Break 9:30-10:00** **10:00-11:00** **Lecture on IHC II** **Place: Auditorium** **11:00-11:30** **Theoretical exercise on IHC 1** **Place: Auditorium**	**8:00 - 9:30** **Microscopy Room** **Show and tell of cases by Ole Bendik Dale with discussion and participation of course participants** **Coffee Break 9:30-10:00** **10:00- 11:30** **Microscopy room** **More show and tell**
Lunch: 12:15 - 13:00	**Lunch: 11:30 - 12:15**	**Lunch: 11:30 - 12:15**	**Lunch: 11:30 - 12:15**
13:00 – 15:30 **Lecture on pathology and histopathology** **Place: Auditorium** **Coffee Break 13:45-14:15** **14:15 – 15:45** **Lecture on pathology and histopathology** **Place: Auditorium**	**12:15 – 13:30** **Lecture on pathology and histopathology** **Place Auditorium** **Coffee Break 13:30-14:00** **14:00-16:00** **Microscopy room II** **Practical exercise**	**12:15-13:15** **Lecture on ISH (Auditorium)** **Coffee Break 13:15 – 13.45** **13:45-15:45** **Microscopy room III** **Practical exercise** **15:45 – 16:45** **Theoretical exercise on IHC 2**	**12:15-14:45** **General discussion on selected cases brought by participants** **14:45-15:15** **Course evaluation** **Coffee, cakes and goodbye**

Evaluation: Introduction to histopathology in fish diseases

Table 4-11 and figure 4-11 showing participant satisfaction for each respective section. The calculations are based on returned evaluation schemes from 13 participants.

Table 4. Evaluation of the training course activities for sampling for histopathological examination, calculated as percentage

Sampling for Histopathological Examination	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	8	92
Teachers preparedness	0	0	0	8	92
Course relevance for you	0	0	8	38	54
Increase of your knowledge	0	8	0	38	54
Overall opinion of course	0	0	0	23	77

Table 5. Evaluation of the training course activities for the pathology and histopathology session, calculated as percentage

Lectures on pathology and histopathology	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	8	92
Teachers preparedness	0	0	0	8	92
Course relevance for you	0	0	8	31	62
Increase of your knowledge	0	0	0	31	69
Overall opinion of course	0	0	0	15	85

Table 6. Evaluation of the training course activities for the practical exercise in the microscopy room, calculated as percentage

Practical exercise in microscopy room	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	8	92
Teachers preparedness	0	0	0	8	92
Course relevance for you	0	0	15	23	62
Increase of your knowledge	0	0	0	31	69
Overall opinion of course	0	0	0	38	62

Table 7. Evaluation of the training course activities for practical exercise in show and tell in the microscopy room, calculated as percentage

Show and tell in microscopy room	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	8	92
Teachers preparedness	0	0	0	8	92
Course relevance for you	0	0	15	23	62
Increase of your knowledge	0	0	15	15	69
Overall opinion of course	0	0	8	23	69

Table 8. Evaluation of the training course activities for the IHC session, calculated as percentage

IHC session	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	23	77
Teachers preparedness	0	0	8	15	77
Course relevance for you	0	15	8	62	15
Increase of your knowledge	0	8	15	54	23
Overall opinion of course	0	8	8	62	23

Table 9. Evaluation of the training course activities for the theoretical exercise on IHC, calculated as percentage

Theoretical exercise IHC	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	25	75
Teachers preparedness	0	0	0	25	75
Course relevance for you	0	0	33	42	25
Increase of your knowledge	0	0	8	75	17
Overall opinion of course	0	0	8	67	25

Table 10. Evaluation of the training course activities for the ISH session, calculated as percentage

ISH session	Very Low	Low	Average	Good	Very Good
Teacher expertise	0	0	0	25	75
Teachers preparedness	0	0	0	42	58
Course relevance for you	0	0	33	50	17
Increase of your knowledge	0	0	0	67	33
Overall opinion of course	0	0	0	83	17

Table 11. Evaluation of the training course session "cases brought by participants", calculated as percentage

Cases brought by participants	Very Low	Low	Average	Good	Very Good
Course relevance for you	0	8	17	50	25
Increase of your knowledge	0	0	33	33	33
Overall opinion of course	0	0	17	50	33

