



## New species for EU aquaculture

### Deliverable Report

<b>Deliverable No:</b>	D31.31	<b>Delivery Month:</b>	58
<b>Deliverable Title</b>	Pikeperch “Know-how Transfer” seminar for the aquaculture industry (potential location: France, Belgium, Denmark), presenting the progress achieved through DIVERSIFY in the production technology.		
<b>WP No:</b>	31	<b>WP Lead beneficiary:</b>	P18. CTAQUA
<b>WP Title:</b>	Dissemination		
<b>Task No:</b>	31.5	<b>Task Lead beneficiary:</b>	P9. UL
<b>Task Title:</b>	Full-day seminars on “Know-how Transfer” of the aquaculture of each of the DIVERSIFY species		
<b>Other beneficiaries:</b>	P9. UL	P6. DLO	P16. FUNDP P21. DTU
<b>Status:</b>	Delivered	<b>Expected month:</b>	58

**Lead Scientist preparing the Deliverable:** Fontaine, P. (UL).

**Other Scientists participating:** Robles, R. (CTAQUA), Kestemont, P. (FUNDP), Tacke, G. (DLO) and Lund, I. (DTU).

**Objective:** The objective of this Deliverable is to present via a “know-how transfer” seminar, the progress achieved through DIVERSIFY in the production technology of pikeperch. The seminar has been organized at the Faculty of Sciences and Technologies of the University of Lorraine in Nancy (France). The seminar was mainly organized for all people concerned by the development of the freshwater aquaculture in inland areas in Europe, especially percid culture. In order to inform these people, the first announcement of this seminar was disseminated using the network of the European Percid Fish Culture group. The initial idea was to inform these people about recent progresses obtained related to DIVERSIFY, but also in other topics, not covered by this programme, through presentations of invited speakers.

**Description:** The seminar for pikeperch has been organized over one full day during Y5 (27<sup>th</sup> June, 2018). A total of 68 people attended the seminar, including pikeperch producers, feed producers, aquaculture systems designers (RAS), consultants in aquaculture, scientists and representatives from the administration (**Fig. 1**). We must also indicate that around 10 persons (researchers, PhD students, technicians) from the University of Lorraine have also participated. The participants were coming from 10 different European countries, mainly from Belgium, Denmark, France, Germany and Switzerland (at least 6 participants per country).

Seven presentations from DIVERSIFY partners and 4 from invited speakers were included in the agenda (**Annex I**). The presentations of the morning included a summary of the project from the Dissemination leader Rocio Robles (CTAQUA), followed by a presentation from the Species leader Dr. P. Fontaine (UL) addressing the bottlenecks of the species (**Fig. 2**). Dr. C. Tsigenopoulos (HCMR) explained the research done on the genetic variability of wild and domesticated populations of pikeperch with the objective to establish breeding programs. After the coffee break, one of the invited speakers, M. Stüeken from the Institute for Fisheries from Mecklenburg (Germany) explained how through the environmental control of the reproductive cycle in pikeperch had allowed them to obtain out of season spawning in RAS (**Fig. 3**). Dr. D. Zarski from the Polish



Academy of Sciences, Institute of Animal Reproduction and Food Research (Poland), presented a series of experiments on pikeperch hormonal injection treatments to induce spawning (**Fig. 4**). The morning session ended with the presentation from Dr. Gemma Tacken (DLO), addressing the market, consumer perception, new products and business model for the species. Her presentation included a description of the cost structure of the pikeperch production which was of great interest for the audience (**Fig. 5**).



**Figure 1.** General view of the attendees to the pikeperch seminar at the aula of the Faculty of Sciences and Technologies (University of Lorraine, Nancy, France).

**Which bottlenecks as priorities?**


- Lack of knowledge of the **genetic variability** of the used broodstocks
- **high sensitivity to stressors, handling and husbandry practices** that result in **high and sudden mortalities**.
- **low larval survival** (typical 5-10%) and **high incidence of deformities** (confirm by recent results in Fish2Be and Asialor)

**Figure 2.** Slide showing the main bottlenecks identified for pikeperch culture before writing the DIVERSIFY project (Dr P. Fontaine presentation).



