

PROJEKT MARINET – PRELIMINARNI REZULTATI

Marinet | Hrvatski veterinarski institut, PP2

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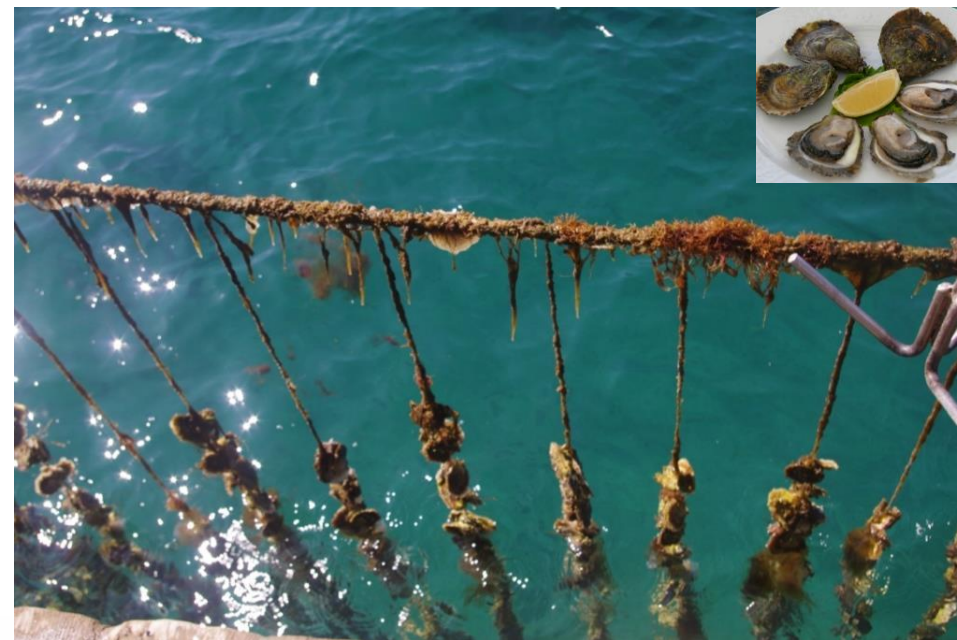
² Fakultet za menadžment u ugostiteljstvu i turizmu, Ika, Hrvatska

³ Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro, Italia

⁴ Università degli studi Udine, Udine, Italia

15. MEĐUNARODNA KONFERENCIJA O AKVAKULTURI, VUKOVAR, 2-4. travnja 2025

MARINET – UMREŽAVANJE U MARIKULTURI: Primjena novih tehnologija za diverzificiranu održivu akvakulturu usmjerenu na zdravo društvo i konkurentne regije



CILJEVI PROGRAMA 2021-2027

1.1 - Inovacije i istraživanja / SO 1.1

1.1: Razvoj i jačanje
istraživačkih i inovativnih
kapaciteta i preuzimanje
naprednih tehnologija



CILJEVI PROJEKTA

1.1: Razvoj i jačanje istraživačkih i
inovativnih kapaciteta i preuzimanje
naprednih tehnologija

**Kreiranjem, primjenom, i diseminacijom
inovativnih pristupa akvakulturi i integriranoj
marikulturi**, naš je **cilj** definirati **biosigurnosni
okvir dizajniran za jadransku regiju s fokusom
na inovativne alate za praćenje održivosti
okoliša i proaktivne strategije prevencije
bolesti te prijenos ovih novih pristupa malim i
srednjim poduzećima.**

Osim toga, projekt će utjecati na **transformaciju
percepcije potrošača i prihvaćanju proizvoda
akvakulture** temeljem **dokazane nutritivne
kvalitete i sigurnosti** kroz **marketinške
procjene, bio-ekonomske modele i
diseminaciju inovativnih postupaka
dizajniranih za primjenu na uzgajalištima riba
i školjkaša.**

