AdriAquaNet

Enhancing Innovation and Sustainability in Adriatic Aquaculture

Deliverable WP4 task 4.3

Operational Welfare Indicators (OWIs) of Sea bass (*D. labrax*) and Sea bream (*S. aurata*) breeding in sea cages

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Legnaro, 30.06.2022

Operational Welfare Indicators are practical Welfare Indicators that can realistically be used on sea bass and bream farm. They can be **Environment based** (observations made on the environment, infrastructure and processes), **Animal based** (group and individual - observations made on or from the animals) and **Laboratory based** (analysis performed by specialized laboratories like cortisol, cathecolamine, lysozyme, bilirubine, etc).

The 25 practical OWIs (5 environmental, 8 group and 12 individual based) for sea bass and sea bream reared in sea cages are summarized in the following table:

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OPERATIONAL WELFARE INDICATORS (OWIs)		
ENVIRONMENT BASED	ANIMAL BASED	
	GROUP BASED	INDIVIDUAL BASED
• Oxygen (mg/L) • Temperature (°C) • Salinity (ppt) • Turbidity • Other……………………	• Appetite • Growth • Mortality • Abnormal swimming • Abnormal behavior • Diseased fish • Emaciated fish • Other………………….	• Emaciation state • Fin damage • Skin loss/ulcers • Eye status (exophtalmus, haemorragies) • Deformities • Abnormal pigmentation • Opercular damage • Mouth/Jaw damage • Gill status • Ectoparasites • Feed in intestine • Visceral fat

Each indicator is assigned a score (0-1) indicating the presence or absence (Non Conformity) of the welfare indicator. The environmental parameters have a range based on the characteristics of the farm and fish species: if the measurement of the environmental parameter is within the range, a score of 0 will be given; if, on the contrary, the measured value is out of range, that parameter will be assigned a score of 1. For group or individual based indicators if present (Non Conformity) the score will be 1; if it is not present, the score will be 0 (see also the "Manual for use on field Operational Welfare Indicators (OWIs) of Sea bass (*D. labrax*) and Sea bream (*S. aurata*) breeding in sea cages).

The table below (**Grid of evaluation**) shows the scores and the relative welfare situation of the animals.

SCORE (NC)	WELFARE SITUATION	SUGGESTION
0 ≤ NC ≤ 5	**OPTIMAL WELFARE**	Keep it up!
6 ≤ NC ≤ 10	**GOOD WELFARE**	Check the environmental parameters, the density and the possible presence of viral, bacterial or parasitic diseases.
11 ≤ NC ≤ 15	**LOW WELFARE**	Check the environmental parameters, check the doses of feed administered and exclude the presence of viral, bacterial or parasitic diseases by sending samples to the laboratory.
16 ≤ NC ≤ 25	**BAD WELFARE**	Review the management of the farm, check the environmental parameters, check the doses of feed administered and exclude the presence of viral, bacterial or parasitic diseases by sending samples to the laboratory. Do blood and / or tissue tests on animal samples to check the presence of stress biomarkers.

In column 3, there are some suggestions on how to solve negative welfare indicators. If the negative situation persists, it will be advisable to contact the competent veterinarian. He will take some samples to be sent for laboratory analyses in order to exclude the presence of viral, bacterial and parasitic diseases. If deemed necessary, blood and/or tissue samples can be analysed for the presence of stress biomarkers, such as cortisol, catecholamines, Heat Shock Protein 70, bilirubin, immunoglobulins, etc.

We suggest filling out the OWIs and data collection sheet at least once a month. It is recommended to keep track of the measurement of the OWIs in order to demonstrate the health and welfare status of the farm.

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			ENVIRONMENT BASED OWIs				
Date __/__/___ **Cage Number** N°_____	**Species** ☐ Sea bass ☐ Sea bream	**Fish age** Months _____	**Parameter** Oxygen (mg/L) _____	**Optimal range** 6-8	**NC** ☐ Yes ☐ No	**Corrective action** ☐ Aeration ☐ Liquid oxygen ☐ Feed reduction ☐ Net cleaning / changing ☐ Other _____	**Final remarks** ☐ Resolved ☐ Not resolved
		Weight (g) _____	Temperature (°C) _____	18-26	☐ Yes ☐ No		☐ Resolved ☐ Not resolved
		Size (cm) _____	Salinity (ppt) _____	30-35	☐ Yes ☐ No		☐ Resolved ☐ Not resolved
			Turbidity (NTU or m) _____	0,12 NTU or 10 m	☐ Yes ☐ No		☐ Resolved ☐ Not resolved
			Other _____		☐ Yes ☐ No		☐ Resolved ☐ Not resolved

