



Confidential

Review of USB FFPW PhD Thesis

First name(s), surname, titles of the PhD student: Volodymyr Bondarenko, M.Sc.	First name(s), surname, titles of supervisor: Assoc. Prof. Dipl.-Ing. Tomáš Polícar, Ph.D.
Title of PhD thesis: Reproduction and intensive juvenile culture in northern pike (<i>Esox lucius</i> L.)	
REVIEWER:	
Surname: Wolnicki	Institution: Inland Fisheries Institute in Olsztyn Fishery Department Żabieniec, Główna 48 05 500 Piaseczno, Poland
Name: Jacek	E-mail: jawol@infish.com.pl
Titles: Prof. dr hab.	
Please describe your professional relationship to the PhD student: None	Please describe your field of expertise: Aquaculture, biology of early stages of fish

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 reviewed thesis is an original work of scientific value, containing experimental results important for both basic and applied research. It is noteworthy that many of results obtained within the work can be easily implemented into aquaculture practice. A good point of the thesis is that it comprises a complete extensive manual for aquaculturists interested in developing production of advanced northern pike juveniles to be used furtherly as a stocking material for natural waters.



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 $\frac{1}{4}$ – $\frac{1}{2}$ page):

In general the reviewed manuscript is organized properly and the results correspond well with the objectives (however, somewhat unclear) of the Ph.D. thesis. The order of its major chapters can be considered as disputable. I would personally prefer to move three scientific chapters (3-5) up and place not scientific Chapter 2 behind them as something resulting from the former.

However, I am afraid that the scientific manuscripts included as Chapters 3-5 may be not the final versions. Otherwise I cannot understand why they contain so many flaws as for example does entirely incomprehensible Abstract from page 54.

It should be stressed that the whole text is written carelessly with many flaws and mistakes and needs a lot of effort to be improved to the acceptable level.

Language is generally poor and abounds in mistakes of different kind. Some but not all more important flaws were highlighted in the pdf file with the thesis.

What has not been done well and what should be done considerably better is General Introduction and – especially – General Discussion. Both of these chapters contain mainly repetitions of sections of the particular articles without more general original relevant information. This should be improved.

Another important flaw of the work is lack of clear final conclusions summing up all important results of the studies performed within the frame of the thesis. To my opinion, such conclusions are necessary.

Literature is selected professionally though – surprisingly – some important and easily obtainable sources were not included.

All the aforementioned critical remarks do not affect my generally positive opinion about the thesis, because all its present weak points are easy to be improved.

OVERALL COMMENTARY ON THE PhD THESIS

Please write comments in extent of 1-2 pages:

Subject of the thesis

Although I have some reservations as to the present form of the purposes of the thesis given in page 11, it is clear that the Author generally intended to develop effective methods of the controlled reproduction of the northern pike and production of high-quality larvae of this species. These issues are of high importance – both scientific and practical – and evidently receive broad interest in many European countries, not only in Czech Republic. From this point of view, all scientific efforts leading to a progress in methods of culture of this species – including its reproduction and rearing – deserve high appreciation.

To my opinion, the subject and purposes of the thesis are good examples of a modern approach to relevant problems of the northern pike aquaculture.



Structure of the thesis

The work consists of six major chapters. Just behind Chapter 1 (General Introduction with five sub-chapters) there are four subsequent chapters containing: not scientific publication entitled *Reproduction and rearing of advanced fry of pike (Esox lucius L.)*; scientific work *Evaluation of different treatments for induction of ovulation in northern pike (Esox lucius L.)* submitted to Aquaculture International; scientific work *Comparison of swimming flagella characteristics in northern pike (Esox lucius L.) and sterlet (Acipenser ruthenus Brandt) spermatozoa using CASA analysis and high speed video microscopy* submitted to Cell Biology International; scientific work *Effect of water temperature on egg incubation time and quality of newly hatched larvae of northern pike (Esox lucius L.)* already accepted for publication in Journal of Applied Ichthyology. All mentioned journals are top journals in the field of ichthyobiology and aquaculture. Chapter 6 includes too short and not very original General Discussion followed by English and Czech summaries etc. etc.

From the formal view-point, I can say that the structure of the work is adequate for a Ph.D. thesis.

The most relevant aspects of the thesis

One of the most important and valuable achievements of the thesis is – to my opinion – an exhaustive manual on reproduction of the northern pike and rearing of advanced juveniles of this species. Preparation of such a wanted and useful work was possible due to broad scientific studies designed and undertaken by the Author. It deserves appreciation the fact that the results of some of his scientific studies can already serve not only pure scientific purposes but also all aquaculture practitioners interested in developing pike culture and production.

What should be pointed out is that the thesis is a good proof of comprehensiveness of scientific horizons of the Author and of his ability to carry out scientific studies in several fields of fish biology and aquaculture.

Conclusion

Summing up, the Ph.D. thesis by Mr. Volodymyr Bondarenko should be considered as his personal achievement in the broad fields of ichthyobiology and aquaculture with a special emphasis on the northern pike. The thesis reveals his extensive knowledge, wide scientific horizons and distinct motivation to scientific research.

Therefore, the thesis fulfills the conditions imposed on Ph.D. theses what means that it can be recommended for defence though with some reservations.