Protocol for induction	Temperature [°C]	Light regime	Feed intensity [%/d]	Duration [w/d]
„Adaption“	23 – 21	• 16 : 8 (L/D) • 50 lx	0.5	2 / 14
„Autumn“	21 – 10	• 8 : 16 • 10 lx	0.5 – 0.15	8 / 56
„Winter“	< 10	• 6 : 18 • < 8 lx	0.1	8 / 56
„Spring“	8 – 15	• 14 : 10 • 20 lx	0.15 – 0.5	8 / 56
„Spawning“	10 – 16	• 16 : 8 • 30 lx	no feed	4 / 28
„Complete cycle“				30 / 210

**Figure 3.** Slide showing a protocol based on environmental manipulations to induce pikeperch out-of-season spawning (M. Stüeken presentation).

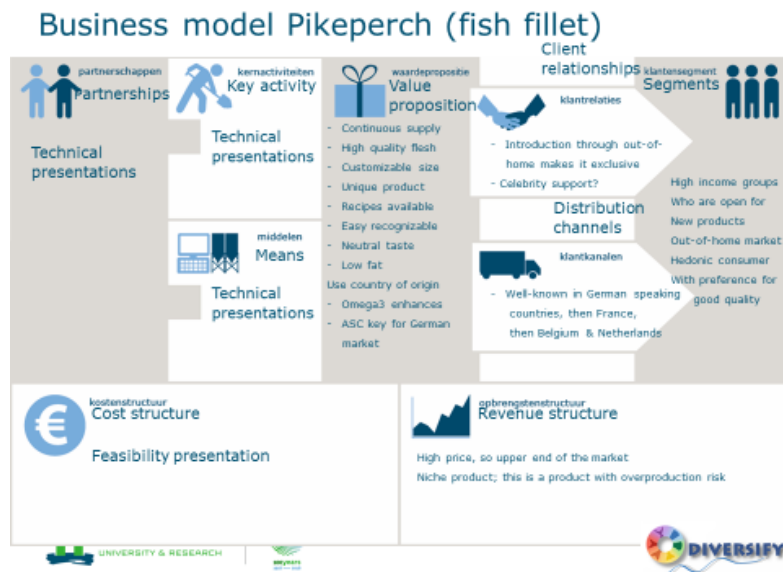
 Institute of Animal Reproduction and Food Research  
Polish Academy of Sciences  
in Olsztyn

Conclusions

1. Both hCG and sGnRHa were found to be efficient for induction of ovulation in pikeperch at various doses
2. A single-dose hormonal treatment mode is recommended for induction of ovulation in pikeperch at a doses:
  - a) 500 IU of hCG per kg
  - b) 50 µg of sGnRHa per kg
3. Fish responding to hormonal treatment fastly (i.e. below 120 h at 12°C) were constituting high proportion of fish yielding lowered egg quality

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**Figure 4.** Slide showing recommendations for hormonal treatment to induce ovulation and spawning in pikeperch females (Dr. D. Zarski presentation).



**Figure 5.** Slide showing a business model for the production of pikeperch fillet (Dr G. Tacken presentation).

After lunch, the first presentation was done by Dr P. Fontaine, it concerned the optimization of larval rearing conditions to improve growth and reduce mortality. An optimal combination of factors (**Fig. 6**) was proposed, it allowed higher survival swim bladder (> 90%) and survival (16%) rates with final juvenile biomass of 14 kg.m<sup>-1</sup>. Then an invited speaker (Dr T. Policar, University of South Bohemia, Czech Republic) down a presentation concerning another way to produce juvenile using outdoor pond systems (**Fig. 7**). A specific discussion concerned the advantages and failures of both approaches. The discussion concerning the improvement of larval rearing was pursued after the presentation concerning nutritional requirements (**Fig. 8**).