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Fiocchi Eleonora & Manfrin Amedeo
Istituto Zooprofilattico Sperimentale delle Venezie
CSI – Centro Specialistico Ittico

Viale dell'Università, 10 – Legnaro (PD)
+39 049 8084459
EFiocchi@izsvenezie.it
AManfrin@izsvenezie.it

GROUP BASED OWIs

Date	Species	Fish age	Parameter	Optimal	NC	Corrective action	Final remarks
Date __/__/___ **Cage Number** N°_____	☐ Sea bass ☐ Sea bream	Months _____	Appetite ☐ High ☐ Normal ☐ Lower ☐ Absent	Normal	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
Number of fish N°_____		Weight (g) _____	Growth ☐ High ☐ Normal ☐ Lower	Normal	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Exclude diseases ☐ Other _____	☐ Resolved ☐ Not resolved
		Size (cm) _____	Mortality ☐ < 5 % ☐ 5-10% ☐ > 10%	< 5%	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Therapy ☐ Other _____	☐ Resolved ☐ Not resolved

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			Abnormal swimming ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Exclude diseases ☐ Other _____	☐ Resolved ☐ Not resolved
			Abnormal behavior ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Reduce density ☐ Other: _____	☐ Resolved ☐ Not resolved
			Diseased fish ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Therapy ☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Reduce density ☐ Other _____	☐ Resolved ☐ Not resolved

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| | | | Emaciated fish

☐ Present
☐ Absent | Absent | ☐ Yes
☐ No | ☐ Water testing
☐ Fish examination
☐ Exclude diseases
☐ Change in feed
☐ Selection
☐ Other
_____ | ☐ Resolved
☐ Not resolved |
| | | | Other
_____

☐ Present
☐ Absent | | ☐ Yes
☐ No | ☐ Water testing
☐ Fish examination
☐ Exclude diseases
☐ Change in feed
☐ Selection
☐ Reduction density
☐ Other
_____ | ☐ Resolved
☐ Not resolved |

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INDIVIDUAL BASED OWIs

Date	Species	Fish age	Parameter	Optimal	NC	Corrective action	Final remarks
__/__/___ **Cage Number** N°_____	☐ Sea bass ☐ Sea bream	Months _____	Emaciation state ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
Number of fish N°_____		Weight (g) _____	Fin damage ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Excluded diseases ☐ Reduction density ☐ Other _____	☐ Resolved ☐ Not resolved
		Size (cm) _____	Skin loss / ulcers ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Reduction density ☐ Other _____	☐ Resolved ☐ Not resolved

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				Eye status (i.e.: exophtalmus, haemorragies) ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
				Deformities ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Other: _____	☐ Resolved ☐ Not resolved
				Abnormal pigmentation ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude diseases ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
				Opercular damage ☐ Present ☐ Absent	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved

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				Mouth/Jaw damage	Absent	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Change in feed ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
				☐ Present ☐ Absent				
				Gills status	Bright red	☐ Yes ☐ No	☐ Water testing ☐ Fish examination ☐ Exclude disease ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
				☐ Bright red ☐ Red with haemorragies ☐ Pale ☐ Pale / Red with necrosis				
				Ectoparasites	Absent	☐ Yes ☐ No	☐ Therapy ☐ Water testing ☐ Fish examination ☐ Selection ☐ Other _____	☐ Resolved ☐ Not resolved
				☐ Present ☐ Absent				
				Feed in intestine	Present	☐ Yes ☐ No	☐ Change in feed ☐ Fish examination ☐ Selection (density) ☐ Other _____	☐ Resolved ☐ Not resolved
				☐ Present ☐ Absent				
				Visceral fat	Normal	☐ Yes ☐ No	☐ Change in feed ☐ Fish examination ☐ Selection (density) ☐ Other _____	☐ Resolved ☐ Not resolved
				☐ Too much ☐ Normal ☐ Low				

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Total score: …../25

Score obtained / Final evaluation

☐ 0 ≤ NC ≤ 5 / Optimal welfare
☐ 6 ≤ NC ≤ 10 / Good welfare
☐ 11 ≤ NC ≤ 15 / Low welfare
☐ 16 ≤ NC ≤ 25 / Bad welfare

The fish farmer/operator: ……………………………………. Signature: ……………………………………………………….

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Recommendation from the consultant (if involved):

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Recommendation from the Competent Authority (if involved):

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Date: ………/……./……….