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BioFishency ELX™

System Assessment Report & POC Test Results

InShare

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Table of Contents

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Abstract

BioFishency Ltd. develops, manufactures and markets highly sustainable and cost-effective Recirculated Aquaculture Systems ("RAS") water treatment solutions. In collaboration with the Technion – Israel Institute of Technology ("Technion"), BioFishency has developed and patented a solution for the removal of electrochemical ammonia in water, marketed under BioFishency ELX™.

BioFishency introduces and integrates this technology in RAS, as an alternative to biofilters, and is now expanding its initiatives in Norway's aquaculture industry. As such, in the fall of 2021, a Proof of Concept (POC) was conducted at Marineholmen RASLab ("RASLab"), a Norwegian research and innovation company with a focus on RAS technology. This POC was initiated to prove the performance of BioFishency ELX in salmon at a dedicated RAS site. During the POC, an identical biofilter was activated for comparison purposes.

The POC results prove that salmon growth and additional health parameters, in BioFishency ELX and biofilter systems, performed in a similar manner to effectively remove ammonia from water.

Background

Founded in Israel in 2013, and part of The Trendlines Group, **BioFishency Ltd.** develops, manufactures and markets disruptive aquaculture water treatment solutions for Recirculated Aquaculture Systems (RAS). The company's patented technologies enable the production of healthier seafood products, while lowering the carbon footprint, and yielding cost and resource savings for its customers around the globe.

BioFishency brings together expertise from the aquaculture, agriculture, engineering, and business development sectors, backed by a skilled and professional management team. With offices and production facilities in Israel and China, and a global install base, BioFishency solutions have been successfully deployed in China, Nigeria, Congo, Bangladesh, India, and Israel.

In 2018, BioFishency signed an agreement to expand its offering by adding a disruptive and innovative technology to its portfolio. **BioFishency ELX™** is a market proven Electro-Chemical Water Treatment (ECWT) system for ammonia removal and disinfection. The first of its kind on the market today, BioFishency ELX operates in a fully controlled environment, while eliminating off-flavors.

Ideal for cold and warm water species, BioFishency ELX is a zero-discharge water treatment system that outpowers the inefficiencies of biological RAS. A built-in disinfection, multi-stage solution in a single cycle, BioFishency ELX directly transforms ammonia to nitrogen, without requiring a denitrification reactor, and operates immediately upon electrical supply. The system has a small carbon footprint, requiring considerably less space than comparable solutions, and is cost-effective, resulting in significant CAPEX and OPEX savings.

The patented BioFishency ELX technology was developed by Prof. Ori Lahav and Dr. Raz Ben Asher at the Technion, Israel's leading technological institute. To date, there are several scientific publications that validate the efficiency of BioFishency ELX technology.

In 2019, to expand its global reach and enter into new markets, BioFishency targeted the Norwegian aquaculture industry, one of the world's leading aquaculture centers. In the spring of 2021, Norway's Allianseinnovasjon (Alliance Innovation), a technology project provider focused on robotics, RAS, nanotechnology, and subsea, acquired partial funding to support BioFishency ELX testing at RASLab's new recirculating aquaculture testing center. This initiative resulted in a POC, from October-December 2021.

This report summarizes the background, methodology, and results of the POC, with detailed analyses, and conclusions that prove BioFishency ELX's ability to produce healthier salmon growth, whereby BioFishency ELX and a reference biofilter system performed in a similar manner to successfully remove ammonia in water.

> ***"BioFishency ELX produces healthier salmon growth, whereby BioFishency ELX and a reference biofilter system performed in a similar manner to successfully remove ammonia in water."***

Methodology

BioFishency ELX technology is an innovative electrochemical process designed to oxidate ammonia directly into nitrogen gas, replacing the limited, traditional biofilter in land-based RAS farms. RAS biofilters are designed to nitrify bacteria, such as strains of Nitrosomonas and Nitrobacter, enabling them to thrive, and process ammonia via the Nitrite, resulting in Nitrate as the final product. To avoid the buildup of Nitrates in the system, a denitrification process is required in the cycle, and/or alternatively, a considerable amount of water is replaced with fresh water.

BioFishency ELX – How It Works

A novel operational approach for seawater RAS, BioFishency ELX is based on a physicochemical water treatment method. The concept behind this technique is to grow fish at high TAN concentration, and a slightly acidic pH level calculated to maintain the NH_3 concentration lower than a predetermined threshold (typically <0.1 mgN/l). The inherently high Cl concentration in seawater enables an efficient electro-generation of Cl_2(aq) species, and consequent electrooxidation of ammonia directly to N_2(g). Fish tank water is constantly recycled between electrolysis tanks and the fish tank, supplying both disinfected water and most of the acidity required to maintain the necessary low pH in the tank.