#### Experiment 4 : Identification of an optimal combination of factors (53 days)

560 000 Larvae from Asialor (February – April, 2018)

Factor	Modality
Density	100 larvae L <sup>-1</sup>
Sorting of fish jumper	no
Sibling or not sibling	Not sibling
Female weight	Large (> 3,3 kg)
Feeding schedule	Discontinuous
Light regime	12:12
Light intensity	50 lx
Weaning start (dph)	16
Weaning duration (days)	9
Water renewal rate (tank vol./h)	1
Tank cleaning period	Morning
Tank current direction	Bottom to top

This combination was repeated 7 times (n = 7).

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**Figure 6.** Slide showing the optimal combination of factors proposed to improve larval rearing of pikeperch (Dr P. Fontaine presentation).





## Production of juveniles for RAS ongrowing farms with a combined system using POND / RAS



T. Policar, J. Křišť'an, M. Blecha, O. Malinovskyi



**Figure 7.** Slide showing the title of presentation concerning another approach for pikeperch larval rearing (Dr T. Policar presentation).

Workshop on recent progress in pikeperch culture  
Faculty of Sciences and Technologies  
Nancy, France  
27. June

### Main conclusions and recommendations

- ✓ 8.2 % PL + supplementation with 1 % d.w. DHA and 0.17% d.w. EPA promote growth and digestive enzymatic activity, and reduce deformities and cellular stress.
- ✓ No effect on stress markers, escape response or metabolic respiration for larvae fed diets with  $\geq 8$  % phospholipids with or without n-3 HUFA supplementation
- ✓ Essential fatty acids (EFA) can be supplemented as TAG
- ✓ Several important enzyme proteins are affected by PL level and EFA level.
- ✓ Low Ca/P ratio induces similar effects as for high PL + EFA levels. P levels should also be considered
- ✓ Nutritional requirements must consider interactions between nutrients especially HUFA ratio (ARA/EPA/DHA and vitamin C and E (antioxidant effect)).

**Figure 8.** Slide showing the main conclusions and recommendations done for nutritional requirements for pikeperch larvae (Dr I. Lund presentation).

Numerous recommendations were presented by Dr I. Lund from the National Institute of Aquatic Resources in Denmark to improve the nutrition of pikeperch larvae (**Fig. 8**). Then the last part of the seminar was focused on the optimization of pikeperch grow out and disease risk. Dr P. Kestemont



(University of Namur, Belgium) presented a talk targeted on the effect of husbandry practices and environmental factors on pikeperch growth, immune and physiological status using multifactorial approach (**Fig. 9**). It was explained that light characteristics, temperature and fish density were directive factors for pikeperch welfare.

### Organisation of the fractional factorial design

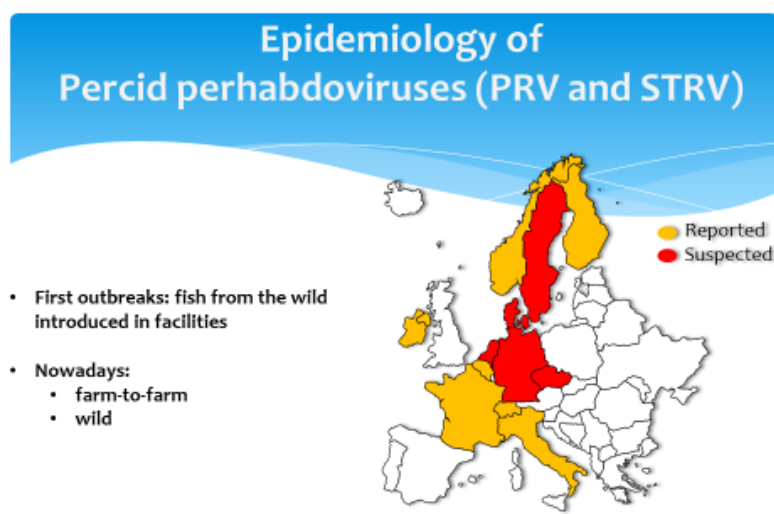
Tank	Light intensity	Stocking density	Light spectrum	Photoperiod	Water temperature	Feed type	Grading	Oxygen saturation
1	10	15	white	24	21	sinking	Y	90
2	100	15	Red	10	26	floating	N	60
3	100	15	Red	24	21	sinking	N	60
4	100	15	Red	10	21	sinking	N	90
5	10	15	Red	10	21	sinking	Y	60
6	10	15	Red	10	21	floating	N	90
7	100	15	Red	24	21	floating	Y	90
8	10	15	Red	24	26	floating	Y	60
9	100	15	white	10	26	sinking	Y	90
10	100	15	white	10	21	floating	Y	60
11	100	30	white	24	26	floating	N	90
12	10	30	Red	10	26	floating	Y	90
13	10	30	Red	24	26	sinking	Y	60
14	10	30	Red	24	21	floating	N	60
15	10	30	white	10	26	sinking	N	60
16	10	15	Red	24	26	sinking	N	90