PROJEKT U BROJEVIMA



- 2 Sveučilišta
- 2 Nacionalna istraživačka instituta



Explaining in detail



Effective management



Goal-setting



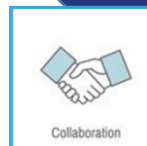
Analysing



Communication



Cooperation



Collaboration

Uključeno
više od 50
znanstveni
ka i
stručnjaka

- 1 obrtnička komora



- 1 udruga
akvakulture



TRAJANJE PROJEKTA

1. ožujka 2024

31. kolovoza 2026

KORDINATOR

Sveučilište UDINE

Ukupni BUDŽET

1.871.881,44 eur



Od kojih

ERDF FOND

1.497.505,15 eura

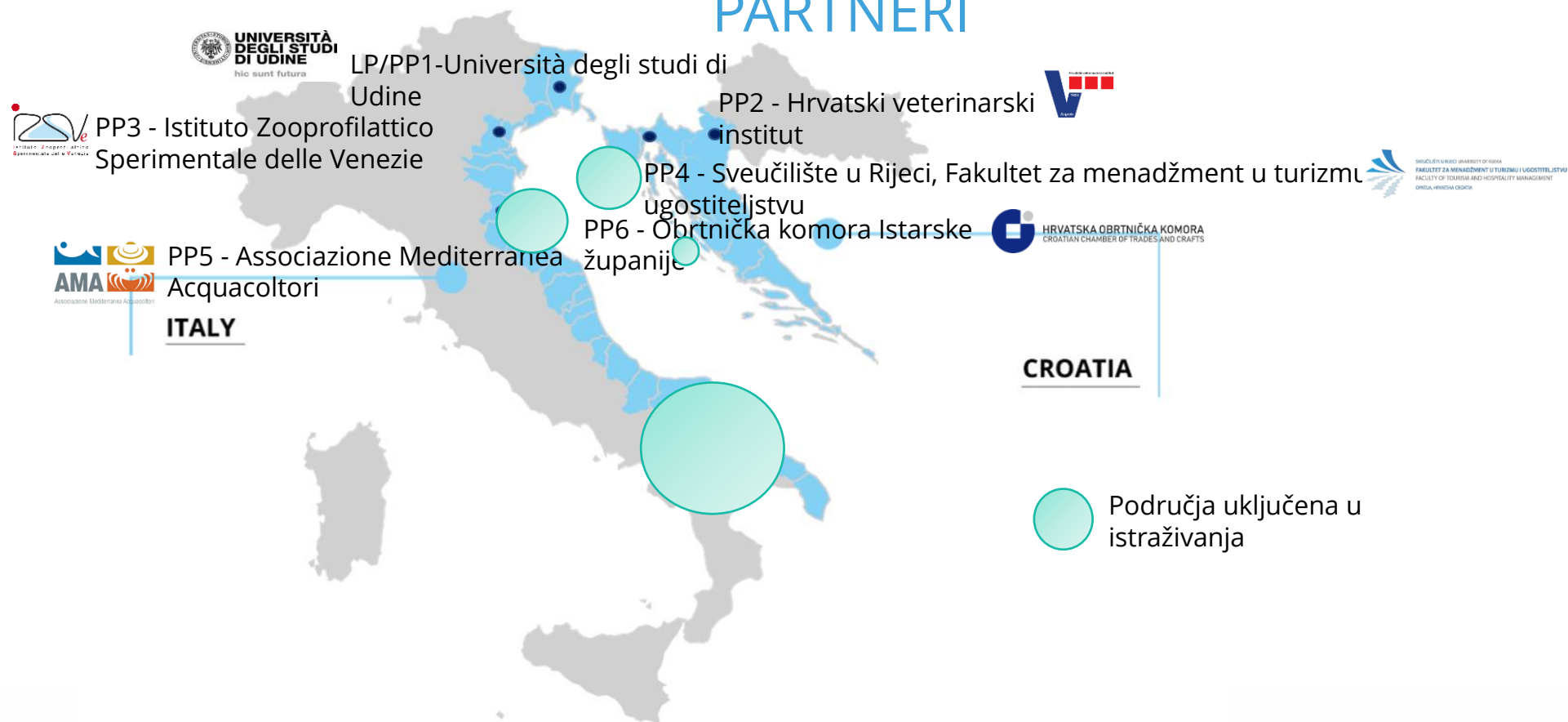
**NACIONALNA ili
partnerska
KONTRIBUCIJA**

209.366,74 eura (FdR)

165.009,55 eura (javni
udio)



PROJEKTNO PODRUČJE I PARTNERI



KAPITALIZACIJA REZULTATA PROŠLIH EU PROJEKATA



AdriAquanet projekt – Jačanje inovacija i održivosti u jadranskoj akvakulturi,
Interreg IT-HR , SO1.1, 2017-2022.



PerformFISH projekt: Integrirani inovativni pristup za kompetitivnost i održivost u vrijednosnom lancu Sredozemne akvakulture. Horizon 2020, Research and Innovation Action (RIA), 2017-2022.



ParaFishControl: Napredni alati i istraživačke strategije za kontrolu parazita u europskih uzgajanih riba. Horizon 2020 (H2020-SFS-10a-2014), Research and Innovation Action (RIA), 2015 - 2020.