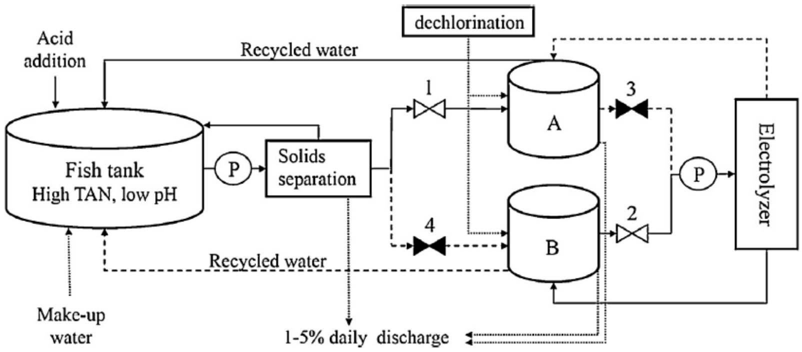


***Fig 1:** Schematic description of the process (A and B are intermediate tanks, operating alternately as electrolysis or water receptacle tanks)*

The water flowing from the fish tank is collected in two receptacle tanks (A and B, as illustrated in Fig. 1, above). Once a receptacle tank is full, it is disconnected from the fish tank, and undergoes batch-mode electrolysis, whereby, due to Cl−electrooxidation, TAN concentration is fully oxidized by the Cl_2(aq) species formed on the anode. During the electrolysis phase, water flow from the fish tank is directed to the second receptacle tank.

When the electrolysis phase is complete, nearly all (95-99%) of the TAN-devoid and disinfected water is returned to the fish tank. Prior to this step, the water undergoes dichlorination (chlorine species reduction via thiosulfate) to ensure that no residual chlorine/chloramine species come into contact with the fish. The electrolysis phase effectively removes the exact daily mass of TAN released by the fish, resulting in maintaining a constant (high) TAN concentration in the tank. The process requires an efficient solids separation phase to ensure that the solids' retention time in the fishpond will result in minimum growth of autotrophic bacteria (e.g., nitrifying bacteria) in the fish tank water.

BioFishency ELX – Key Benefits

- **Operates immediately upon electrical supply** – no startup period required
- **Water temperature agnostic** – works well with salmon
- **Small footprint** – system requires significantly less space as compared with traditional water treatment system areas
- **Inherent disinfection** – additional disinfection system not required
- Direct transformation of ammonia to nitrogen gas – eliminates the need for a denitrification reactor
- **No bacteria used in the process** – results in no off-flavor

POC at RASLab

The POC was initiated by Allianseinnovasjon, followed by a grant from Norges Forskningsråd (Research Council of Norway) via Allianseinnovasjon, to cover a portion of the costs, while BioFishency covered additional costs incurred.

A representative from "NIVA" (Norwegian Institute for Water Research) was regularly involved in water sampling. NIVA's detailed findings are included in this report.

POC Setup

The POC setup included the following elements:

1. BioFishency setup
    a. 1m^3 fish tank
    b. Drum filter
    c. 1.5 m^3 sump
    d. Feeder
    e. BioFishency ELX system

2. Reference System setup
    a. 1m^3 fish tank
    b. Drum filter
    c. Feeder
    d. 1.5m^3 biofilter system

Operating Conditions

As the RASLab test units are designed as integrated units, there was no way to successfully remove the biofilter from the system. The solution was to gradually remove the biofilter media, and leave an empty space (volume) where the biofilter should have been. Essentially, this meant that the BioFishency ELX system had a 1.5 m^3 "sleeping" water volume added, that in turn, held no practical function. The electrolyzing unit is designed to treat a volume of 1 m^3, therefore, even when run at maximum capacity, it was only able to treat 60% of the volume daily, while the biofilter control system had optimal conditions, treating the 1 m^3 it was designed to process.

According to the POC plan, 150 fish should have been stocked in each system, however, upon harvesting, the BioFishency ELX system had 163 fish, while the biofilter system had only 144 fish. According to the lab, due to poor conditions, on November 25, 2021, 5 fish were removed from the biofilter system, and 6 were removed from the BioFishency ELX system.

System	Fish*	Avg. Weight
BioFishency ELX	169	190
Reference Biofilter	149	190

**Fish in each system at stocking, based on fish at harvest and fish removed from each system on November 25, 2021.*

Water Sampling

Daily, BioFishency ELX analyzed pH, NH_4, NO_2 and NO_3, in addition to setting temperatures, cycles, amperes, volts and total CL_2. Further, the water clock was set to monitor water consumption in addition to feed/day.