**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 with reservations for defence
 PhD Thesis can not be recommended for defence

Žabieniec, June 25th, 2014
Date and place


Jacek Wolnicki
Name and signature



Confidential

Review of USB FFPW PhD Thesis

First name(s), surname, titles of the PhD student: Volodymyr Bondarenko, Dipl.-Ing.	First name(s), surname, titles of supervisor: Assoc. Prof. Dipl.-Ing. Tomáš Policar, Ph.D.
Title of PhD thesis: Reproduction and intensive juvenile culture in northern pike (<i>Esox lucius</i> L.)	
REVIEWER:	
Surname: Kucharczyk	Institution: University Warmia and Mazury Oczapowskiego 2 str. 10-719 Olsztyn Poland
Name: Dariusz	
Titles: Prof.	E-mail: darekk@uwm.edu.pl
Please describe your professional relationship to the PhD student: I know the PhD student (we met at conferences) and I know his published papers.	Please describe your field of expertise: I'm working on improving artificial reproduction of fish under controlled conditions, mainly wild cyprinids. But one of the main topic in which I work is the artificial reproduction of Northern pike with special emphasis on the quality of gametes and larvae. The obtained results in these studies are implemented in fish farms and used in commercial production.

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 doctoral dissertation by **Volodymyr Bondarenko** is a part of the modern research on the improvement of reproductive biotechnology and rearing larvae of fish which have potential interest to intensive aquaculture. In recent years, the European aquaculture is looking for new species to extension of culture, both freshwater and marine. Among freshwater fish, one of the most valuable species are predator fishes, especially Northern pike and percids: Eurasian perch and pikeperch.



The production of these species is developed year to year. However, the preparation of the full protocol of culture requires, on the one hand the aspects of basic research and on the other, the applied research. The doctoral dissertation by **Volodymyr Bondarenko** entitled “**Reproduction and intensive juvenile culture in northern pike (*Esox lucius* L.)**” research fits precisely in this current trend of research. They are competing to research carried out by other authors in Europe. There are also carried out on a very high scientific level. The compilation of the results obtained in different European research teams should made fast developing of intensive percid aquaculture in Europe.

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 PhD thesis by **Volodymyr Bondarenko** entitled “**Reproduction and intensive juvenile culture in northern pike (*Esox lucius* L.)**” is correctly structured. The aim of the study was clear and understandable presented. The chapters are ordered directly: first the chapter about the broodstock, later the chapters containing chosen aspects of artificial reproduction, and later investigations of gametes biology (spermatozoa) and influence of temperature on embryo development. The author chooses the adequate and responsible research methods to solve the PhD study objectives. The scientific quality of published and submitted papers to the scientific journals (chapters 2, 3, 4, and 5) are high. All attached papers and manuscripts are ordered logically. The aim of the study is strictly correspond with the described results. The PhD thesis contains important information for scientists and fish farmers. Much of the information contained in this trial can be successfully implemented immediately to commercial fish culture.

In my objections raises the quality of the English language, especially in Chapter 2 and 3. Chapter 2 is a translation from Czech language and it need of additional linguistic corrections. Also, Chapter 3, especially sections: abstract and introduction needs to improve language, preferably made by a



native speaker.

OVERALL COMMENTARY ON THE PhD THESIS

Please write comments in extent of 1-2 pages:

The doctoral dissertation by **Volodymyr Bondarenko** entitled “**Reproduction and intensive juvenile culture in northern pike (*Esox lucius* L.)**” is a part of the modern research on the improvement of reproductive biotechnology and rearing larvae of fish which have potential interest to intensive aquaculture. The research was done on Northern pike, which has commercial value today, but in the nearest future will be very important aquaculture species. The commercial culture on the mass scale need very well working protocol of:

- ✓ Propagation, culturing and handling with the spawners.
- ✓ Technology of artificial reproduction, including obtaining high quality gametes.
- ✓ Methods of hatchery techniques including eggs incubation.
- ✓ Larviculture.
- ✓ Culture of juveniles and adult fishes to the market size.

The bottleneck of whole production process is still artificial reproduction. This part of culture is ending in the case of obtaining larvae. Without developing of full protocol of artificial reproduction of Northern pike, the mass culture In the PhD thesis **Volodymyr Bondarenko** focused on few very important problems which solving increasing success of pike intensive culture. The procedures on handling spawners and use anesthetics during manipulation are very important, because the



Northern pike is very sensitive for stress manipulations. Stressed fish have low ovulated rate and produced low quality gametes and showed high mortality rate. Some new, but very important information from these aspects are present in the PhD thesis. The improvement methods of artificial reproduction, including applying new hormonal spawning agents, testing the doses of these agents and new media for hormones and hatchery techniques, including influence of temperature gives the possibility to fast developing methods of mass aquaculture of pike in Europe. Also, presented data showed, which problems of artificial reproduction of Northern pike and larviculture should be solved in the nearest future. The PhD thesis has identified few possible problems in pike reproduction, and presented and discussed factors having the potential to improve embryo production for pond or intensive aquaculture.

FINAL RECOMMENDATION

- PhD Thesis can be recommended for defence
 PhD Thesis can be recommended with reservations for defence
 PhD Thesis can not be recommended for defence

Vodňany 30-06-2019
.....
Date and place

Danier Kucharský
.....
Name and signature