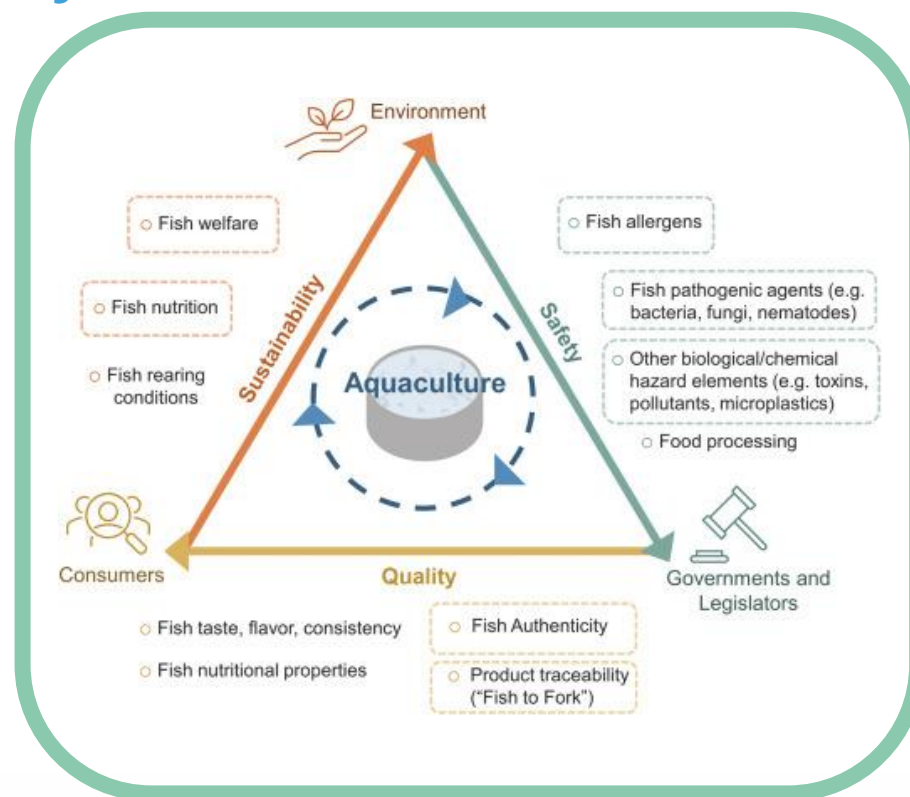


MedAID. Integrirani razvoj sredozemne akvakulture. Horizon 2020, Research and Innovation Action (RIA), 2017-2022.

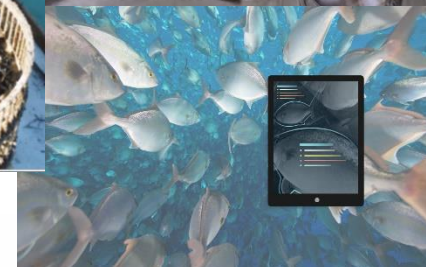
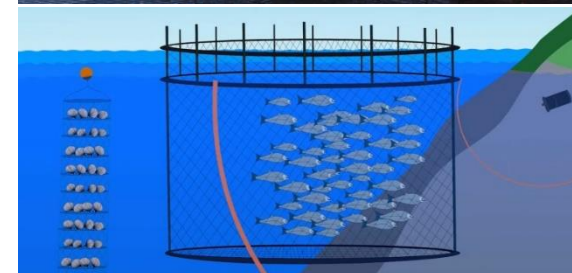
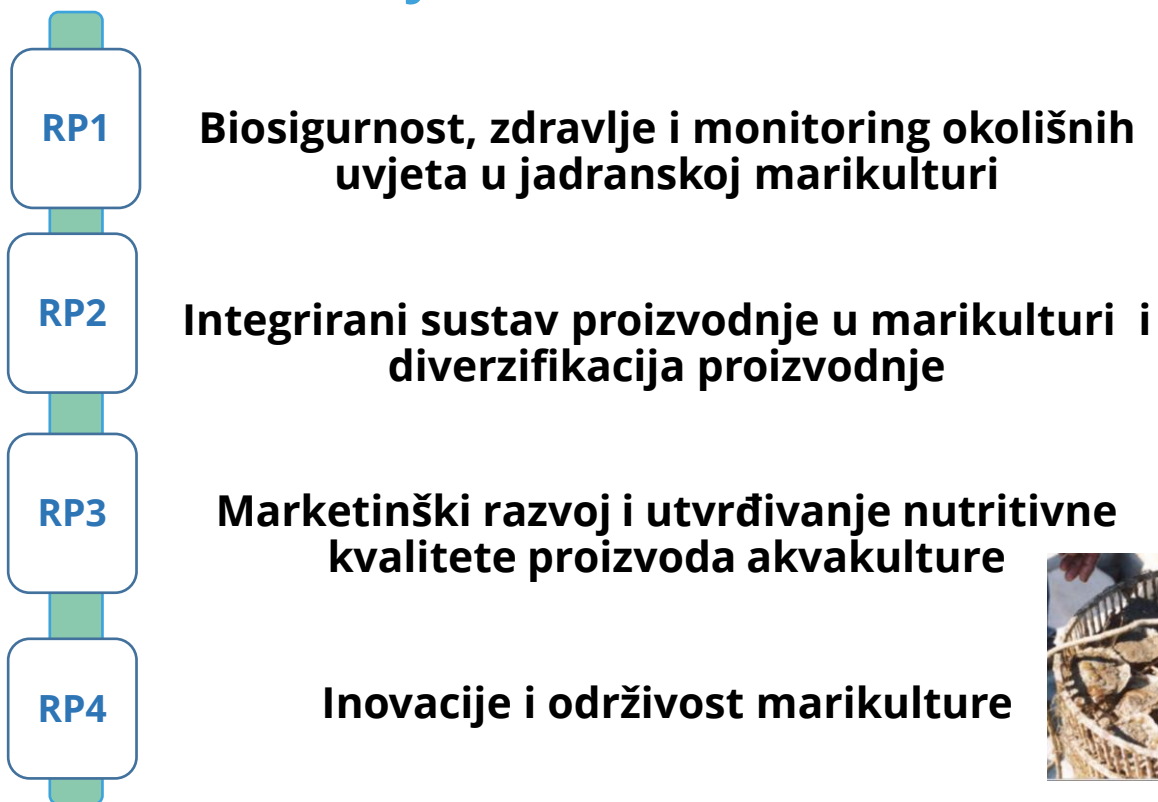
FAIMMAC. Integrirani model upravljanja ribarstvom i akvakulturom uzduž jadranskih obala. EASME/EMFF/2015/1.2.1.7/02/SI2, 2016-2018.