NIVA analyzed the process at four different dates during the testing for turbidity, alkalinity, UV transmission, total Phosphorous, orthophosphate, total Nitrogen, NH_4, NO_2 and NO_3, redox potential, salinity, Lead, Cadmium, Copper, Zinc, Aluminum, Iron, Potassium, Calcium, Magnesium, Manganese, Sodium, chlorides, DOC, TOC, pH, and suspended matter.

Important POC Deviations

Due to a power failure, the BioFishency ELX system stopped completely at 3.00am on one of the test days, and was reconnected at 12.00pm. This did not affect system performance. There was at least one significant water exchange “accident” in the reference system that can be seen from the chemical and water exchange results. Fish in the BioFishency ELX and reference system had been fed the same amounts, resulting in different feeding rates per fish due to different stocking rations between the systems.

Results and Review

The main objective of the POC was to prove that BioFishency ELX system performance is similar or superior to the traditional biofilter deployed in a salmon RAS facility.

Water Sampling Results

Ammonium, Nitrite, Nitrate and pH were sampled daily. Figures 1a and 1b, below, show the ammonium and nitrite. Low ammonium levels were maintained for both systems, whereas Nitrate levels climb steadily in the biofilter system, while being low and controlled in the BioFishency ELX system.

Due to the rapid increase of NO_3 in the reference system, approximately one month following the POC launch, there was a large water exchange. Eventually, had the water not been exchanged, the NO_3 values in the reference system might have doubled by the end of the POC.

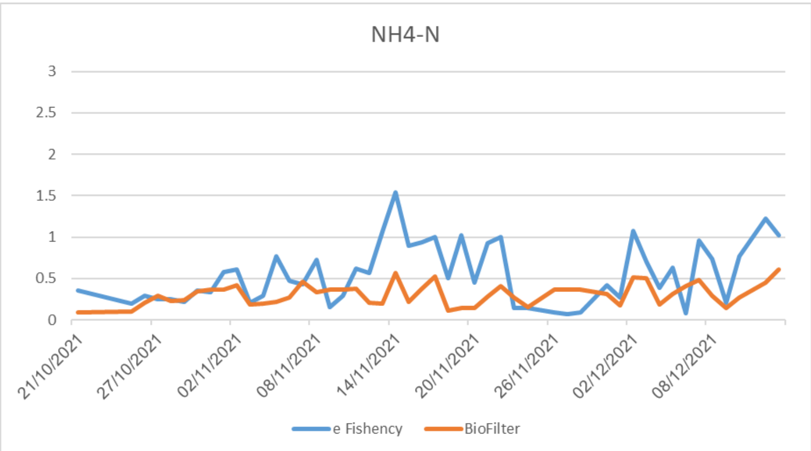


Figure 1a: *Ammonium levels (mg/l) are kept low throughout the testing period*

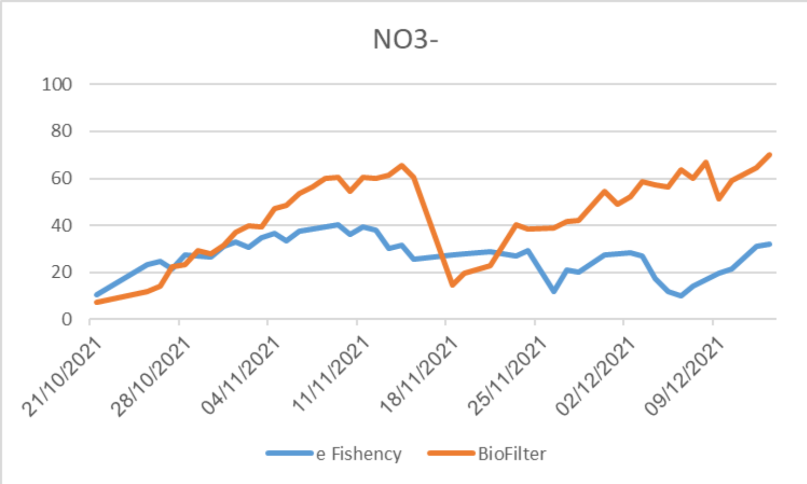


Figure 1b: *Nitrate (mg/l) shows a steady increase in the biofilter RAS. If not for a significant water exchange on approximately November 20, 2021, it would have been double at the end of the POC.*

Table 1, below, shows similar daily water exchanges of both systems, bearing in mind that a single large water exchange in the reference system was due to a high increase in NO3 (as detailed above).

