



Review of USB FFPW PhD thesis

First name(s), surname, titles of the PhD student: Ali Asghar Baloch, M.Sc.	First name(s), surname, titles of supervisor: Veronika Piačková, MVDr. Ph.D.
Title of PhD thesis: Susceptibility of common carp strains to the disease caused by carp edema virus	

REVIEWER:

Surname: Schmidt Posthaus	Institution: Institute for Fish and Wildlife Health, University of Bern, Switzerland
Name: Heike	
Titles: Prof. Dr. med. vet., DipECVP, DipECAAH	E-mail: heike.schmidt@unibe.ch
Please describe your professional relationship to the PhD student: I never worked with Ali Baloch nor was I involved in the supervision of or any work related to the PhD.	Please describe your field of expertise: I am a trained veterinary pathologist, and diplomate of the European College of Veterinary Pathology and the European College of Aquatic Animal Health. I am specialised in fish pathology and infectious diseases of fish and crayfish. In research, I am focussing on infectious fish diseases, e.g. Proliferative Kidney Disease, and crayfish diseases, e.g. crayfish plague.

QUESTIONNAIRE

Originality, scientific importance, perspectives and impacts of results presented in the PhD thesis for basic and/or applied research

Evaluate competitiveness of the PhD thesis in the international context and compare its level with the current state of the art in the field (**extent ¼ – ½ page**):

The thesis work of Ali Baloch consists of two manuscripts, whereas both papers are already published in peer-reviewed journals. In addition, a clearly written introduction introduces the reader to the topic and its importance and a general discussion sums up the most important findings and refers back to the chapters where these results can be found. In addition, the general discussion highlights the importance of the findings, but also the limitations of the study.

The first part of the PhD work consists of an extensive review of the immune system and cytokine responses of common carp to various infectious agents, including selected viral diseases and *Aeromonas hydrophila*. This review showed that cytokines play an important role in the immune reaction towards viral and bacterial diseases. Authors concluded that



differences in expression profile can be due to different immune strategies or due to genetic differences in the fish host.

The second part of the thesis consists of an experimental part investigating the immune responses in various carp strains with different susceptibility to carp edema virus, to determine immune gene expression pattern in different carp strains infected with two different CEV genogroups and to evaluate selected immune-related gene expressions in the mucosal organs of infected carp. The expression of a total of eleven immune-related genes encoding cytokines, antiviral response, cellular receptors, immunoglobulin, and genes encoding-mucins were monitored in gills of four differently susceptible strains of carp. However, infection lead to the same expression pattern regardless of the fish's susceptibility towards the virus. The results showed that resistance to CEV could not be linked with the selected immune responses measured. Nevertheless, these results are important to the scientific community to rule out possible reason for differences in susceptibility.

Elaboration of the PhD thesis, objectives of the work and deliverables

Evaluate the overall level of elaboration of the PhD thesis (structuring of the main text, comprehensibility, logicity of the chapters and their ordering) and the originality of the selected approaches to solve the objectives; evaluate publications and whether the results described correspond to objectives of the PhD thesis (extent ¼ – ½ page):

The thesis is ordered in an introduction, a main body consisting of two manuscripts (accepted in peer-reviewed journals), rounded up by a general discussion. The first manuscript is an extensive review on the immune system and cytokine responses of common carp to various infectious agents, including selected viral diseases and *Aeromonas hydrophila*. The candidate Ali Baloch did 70% of the total work on this project. The second manuscript deals with the experimental part of the thesis, evaluating immune gene expression pattern in different carp strains infected with two different CEV genogroups. This practical part of the thesis was done in collaboration with a research group in Germany. According to the thesis, the participation of the PhD candidate is 60%.

The title of the thesis "Susceptibility of common carp strains to the disease caused by carp edema virus" is therefore mainly focussing on the experimental part of the thesis and is not comprehensive, as the focus of the practical work also was on immune reactions of carp towards the viral infection. Susceptibility differences were not examined, but rather possible reasons. Also the main goals formulated at the end of the introduction are focussing on the experimental part (Manuscript 2). The review (Manuscript 1) could be regarded as base to elaborate the experimental layout including open questions and should have been more extensively incorporated in the overall PhD structure.



OVERALL COMMENTARY ON THE PhD THESIS

Please write in the box specific comments concerning the PhD thesis in extent of 1-2 pages:

The thesis work of Ali Asghar Baloch consists of two manuscripts, both are already published in peer reviewed journals. In addition, a clearly written introduction introduces the reader to the topic and its importance and a general discussion sums up the most important findings and refers back to the chapters where these results can be found.

The title of the thesis "Susceptibility of common carp strains to the disease caused by carp edema virus" is a bit misleading, as immune reactions of different carp strains, including koi, are examined as response to viral and bacterial infections (review, manuscript 1) or - in an experimental approach - to carp edema virus. Comparison of susceptibility itself was not the focus of Ali Baloch's work. The main goals formulated at the end of the introduction are focussing on the experimental part (Manuscript 2). However, the review (Manuscript 1) could be regarded as base to elaborate the experimental layout including open questions and should have been more extensively incorporated in the overall PhD structure.

The experimental part of the thesis was a work-intensive infection experiment using different carp strain (different susceptibility levels) and different CEV genogroups.

Taken together – manuscript 1 and 2 - Ali Baloch significantly contributed to the understanding of immune reactions of different carp strains to various infections, viral and bacterial, with a focus on CEV.

Ali Baloch

- has made an original and substantial contribution to the knowledge in the field of the study;
- has shown a systematic and critical understanding of a substantial and complex body of knowledge;
- has developed written communication skills;
- has shown expert, specialised, cognitive, technical, creative, and research skills in a discipline area to independently and systematically:
 - being engaged in critical reflection, synthesis and evaluation;
 - developing, adapting and implementing research methodologies to extend and redefine existing knowledge or professional practice;
 - generating original knowledge and understanding to make a substantial contribution to a discipline or area of professional practice;
- can apply knowledge and skills to demonstrate autonomy, authoritative judgment, adaptability and responsibility as an expert; and
- demonstrated a high level of research integrity with an ethical approach.

All papers are published in peer-reviewed journals and obtained international recognition. They covered not yet investigated mechanisms and processes of the immune reactions in carp towards a viral infection.

Ali Baloch was the first author in both papers and contributed substantially to this work. The field of research was well selected as not explored yet and representing a very important issue.



Fakulta rybnářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice
Czech Republic

FINAL RECOMMENDATION

- ☒ PhD thesis can be recommended for defence
- ☐ PhD thesis can be recommended for defence with reservations
- ☐ PhD thesis cannot be recommended for defence

24.06.2023

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Date and place

Šimov - 70/120

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Name and signature