PROJEKTNI IZAZOVI KOJI ĆE POBOLJŠATI AKVAKULTURU JADRANA

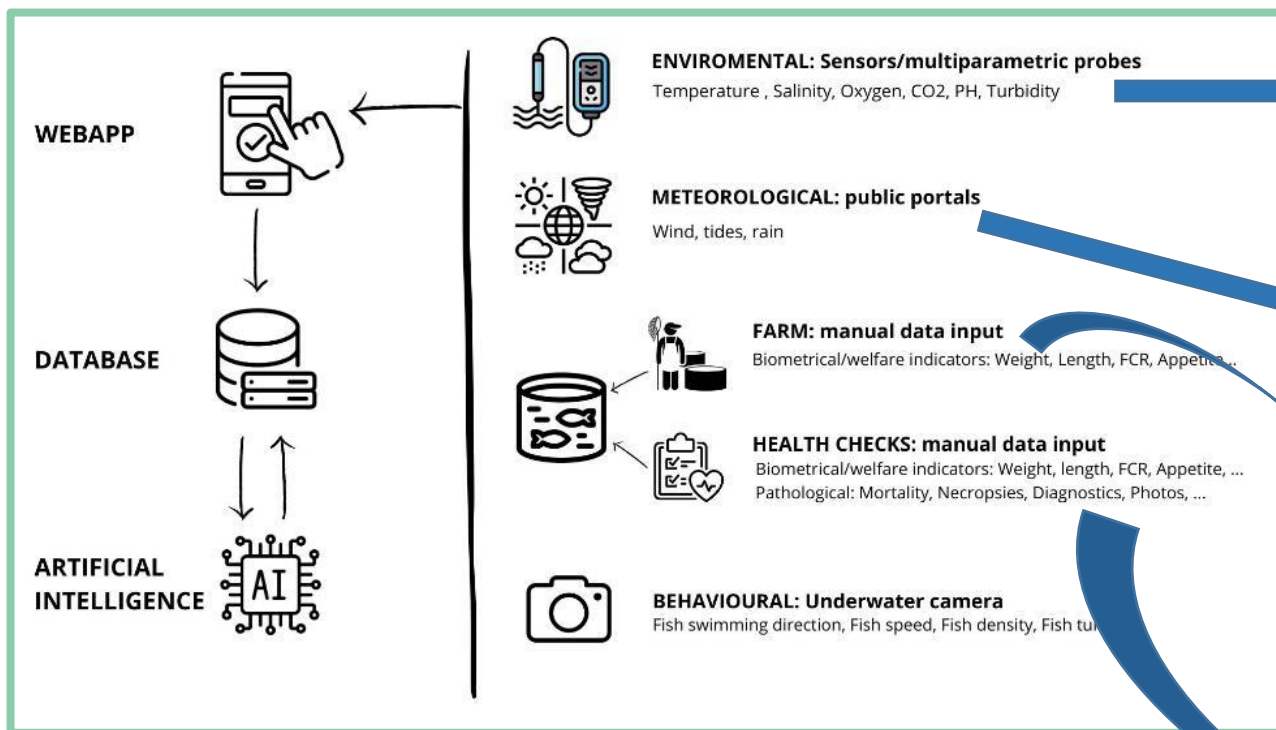
- **Unaprijediti** održivost uzgoja riba i otpornost klimatskim promjenama i novim proizvodnim potrebama.
- - **Procijeniti** uzgoj u integriranoj marikulturi i **analizirati** diverzifikaciju proizvoda: uzgoj riba (lubin i komarča) i uzgoj školjkaša (Europska kamenica).
- - **Pojačati** kvalitetu i zdravstvenu ispravnost te sigurnost proizvoda akvakulture.
- - **Identificirati** marketinške alate i pristupe kako bi se **poboljšala** percepcija potrošača prema proizvodima akvakulture i posljedično povećala potražnja odnosno proizvodnja u akvakulturi



PROJEKTNI RADNI PLAN



Aktivnost 1. Monitoring zdravlja i okoliša

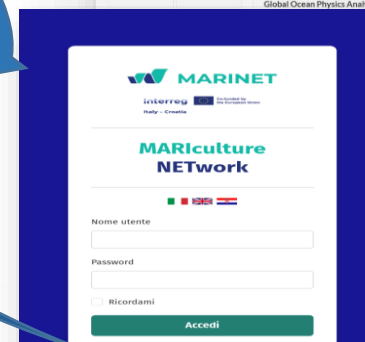
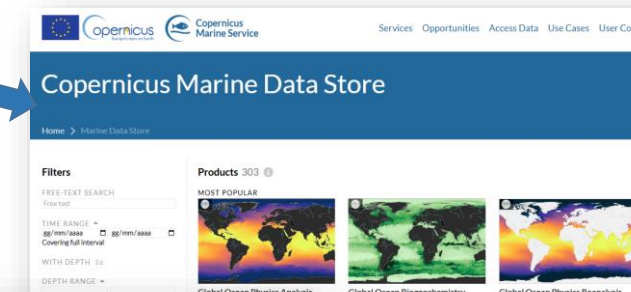


Check 01/04/2025 10:46:17

OX	7.64	ppm
TEMP	14.40	°C
SAT	96.00	%
SAL	37.90	ppm
PH	8.27	ph
TOR	5.75	NTU
BATT	4.02	V
Alarm		

Correntometro
Check 01/04/2025 10:35:17

SPD	0.05	kn
DIR	169.00	°
PTC	-29.10	°
RLL	5.40	°
BATT	4.04	V
Alarm		



Aktivnost 1. Monitoring zdravlja i okoliša

The screenshot shows the MARINET dashboard. On the left is a sidebar with a user profile 'test' and a 'DASHBOARD' menu. The main area has a 'COMPANY PROFILE' section with a table of cages. Below it is an 'ACTIVITIES' section with a table of activities for 'test1' and 'Company CODE22'. The activities table has columns for 'Cage Code' and 'Activities', with buttons for Monitoring, Feeding, Corrective Action, and Biometry.