System	Liters	Days	Average/Day	% Exchange/Day
Ref. Biofilter	1267	54	23.46	0.94
BioFishency ELX	1308	54	24.22	0.97

Table 1: *Accumulated water exchange is the same in both RAS systems at the end of the experiment*

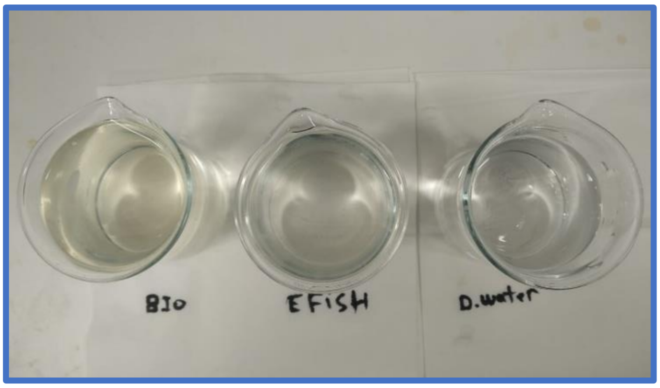
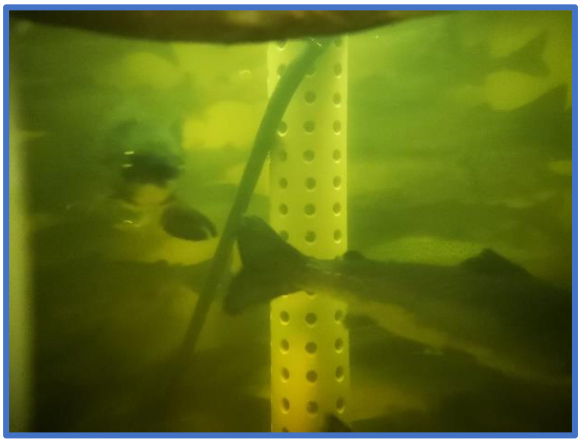


Image 1a: *Comparison of water quality between biofilter and BioFishency ELX system (distilled water at right)*

There was a significant difference in water clarity and color between the BioFishency ELX and reference biofilter systems, as noted in images 1a-c, below. Usually, brown or yellow color in water is an indication of dissolved organic matter. As such, this suggests that organic matter has been oxidized and removed from the water body of the BioFishency ELX system, resulting in cleaner water.

"Organic matter has been oxidized and removed from the water body of the BioFishency ELX system, resulting in cleaner water."

Images 1b and c: *Snapshot through the fish tank window. Image (left) is the tank where the water was treated with the BioFishency ELX system; image (right), was treated by the reference biofilter system.*

NIVA Water Testing

Table 2a, b, and c, below, present NIVA's water testing results.

		Salinity	Chlorid	Redoks		pH	Alkalinity	Tot N	NH_4	NO_2		NO_2+NO_3
Date	System	PSU	mg/l	°C	mV		mmol/l	µg/l	µg/l	µmol/l	mg/l	µg/l
27.10.2021	Biofilter	31,5	14000	23	230	7,8	5,14	23000	370	43	2,0	24000
27.10.2021	E-Fishency	33,4	15000	23	250	7,3	1,46	24000	470	100	4,6	29000
05.11.2021	Biofilter	32,3	18000	23	260	7,3	2,21	69000	790	120	5,7	59000
05.11.2021	E-Fishency	32,3	16000	23	260	7,3	2,18	49000	1600	120	5,6	39000
12.11.2021	Biofilter	32,7	18000	22	270	7,2	1,36	76000	660	31	1,4	57000
12.11.2021	E-Fishency	32,5	16000	22	270	7,4	2,37	51000	4800	240	20,8	38000
06.12.2021	Biofilter	32,2	20000	21	270	7,1	1,4	70000	970	51	2,3	60000
06.12.2021	E-Fishency	33,3	20000	21	270	7	2,36	34000	2700	240	11,1	26000

Table 2a: *Tot N = Total Nitrogen, PSU = Practical salinity unit. No significant differences, except for increasing Nitrate and TAN levels in the biofilter system, and slightly higher alkalinity, Ammonium and Nitrite levels in the BioFishency ELX system.*

		Turbidity	UV-trans	SSP (0,45 µm)	TOC/NPOC	DOC	Total P	Orto-P	SO_4	H_2S
Date	System	FNU	% (5 cm)	mg/l	mg/l	mg/l	µg/l	µg/l	mg/l	
27.10.2021	Biofilter	0,45	18,4	<2,0	6,5	7,8	260	230	3500	
27.10.2021	E-Fishency	0,36	20,5	<2,0	7	7,1	320	280	3500	
05.11.2021	Biofilter	0,69	8,03	3,4	10,4	20,5	520	410	3080	0
05.11.2021	E-Fishency	0,74	7,88	2,7	10,6	10,8	230	130	3040	0
12.11.2021	Biofilter	0,56	8,06	2,4	11	11,9	600	450	2370	
12.11.2021	E-Fishency	0,55	21,6	3,6	6,8	7,2	330	240	1020	
06.12.2021	Biofilter	0,57	14	3,7	10,7	10,9	310		2650	
06.12.2021	E-Fishency	0,96	33,4	5,5	9,5	9,2	290		2880	