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**Figure 9.** Slide showing the combinations of factors tested using the multifactorial approach for the optimization of pikeperch growth and welfare (Dr P. Kestemont presentation).

The last presentation was realized by an invited speaker, D. L. Bigarré from the French agency ANSES, it was related the pathological risks linked to viruses. This field is poorly documented and few data exists, however the risks for fish farmers is very high (**Fig. 10**).



**Figure 10.** Slide showing pathological risks related to Percid perhabdoviruses (Dr L. Bigarré presentation).



Fish farmers were highly sensitized to virus risks and several questions were addressed to L. Bigarré about further projects in order to increase our knowledge about pikeperch pathogens and pathology and to secure percid farming.

After all presentations, a debate was organized, it was managed by Rocio Robles (CTAQUA). The debate was very intense and lasted for more than one hour. It mainly focused on the socio-economic situation, perspectives and strategies of farming pikeperch.

Farmers have the impression that cheap imports of fish in the EU make it difficult to market pikeperch for an acceptable price. They proposed that import tariffs or other import barriers should be initiated to protect extra investments in the EU with regard to food safety and animal welfare. This action seems to be unlikely to happen since there was a similar demand to the EU from the meat sector and did not succeed. The chances for such a form of protection of the market is low.

An alternative action was suggested to the producers: to label or market their products as a local product, so that consumers who are interested can pay a premium. In fish and aquaculture marketing, to buy a local product is proven to be a premium (according to the results from the consumer research done in DIVERSIFY). In that case, entrepreneurs would not be so dependent of political decisions and they could be in control. In theory this could be a good approach, but it is not clear who would carry the cost for these actions. In the salmon industry, the Norwegian government has subsidized this kind of marketing. So far, it is unlikely that the EU could fund this kind of marketing for any fish species. However, the existence of a pikeperch producer union could be a way to get market development funds. If pikeperch entrepreneurs would launch a producer's union, it would improve the marketing of the species, the sector development and it could provide several other economic advantages. Some of the farmers are very interested in organizing such a producers union, not only for marketing and sales purposes but also to decrease production costs (feed, innovation, etc).

The need to decrease production costs was the general comment. Several aspects would need a deeper investigation to tackle the high cost of pikeperch production:

- Feed cost, and more specifically, the incorporation of new ingredients in the pikeperch feed formulation, still very dependent on the use of fishmeal (45% inclusion),
- Improve the technical knowledge on feed management, feeding strategies and growth curves,
- Increase fingerling survival and control the high cannibalism during larval stages,
- Breeding programs and selection of specific traits to improve growth performance,
- Promote the exchange of technical information among farmers for the general advantage.

Concerning the economic research done in DIVERSIFY, the audience demanded a more detailed and deeper cost structure study including the business model for the species, however the important issue of fingerling survival and other related issues were not reflected in the projection studies done since it was not stated as such by the data providers. Benchmarking pikeperch farms technically and economically could be an effective approach to improve the learning curve of farms.