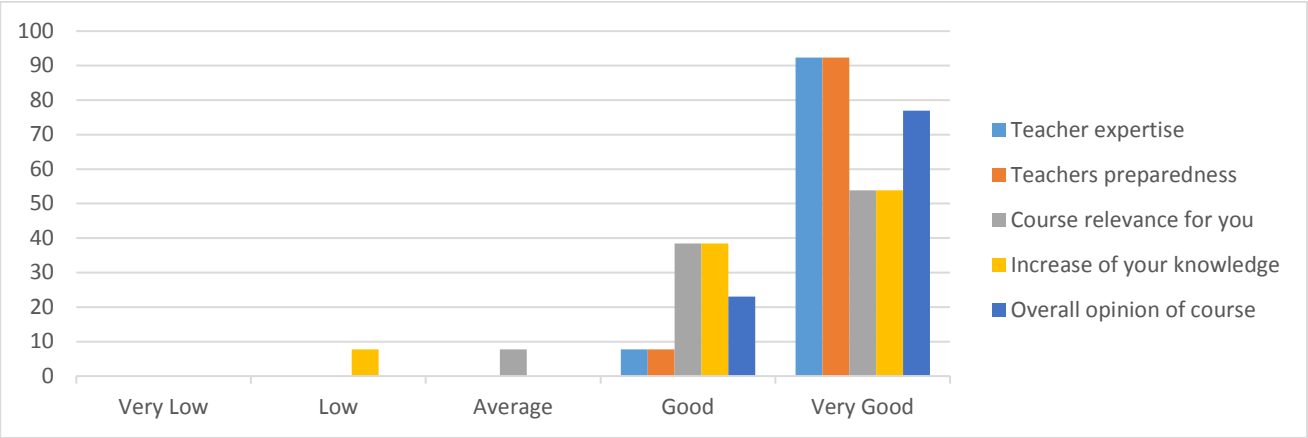

Figure 4. Evaluation of the training course activities for sampling for histopathological examination, calculated as percentage

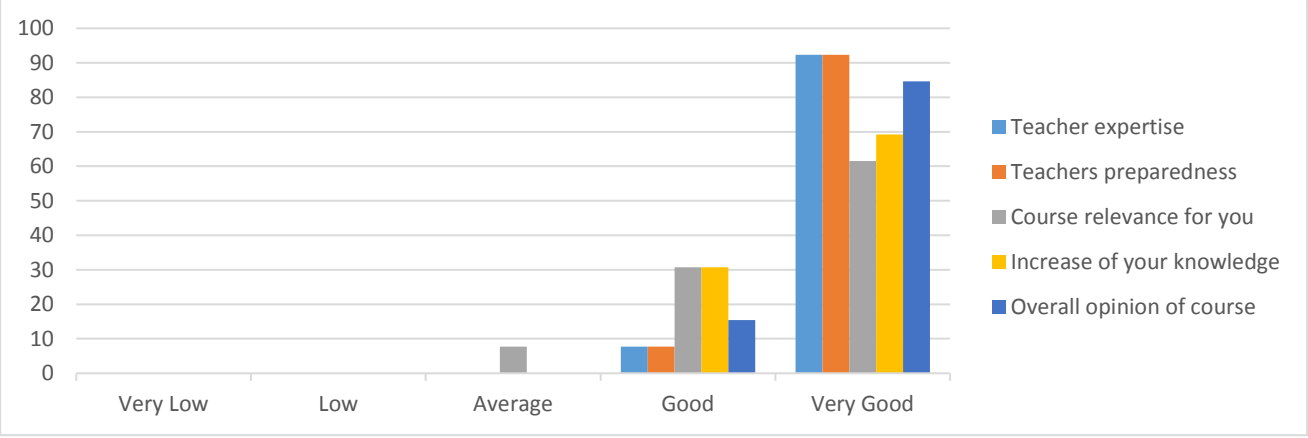

Figure 5. Evaluation of the training course activities for the pathology and histopathology session, calculated as percentage