Table 2b. *UV-trans = UV transmission, FNU = Formazin Nephelometric Unit, SSP = Suspended solids, TOC = Total Organic carbon, DOC = Dissolved Organic Carbon, Orto-P = Orthophosphate. There appears to be an increase in UV transparency, SSP and turbidity for both systems, but more in the BioFishency ELX system. Other parameters show fewer significant changes.*

Date	System	Pb µg/l	Cd µg/l	Cu µg/l	Zn µg/l	Al µg/l	Fe mg/l	K µg/l	Ca µg/l	Mg µg/l	Mn mg/l	Na µg/l
27.10.2021	Biofilter	< 0,20	< 0,20	6,4	10	13	< 0,05	360000	360000	1200000	< 0,005	10000000
27.10.2021	E-Fishency	< 0,20	< 0,20	5,3	17	7,6	< 0,05	410000	410000	1300000	0,01	11000000
05.11.2021	Biofilter	< 0,20	0,31	8,9	160	4,8	< 0,05	390000	380000	1200000	0,02	10000000
05.11.2021	E-Fishency	< 0,20	0,31	8,8	36	5,4	< 0,05	390000	380000	1200000	0,019	10000000
12.11.2021	Biofilter	0,37	0,33	9	32	6,7	< 0,05	400000	390000	1200000	0,015	13000000
12.11.2021	E-Fishency	< 0,20	< 0,20	4,9	20	7,4	< 0,05	390000	380000	1200000	0,018	10000000
06.12.2021	Biofilter	< 0,20	< 0,20	7,6	20	5,7	< 0,05	380000	390000	1200000	0,03	11000000
06.12.2021	E-Fishency	< 0,20	< 0,20	5,1	13	4,7	< 0,05	430000	450000	1300000	0,02	11000000

Table 2c: *The BioFishency ELX process had no obvious influence on metal ion concentrations in the water.*

Condition Factor

The Condition Factor (CF) provides an indication of the general fish health, as calculated below.

$$\text{Condition factor (CF)}: \ \text{CF} = \frac{\text{body weight (g)}}{\text{length}^3\text{(cm)}} \times 100$$

Evaluation of condition factors for salmon:

1,6 Excellent, trophy-class fish
1,4 Good, well-proportioned fish
1,2 Average fish, acceptable by many anglers
1,0 Poor fish, long and thin
0,8 Extremely poor fish, large head and narrow, thin body

Weight and length of the fish were not reported prior to stocking, however, by using the data from the two registration points, 36 days and at harvest, the CF values in Table 3, below, were calculated.

Days	CF (Biofilter)	CF (BioFishency ELX)
36	1,15	1,14
56	1,21	1,20

Table 3: *Condition Factor (CF)*

Figure 2, below, illustrates the CF values with a linear projection to indicate the value at the start of the experiment.

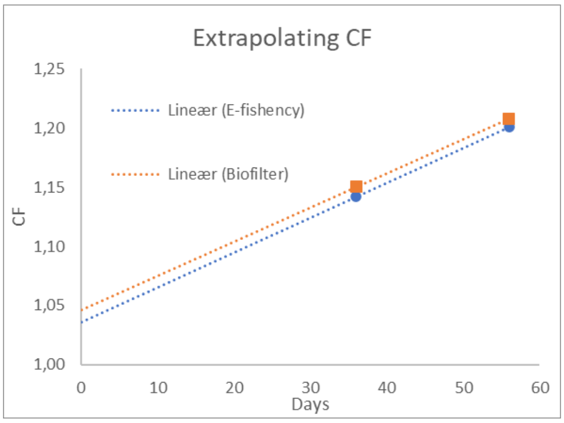


Figure 2: *Extrapolating the registered CF, suggests a low value at the stocking of the experiment*

Further, in this table, we can see a significant difference in the CF factor for the two systems, where both systems show a similar increase until harvest. In conclusion, the CF factor proves that both the BioFishency ELX and reference biofilter systems performed in a similar manner.

Growth Rate

Fish Growth Rate is an important parameter in comparing both system's performance. The key growth factor to determine, is the Specific Growth Rate (SPG). Growth Rate calculates the amount of biomass produced in a certain time, while the SPG represents the fish's ability to add weight, as illustrated below.

$$\text{Specific growth rate (SGR)}: \text{SGR} = \frac{\ln w_2 - \ln w_1}{d} \times 100$$

"W_1" is the fish weight at t1, and "W_2" is the fish weight at t2, whereby d=t2-t1.