Company	Cages	Production Cycles
Company CODE22	Cage Code: test1	Cycle start: 17-02-2025 Cycle phase: Fattening Species: Seabass
	Cage Code: test 2	No cycle for this cage

Cage Code	Activities
test1	Monitoring, Feeding, Corrective Action, Biometry

The screenshot shows the MORTALITY SURVEY and MORBIDITY SURVEY forms. The MORTALITY SURVEY form has fields for 'Indicative number of dead fish', 'Suggested cause of mortality', and 'Sampling required?'. The MORBIDITY SURVEY form has fields for 'Indicative number of sick fish', 'Suggested cause of morbidity', and 'Sampling required?'. Both forms include a 'Relevance' slider and a 'Yes' button.

MORTALITY SURVEY

Indicative number of dead fish: 200
Suggested cause of mortality: Bacterial infection
Sampling required? Yes

Attention! Proceed with sampling if the number of deaths is greater than 200

MORBIDITY SURVEY

Indicative number of sick fish: 40
Suggested cause of morbidity: Bacterial infection
Sampling required? Yes

Attention! Proceed with sampling if the number of sick individuals is greater than 40

The screenshot shows the CORRECTIVE ACTIONS form. It has a table with columns for 'Date', 'Status', and 'Action'. The table contains three rows of data for 'Gabbia 1' and 'Company CODE21'.

Date	Status	Action
06/02/2025	Resolved	Net Cleaning 06/02/25 - 07/02/25
25/01/2025	Enter outcome	Biomass Reduction 25/01/25 - 27/01/25
20/12/2024	Partially resolved	Daily Ration Decrease 30/01/25 - 31/01/25

The screenshot shows the CORRECTIVE ACTIONS table. It has a table with columns for 'Date', 'Status', and 'Action'. The table contains three rows of data for 'Gabbia 1' and 'Company CODE21'.

Date	Status	Action
06/02/2025	Resolved	Net Cleaning 06/02/25 - 07/02/25
25/01/2025	Enter outcome	Biomass Reduction 25/01/25 - 27/01/25
20/12/2024	Partially resolved	Daily Ration Decrease 30/01/25 - 31/01/25



Italy – Croatia



Deliverable D 1.1.1

Health and welfare surveillance protocols for Aquaculture

Author(s): Snježana Zmčić, Marco Galeotti, Paolo Tomè, Dražen Oraić, Ivana Giovanna Zupčić, Donatella Volpatti, Tobia Pretto, Giuseppe Arcangeli

WP1 Leader: VEINST

Udine, 28.02.2024

RP1

Biosigurnost, zdravlje i
monitoring okolišnih uvjeta u
jadranskoj marikulturi

2 Razvoj protokola za praćenje zdravlja i dobrobiti uzgajanih riba i monitoring okolišnih uvjeta za poboljšanu održivost uzgoja ribe



Italy – Croatia



Table of content:

- 1. Introduction**
 - Overview of the MARINET project and its focus on aquaculture challenges in the Adriatic region.
 - Objectives of the health and welfare surveillance protocols in line with MARINET's mission of sustainability, innovation, and SME support.
- 2. Operational Welfare Indicators (OWIs)**
 - Definition and role of OWIs in aquaculture health and welfare monitoring.
 - Capitalizing on OWIs from the AdriAquaNet project to enhance MARINET's objectives.
- 3. Environmental and Health Parameters for Monitoring in the Adriatic**
 - Key parameters tailored to the Adriatic region, including:
 - Water quality metrics (e.g., temperature, salinity, oxygen levels).
 - Fish-specific indicators (e.g., behaviour, feeding, growth, and appearance).
 - Disease prevention metrics informed by AI-driven risk alert systems.
- 4. Data Collection Protocols for Cross-Border Regions**
 - Standardized data collection methodologies for Italy and Croatia.
 - Collaboration strategies for experimental fish farms and regional stakeholders.
- 5. Integration with MARINET's Technological Tools**
 - Utilizing data to develop a Progressive Web Application (PWA) for real-time monitoring.
- 6. Evaluation and Continuous Improvement**
 - Methods for assessing the effectiveness of the surveillance protocols for fish welfare and integrated mariculture assessments.
 - Best practices for applying advanced vaccines and corrective measures.
- 7. Implementation Strategy for Cross-Border Cooperation**
 - Steps for protocol adoption across Italian and Croatian aquaculture sites.
 - Coordination with SMEs, public authorities, and policy frameworks.
- 8. References and Knowledge Transfer**
 - Leveraging AdriAquaNet results and other scientific contributions.
 - Strategies for sharing insights with SMEs and regional policymakers to ensure practical adoption.