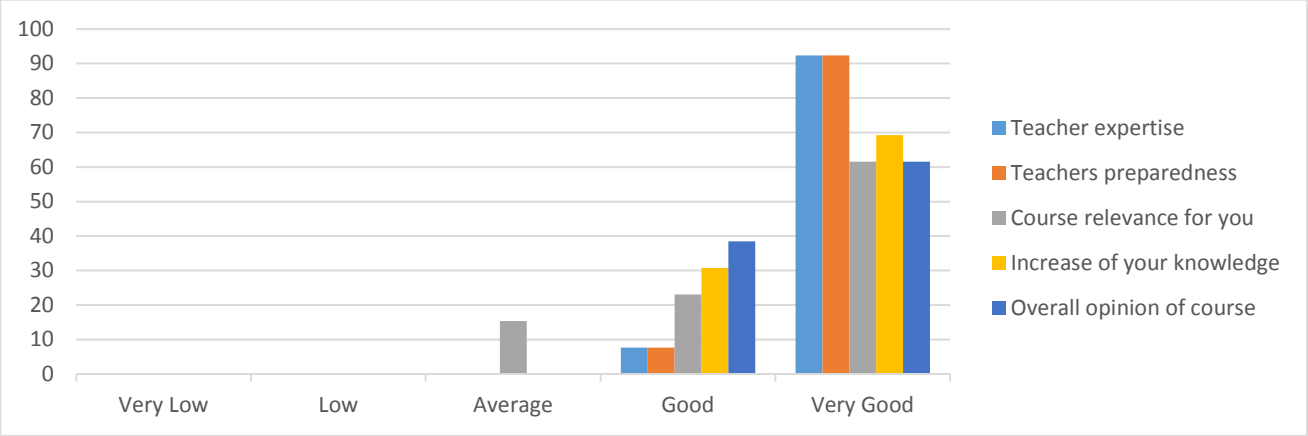

Figure 6. Evaluation of the training course activities for practical exercise in microscopy room, calculated as percentage

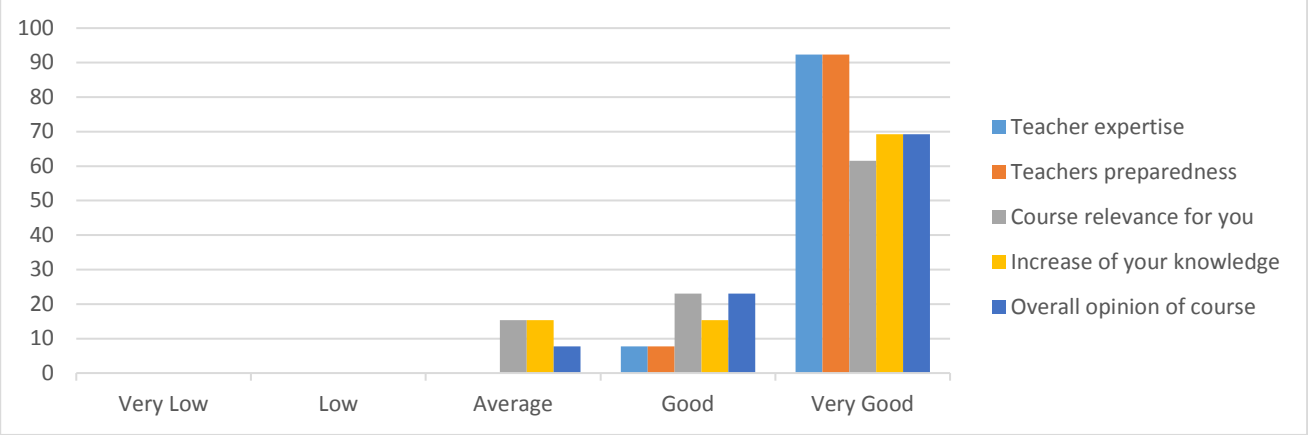

Figure 7. Evaluation of the training course activities for the practical exercise in show and tell in the microscopy room, calculated as percentage