In Figure 2, below, we see that there is very little difference between the two systems in the specific growth rate, even though the BioFishency ELX system had a 13% higher load with the same amount of feed added. The slightly higher drop in the SPG towards harvest in the BioFishency ELX system, can be attributed to the fish in this system being underfed, as compared to the reference biofilter system.

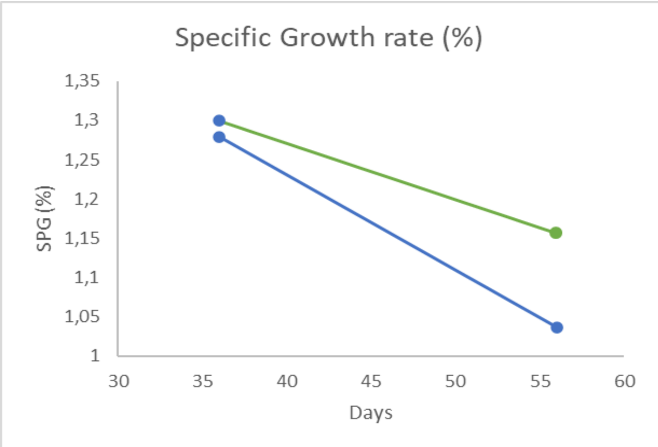


Figure 3: *Green line represents the reference biofilter system; blue line represents BioFishency ELX*

Feed Conversion Rate

The Feed Conversion Rate (FCR) provides information about the feed quality, and the fish's ability to utilize it, as illustrated below.

$$\text{Feed conversion ratio (FCR)}: \ \text{FCR} = \frac{\text{feed eaten (g)}}{\text{weight gain (g)}}$$

Table 4, below, shows how FCR values were calculated during the experiment.

Parameter	Ref. Biofilter	BioFishency ELX
Feed eaten (gram)	24602	24560
Weight gain (gram)	27725	29475
FCR	0,89	0,83

Table 4: *FCR Values*

Table 4 shows that the two systems have been fed the same amount of feed, despite the difference in number of fish stocked. Three different parameters may influence the FCR – quality of the feed, feeding system, and the health of the fish influencing the ability to utilize the feed. When it comes to feed quality and feeding systems, they are identical in both the reference biofilter and the BioFishency ELX systems, unless feed is lost, where the fish are unable to grab it in time. Most likely not much feed was lost, although feed loss was not calculated.

Overall, FCR values were very good, which is an indication of good feed quality, but also, healthy fish. The fact that the FCR appears significantly better in the BioFishency ELX system, may suggest a slightly better health condition of the fish in this system, however, this cannot be concluded.

"FCR values were very good in the BioFishency ELX system, an indication of good feed quality, and healthy fish."

Health Data

Health data was evaluated after 36 days (Table 5a, below), and at harvesting or 56 days (Table 5b, below). It is important to note that the lower the "FishWell" benchmark value is, the better it is.

Skin hemorrhage is one of the parameters that contributes to the BioFishency ELX system's lower score, however, due to higher densities and less feeding, this was to be expected. Higher densities mean that fish will hit each other more often, while fighting for less feed will also influence the score. As the fish grow larger, we can see that the BioFishency ELX system suffers an increasing amount of said damage to the fish.

There is no score for wounds, however, scale loss is higher in the reference biofilter system, although there is a certain drop in both systems towards harvest. Fin status shows no difference between the systems, while for the four different eye conditions, there is a small effect in the BioFishency ELX system. With regard to the remaining parameters, backbone deformity has significance, and it shows the same increase between the two systems towards harvest. Gill status contributes negatively to the BioFishency ELX system at harvest.

25.11.2021	Skin Hemorrhage	Wounds	Scale Loss	Fin Status	Cataracts	Eye Hemorrhage	Eye Protrusion	Opercula	Gill Status	Mouth Injury	Backbone Deformity	Lower Jaw Deformity	Upper Jaw Deformity	Total	
Biofilter	6,0	0,0	34,0	19,0	0,0	6,0	20,0	3,0	0,0	0,0	2,0	0,0	0,0	90,0	Total
E-Fishency	11,0	0,0	20,0	14,0	7,0	6,0	17,0	6,0	0,0	0,0	3,0	0,0	2,0	86,0	
Delta	-5,0	0,0	14,0	5,0	-7,0	0,0	3,0	-3,0	0,0	0,0	-1,0	0,0	-2,0	4,00	
Biofilter	0,3	0,0	1,8	1,0	0,0	0,4	1,0	0,2	0,0	0,0	0,1	0,0	0,0	4,71	Average
E-Fishency	0,6	0,0	1,0	0,7	0,4	0,3	0,9	0,3	0,0	0,0	0,2	0,0	0,1	4,30	
Delta	-0,3	0,0	0,8	0,3	-0,4	0,1	0,2	-0,2	0,0	0,0	-0,1	0,0	-0,1	0,41	