3. Prevencija bolesti/stresa i poticanje prirodne otpornosti riba/jačanje
specifičnog imuniteta za prevenciju bakterijskih infekcija

EXPERIMENTAL VACCINATION IN PRODUCTION FACILITY - CROMARIS

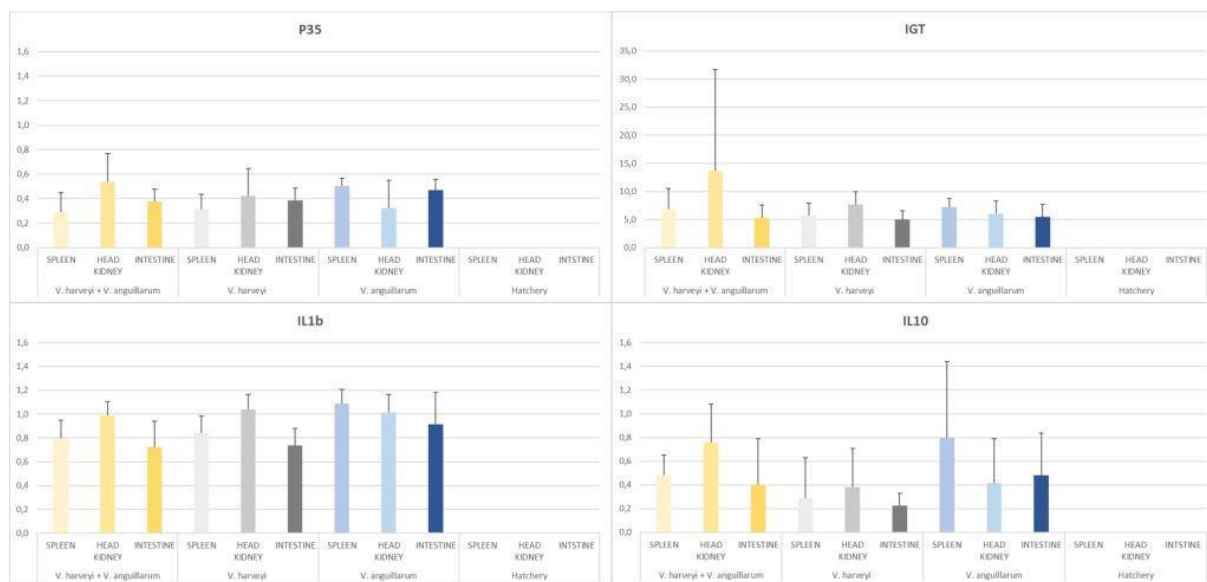


Three experimental groups:

1. Vaccinated against *V. harveyi*
2. Vaccinated against *V. anguillarum* and *V. harveyi*
3. Control group vaccinated against *V. anguillarum*

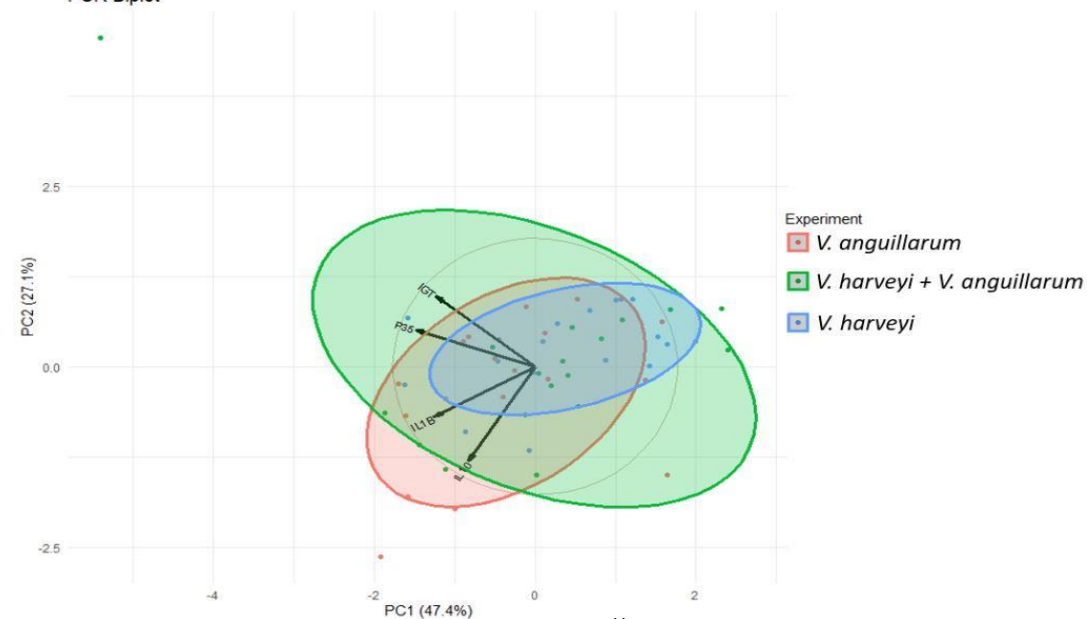
3. Prevencija bolesti/stresa i poticanje prirodne otpornosti riba/jačanje specifičnog imuniteta za prevenciju bakterijskih infekcija

MENTAL VACCINATION IN PRODUCTION FACILITY - CROMARIS



Ekspresija gena koji kodiraju za stečenu (vakcinalnu) imunost (*IgT*, *p35*) i urođenu Imunost (*IL1b*, *IL10*) pokazuje da je svih pokusnih vakciniranih skupina najjače eksprimiran gen *IgT*.