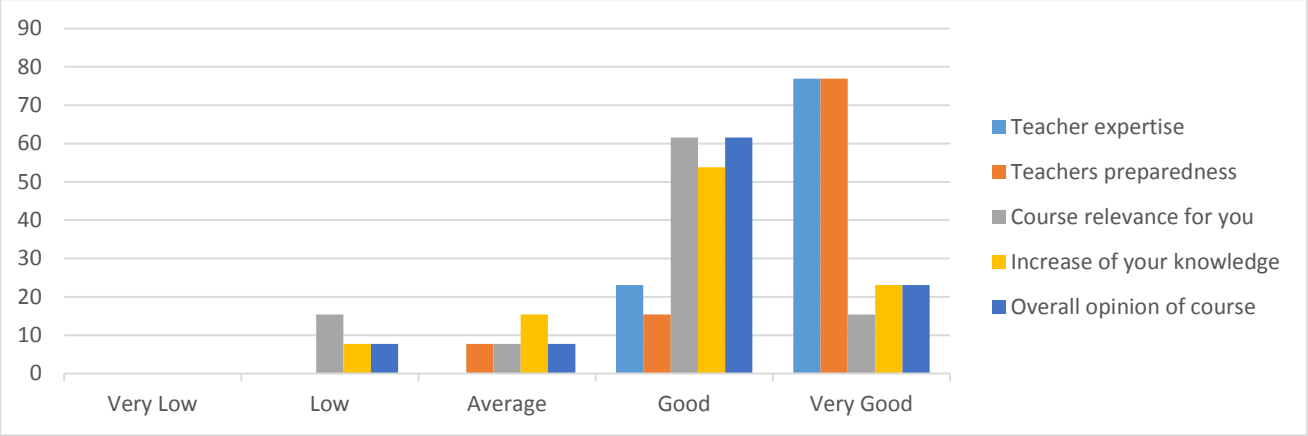

Figure 8. Evaluation of the training course activities for the IHC session, calculated as percentage

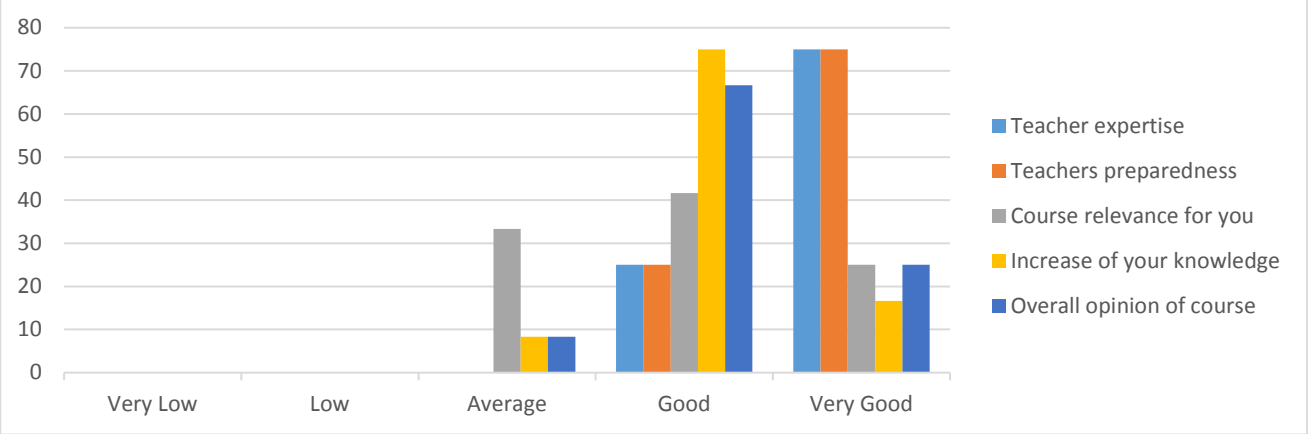

Figure 9. Evaluation of the training course activities for the theoretical exercise on IHC, calculated as percentage