***Table 5a:** Health data registration after 36 days*

14.12.2021	Skin Hemorrhage	Wounds	Scale Loss	Fin Status	Cataracts	Eye Hemorrhage	Eye Protrusion	Opercula	Gill Status	Mouth Injury	Backbone Deformity	Lower Jaw Deformity	Upper Jaw Deformity	Total	
Biofilter	4,0	0,0	18,0	20,0	7,0	0,0	20,0	3,0	0,0	0,0	7,0	1,0	0,0	80,0	Total
E-Fishency	28,0	0,0	12,0	20,0	14,0	0,0	25,0	2,0	13,0	0,0	9,0	0,0	0,0	123,0	
Delta	-24,0	0,0	6,0	0,0	-7,0	0,0	-5,0	1,0	-13,0	0,0	-2,0	1,0	0,0	-43,00	
Biofilter	0,2	0,0	0,9	1,0	0,4	0,0	1,0	0,2	0,0	0,0	0,4	0,1	0,0	4,00	Average
E-Fishency	1,4	0,0	0,6	1,0	0,7	0,0	1,3	0,1	0,7	0,0	0,5	0,0	0,0	6,15	
Delta	-1,2	0,0	0,3	0,0	-0,4	0,0	-0,3	0,1	-0,7	0,0	-0,1	0,1	0,0	-2,15	

***Table 5b**: Health data registration after 56 days*

It is important to note that after 60% of the time, the scores are slightly negative towards the reference biofilter system. Up to this stage, fish will be smaller, however, for the remaining 40% of the experiment, larger fish will mean even higher densities, and more stress in general. Presumably, this explains why the BioFishency ELX system scores are lower at harvest, as the higher densities and scarcer food will lead to more aggressive fish.

This is also reflected by the fact that by far, skin hemorrhage adds to the BioFishency ELX system's negative score at harvest, suggesting that fish are presumably bumping into each other more frequently, and into the walls of the tank. If skin hemorrhage is removed from the calculation, there is a significantly less difference between both systems at harvest.

Quantidoc Health Evaluations

Fish health methodology developed by Quantidoc (https://www.quantidoc.no), analyses the mucous cell size, density and distribution, to assess whether the cells are in a defensive or healthy state. Once mucous cells are in a defensive state, it means that environmental conditions, and the effect of external stressors are not optimal. This is due to handling, pharmaceuticals, and other factors, such as water chemistry.

Findings from fish sampled after the end of the experiment, were that the fish in the BioFishency ELX system were in better health. Both mucous cell size and density was smaller than in the reference biofilter system, indicating lower defense activity, and more optimal environmental conditions for the fish. Quantidoc has developed a formula to calculate "defense activity," where Quantidoc results clearly indicate the results identical to the experiment (see Figure 4, below).

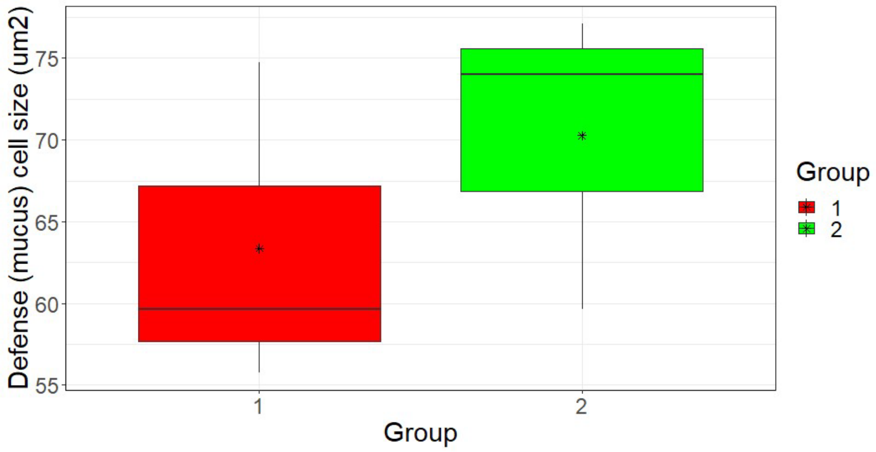


***Figure 4:** Defense mucous cell size. Group 1: BioFishency ELX system; Group 2: Reference biofilter system*

A visual assessment using histological slides proved the same tendency. The epithelium/gill surface ratio was higher for the fish from the reference biofilter system, suggesting that the degree of epithelial hyperplasia in the gill lamella as well, is higher. These results can be clearly seen in Figure 5, below.