The knowledge generated by the DIVERSIFY economic research should be implemented in the pikeperch companies and in the value chain. The audience asked for a set of recommendations for the sector and for more species-specific training programs.

Particularly from DIVERSIFY, they would appreciate to have an economical summary for the species including specific advice, something like “the 10 main things to market pikeperch”. This request will be evaluated by the socioeconomic team of DIVERSIFY. Overall, the debate was very motivating and thanks to the presence of many pikeperch producers, it brought to the scene the main worries and demands of the sector.



All the attendees were very grateful for the organization of this know-how transfer event and even demanded that such a pikeperch seminar would be organized every year.

**Deviations:** No deviation.



## Annex I



**First announcement: Workshop on Recent progress in pikeperch culture**

**Nancy, France, 27<sup>th</sup> June, Faculty of Sciences and Technologies**



### Preamble:

The pikeperch (*Sander lucioperca*) is one of the six species selected for the European project DIVERSIFY (FP7, GA 603121) a five-year project for the diversification of the European aquaculture using new/emerging finfish species. Part of the dissemination activities of DIVERSIFY includes the organization of species-specific knowledge-transfer workshops to facilitate know-how transfer towards fish farmers. The event is opened to all people and has no registration fee. Current information will be posted in the website of the programme (<http://www.diversifyfish.eu/species-workshops.html>).





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## FORECAST PROGRAMME

8:30 – 9:00	Welcome and registration
9:00 – 9:15	Presentation of DIVERSIFY ( <b>R. Robles</b> , Aquaculture Technological Centre, Spain)
9:15 – 9:30	Presentation of the bottlenecks for pikeperch culture ( <b>P. Fontaine</b> , <b>Species leader</b> , University of Lorraine, France)
9:30 – 10:00	Analysis of genetic variability of wild and domesticated populations: basis for further breeding programs ( <b>C. Tsigenopoulos</b> , Hellenic Centre for Marine Research, Greece)
10:00 – 10:30	Coffee break
10:30 – 11:00	Environmental control of the reproductive cycle for out-of-season spawning ( <b>M. Stüeken</b> , Institute for Fisheries, Mecklenburg, Germany – <b>INVITED SPEAKER</b> )
11:00 – 11:30	Hormonal treatments to induce spawning ( <b>D. Zarski</b> , University of Warmia and Mazury, Poland – <b>INVITED SPEAKER</b> )
11:30 – 12:00	Market, consumer perception, new products and business model ( <b>G. Tacken</b> , Wageningen University and Research, The Netherlands)
12:00 – 13:30	Lunch (free)
13:30 – 14:00	Optimization of the protocol for larval rearing in RAS ( <b>P. Fontaine</b> , University of Lorraine, France)
14:00 – 14:30	Production of high quality juveniles for RAS ongrowing farms with a combined system using pond/RAS ( <b>T. Policar</b> , University of South Bohemia, Czech Republic- <b>INVITED SPEAKER</b> )
14:30 – 15:00	Improvement of nutritional requirements for pikeperch larval rearing ( <b>I. Lund</b> , Technical University of Denmark, Denmark)
15:00 – 15:30	Coffee break
15:30 – 16:00	Effects of husbandry practices and environmental factors on pikeperch growth, immune and physiological status ( <b>P. Kestemont</b> , University of Namur, Belgium)
16:00 – 16:30	Major disease risks related to pikeperch culture ( <b>L. Bigarré</b> , ANSES, France - <b>INVITED SPEAKER</b> )
16:30 – 17:30	Debate ( <b>R. Robles</b> , Aquaculture Technological Centre, Spain) <ul style="list-style-type: none"><li>• Are the needs of the farmers covered with the presented research?</li><li>• Is pikeperch culture interesting for investors?</li><li>• Does the market need a product adaptation?</li></ul>

*Remark: All presentations include 10 minutes for questions and discussion.*

*For all registration to this workshop, please contact Pascal FONTAINE **before April 30<sup>th</sup>, 2018.***

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00 33 3 72 74 56 99

<http://www.diversifyfish.eu/species-workshops.html>



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