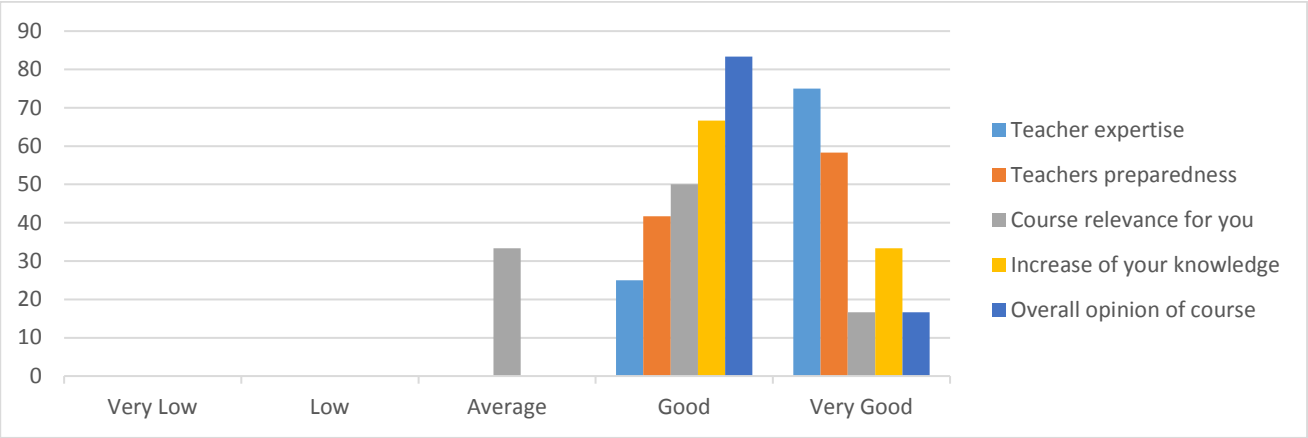

Figure 10. Evaluation of the training course activities for the ISH session, calculated as percentage

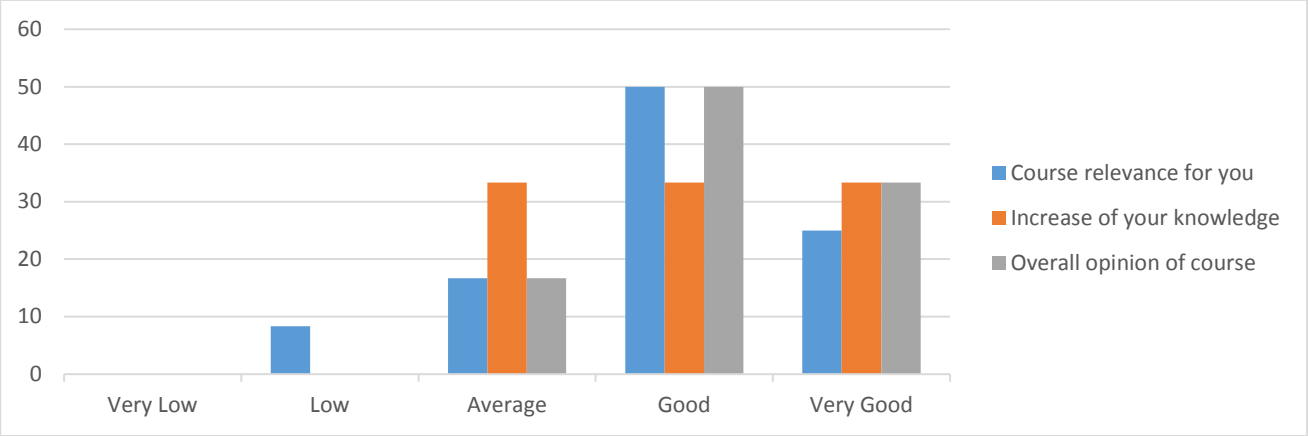

Figure 11. Evaluation of the training course session "cases brought by participants", calculated as percentage

Closing remarks

The EURL training course 2017 was - based on the feedback from the participants - considered a success. The possibility to provide financial support to participants made it possible to offer training to laboratories where the lack of funding usually makes it hard to find the resources to participate in such activities. This way of funding the training courses, therefore, holds the possibility to increase the expertise in all laboratories within the EU.

Again, this year's course on "Methods for implementation of surveillance procedures for listed fish diseases", it was decided to include an inspection to a fish farm, to demonstrate the full process from sampling fish at a fish farm to final reading and interpretation of results, giving a holistic view and large span of topics that, according to the evaluation schemes, were well received.

DTU-Vet is acknowledged for offering training course facilities for free. Dr. Henrik Korsholm and Morten Fruergaaard-Andreasen from the Danish Veterinary and Food Administration, is deeply acknowledged for organizing the office and field visit and for teaching how to organize and implement surveillance and eradication programmes and how to inspect and sample on fish farms. Vejen Store Vandmølle dambrug is acknowledged for its hospitality and for providing all information and facilities needed during the farm visit.

External tutors, Dr. Ole Bendik Dahle, Norwegian Veterinary Institute, Oslo, Norway, Torsten Snogdal Boutrup, Aquapri and Tim Kåre Jensen, DTU Vet are deeply acknowledged for their very enthusiastic and excellent lectures.

Finally, all laboratory technicians and scientists in the fish diseases unit of DTU VET are deeply acknowledged for delivering excellent teaching and training and help with practical issues.

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EURL for fish diseases