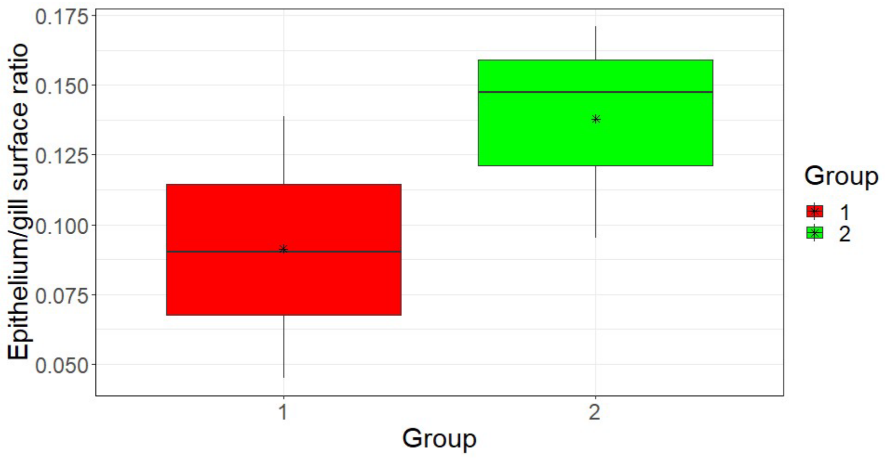


***Figure 5:** Group 1 - Group 1: BioFishency ELX system; Group 2 - Reference biofilter system*

Quantidoc has created a large database used to plot defense mucous cell size against the calculated defense activity. The plot, entitled "VERIBARR," is used to identify where a certain sample is to be found related to fish's known background health status. As can be seen in Figure 6, below, the plot clearly indicates that the fish from the BioFishency ELX system appear to be in a sector of fish that are in better health than the fish samples from the reference biofilter system.

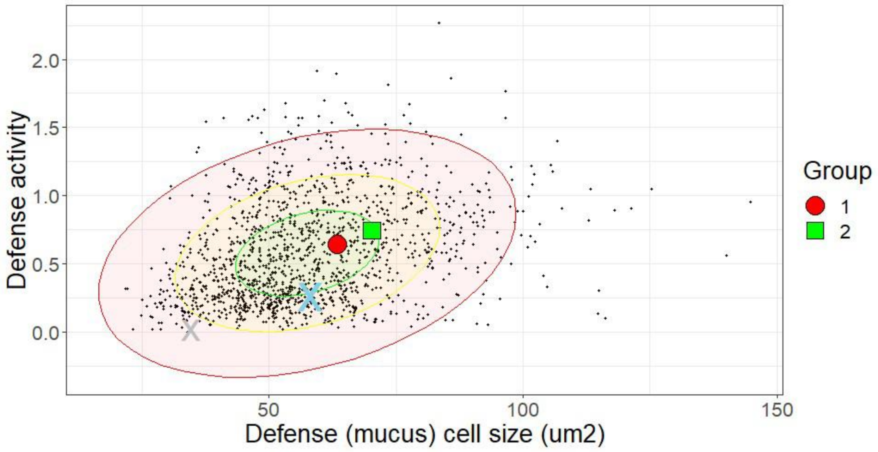


Figure 6: *VERIBARR Grid (Traffic light model) for salmon gill lamella (n=6) in relation to QuantiDoc's database (Seawater subset; n=1432). Green zone = common; yellow zone = potentially vulnerable or recovering; red zone = transition to vulnerable or active protection. Green zone is 30% of the values in the database. Colors and shapes indicate diets and cages. X- wild Atlantic salmon adults, X- wild Atlantic salmon smolts. Group 1 is the BioFishency ELX system.*

"Fish from the BioFishency ELX system appear to be in better health than the fish samples from the reference biofilter system."

Conclusions

A POC comparing the BioFishency ELX and traditional biofilter in Salmon RAS systems, was conducted at RASLab in Norway. The duration of the POC was 56 days, and included a sufficient number of fish to establish reliable statistics. Multiple tests were conducted during the POC.

POC test results indicated that growth and health using the BioFishency ELX system performed better or similar to the reference biofilter system.

Growth rate and development condition factor were similar in both systems.

With regard to the food conversation ratio, it appears that the fish in the BioFishency ELX system had a lower FCR, indicating better feed utilization, and better health conditions.

This was also underlined by the health data, where the nature of damage to the fish appears to point towards more active fish.

The Quantidoc innovative gill sample, and analytic method proved that the fish from the BioFishency ELX system appear to have a healthier growth environment, resulting in potentially more robust fish.

Jarl Øystein Zhou Loland, CEO & Co-Founder
InShare AS
Grimstad, Norway, June 2022

About InShare AS

Established in 2013, InShare AS provides a wide range of aquaculture and agricultural services, international cooperation, and research activities, including project management, research, consultancy associated with the agriculture and aquaculture sector.