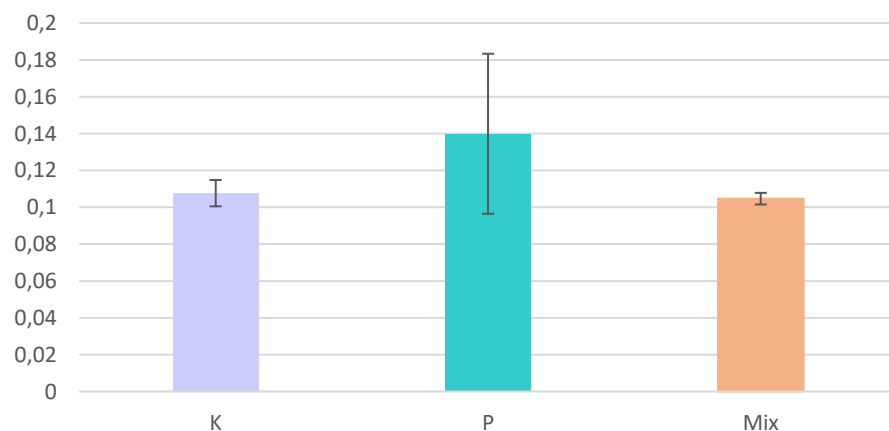
PCR Biplot



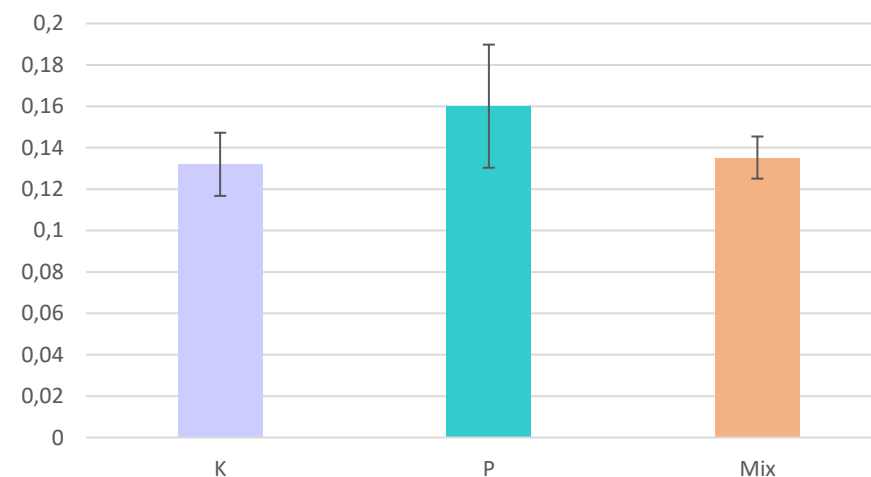
PCA analiza svih pokusne skupine ukazuje pojačanu ekspresiju gena od interesa i bližu korelaciju gena stečene imunosti (*IgT*, *p35*), kao i između gena nespecifične imunosti (*IL1b*, *IL10*)

3. Prevencija bolesti/stresa i poticanje prirodne otpornosti riba/jačanje specifičnog imuniteta za prevenciju bakterijskih infekcija

Specific IgM VS *Vibrio anguillarum*



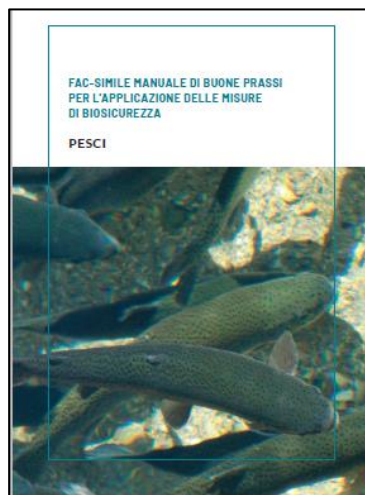
Specific IgM VS *Vibrio harveyi*



4. Razvoj sveopćeg plana biosigurnosti za jadransku marikulturu s praktičnim obrascima za uzgajivače riba

Italian experience on the application of biosecurity in relation to the AHL legislation

Reg. UE 2016/429 New Animal Health Law	<i>Biosecurity measures, surveillance, eradication, contingency planning, animal movements</i>
Reg. (UE) 2020/691	<i>Prescription related to biosecurity management and surveillance in aquaculture recognized establishments</i>
Italian Decree on biosecurity in aquaculture (2024)	<i>Biosecurity prescription</i> - Management measures - Infrastructural measures - Disinfection procedures





Aktivnost 1. Procjena integriranih sistema proizvodnje u marikulturi

Aktivnost 2. Diverzifikacija i inovacije u uzgoju Europske kamenice

Aktivnost 3. Analiza i razvoj integrirane marikulture

Aktivnost 4. Analiza zdravstvenog stanja kamenica u integriranoj akvakulturi

- Analiza integrirane multitrofičke akvakulture – IMTA (uzgoja riba i školjkaša) koja se naslanja na stvarnu proizvodnju, ekonomske, okolišne i socijalne utjecaje, koncentrirana na proizvodnju plosnate kamenice u Jadranu – Duino, Mattinata, Gallipoli, Budava
- Testiranje inovativnih kolektora i lanterni na 9 lokaliteta (Duino, Muggia, Cattolica, Trget, Budava, Lim, Savudrija)

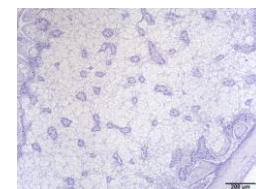


Aktivnost 2 Diverzifikacija i inovacije u uzgoju Europske kamenice

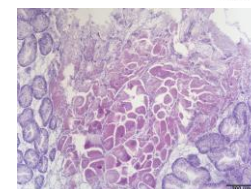


Udio gonada u mekom tkivu

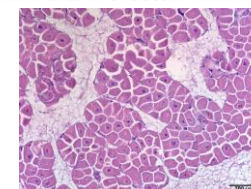
Oyster number	Gonad proportion within the visceral mass (%)
1	40
2	40,00
3	20,00
4	40,00
5	30,00
6	20,00
7	20,00
8	10,00
9	40,00
10	10,00
11	40,00
12	10,00
13	25,00
14	25,00
15	30,00



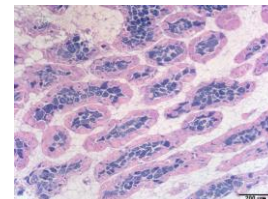
Nediferencirani



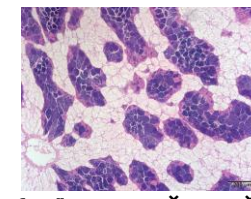
Ženske gonade



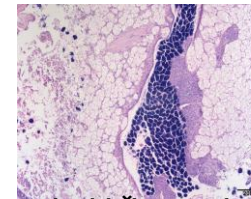
Hermafrodit uz pretežno ženske



Hermafrodit



Hermafrodit uz pretežno muške gonade



Muške gonade

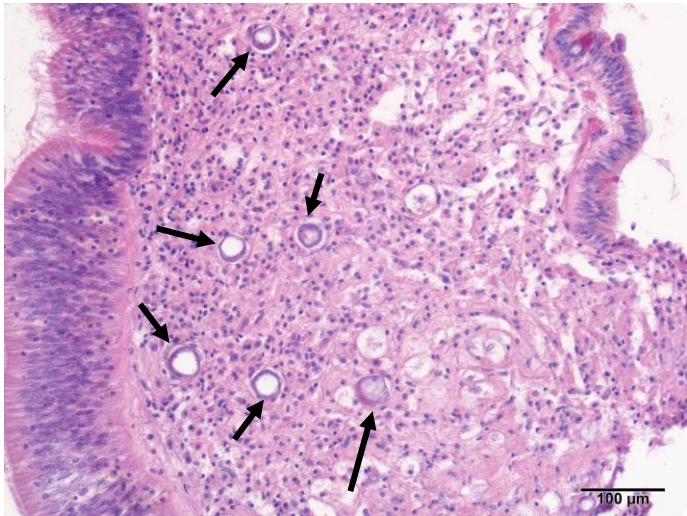
Oyster number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sexually undifferentiated gonads															
Female gonads (F)															
Hermaphrodite with mostly female gonad (HF)													X	X	X
Hermaphrodite (H)				X	X						X				
Hermaphrodite with mostly male gonad (HM)	X		X			X	X		X			X			
Male (M)	X	X						X		X					



Aktivnost 4. Analiza zdravstvenog stanja kamenica u integriranoj akvakulturi



			RESULTS		
Date	Site	Sampling	Bonamia	Marteilia	Perkinsus
17.1.25	Mali Ston	12*	neg	neg	-
19.2.25	Budava	10**	neg	neg	2 positive
11.3.25	Lim	10**	neg	neg	1 positive
	Budava	10**	neg	neg	All negative
12.3.25	Mali Ston	20**	neg	neg	?
19.3.25	Budava	10**	neg	neg	?
	Lim	10**	neg	neg	?



Sequences producing significant alignments									
Download Select columns Show 100									
select all 100 sequences selected									
Description	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession	
Perkinsus mediterraneus isolate 5 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene and in	Perkinsus medite...	1149	1149	99%	0.0	99.84%	666	KJ701584.1	
Perkinsus mediterraneus isolate 7 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene, comp	Perkinsus medite...	1149	1149	99%	0.0	99.84%	649	KJ701586.1	
Perkinsus mediterraneus isolate 12 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene and in	Perkinsus medite...	1149	1149	99%	0.0	99.84%	672	KJ701591.1	
Perkinsus mediterraneus isolate 6 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene, comp	Perkinsus medite...	1146	1146	98%	0.0	99.84%	647	KJ701585.1	
Perkinsus mediterraneus isolate 2 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene and in	Perkinsus medite...	1144	1144	99%	0.0	99.68%	675	KJ701581.1	
Perkinsus mediterraneus isolate 10 internal transcribed spacer 1, partial sequence, 5.8S ribosomal RNA gene, comp	Perkinsus medite...	1140	1140	98%	0.0	99.84%	662	KJ701589.1	

Interreg



Co-funded by
the European Union

Italy – Croatia



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Koordinator:

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Dipartimento di Scienze

(Dpt. Of Agricultural, Food,

**Hvala na pozornosti i pozivamo vas na
daljnje praćenje
projektnih dostignuća**