



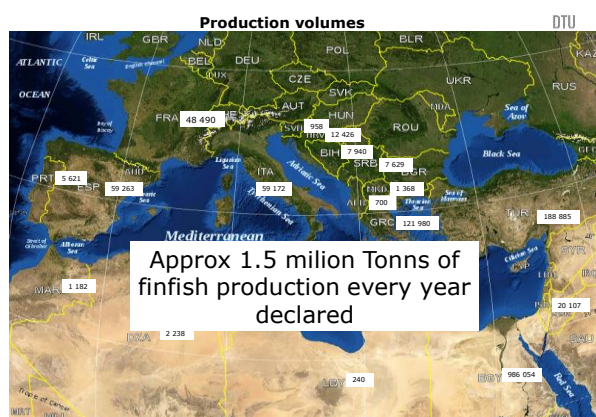
UPDATE ON FISH DISEASE SITUATION IN THE MEDITERRANEAN BASIN 2013

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Background the Mediterranean basin

- point of connection for 3 different continents (Europe, Africa, Asia)
- great development of aquaculture, aside from traditional trout/carp farming, sea cage for marine high cost species
- different legislation, different control methods (implying different Antibiotics authorized and vaccines registered)

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WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Large Rainbow Trout in the Med



Large Rainbow Trout	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
FRANCE	10.000	10.000	9.000	9.000	9.000	9.000	9.000	12.000	12.500	12.500
ITALY	600	600	600	600	600	500	600	1.000	2.000	1.500
SPAIN	1.500	2.250	1.500	2.000	2.000	2.000	1.500	1.500	1.500	1.600
TURKEY	1.194	1.650	1.249	1.633	2.740	2.721	5.229	7.079	7.697	3.234
TOTAL										15.734

Approx 13% European production 128 Ktonns DATA FROM FEAP

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Portion Rainbow Trout in the Med

COUNTRY	YEAR										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
CROATIA	791	800	800	800	800	800	2.000	2.095	2.358	1.232	
FRANCE	27.000	27.500	25.000	25.000	25.000	25.000	25.000	22.000	23.500	23.500	
GREECE	1.870	2.060	4.892	3.187	2.820	3.420	2.588	2.712	2.712	2.712	
ITALY	37.400	39.000	39.000	39.000	39.000	38.900	40.500	39.000	39.000	36.300	
PORTUGAL	954	916	845	943	937	941	936	951	900	900	
SPAIN	31.500	31.500	25.000	24.000	20.000	20.000	20.000	18.000	18.000	14.400	
TURKEY	39.674	43.432	48.033	56.026	58.433	65.928	75.657	78.165	100.239	111.335	
TOTAL										179079	

Approx. 74% of European production 260 Ktonns DATA FROM FEAP

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Common Carp



Country	YEAR										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Croatia	1633	1.575	2.180	2.312	1.503	1.546	2.058	1.816	2.891	2.300	
France	6.000	6.000	6.000	6.000	6.000	6.000	6.000	4.000	3500	3500	
Greece	107	105	107	136	93	113	114	123	123	123	
Italy	650	222	263	700	750	750	750	700	750	750	
TOTAL										4250	

Approx. 20 %European production 60 Ktonns DATA FROM FEAP

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Sea bass production –tonns and thousands of Juveniles

SPECIES	COUNTRY	YEAR										
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Sea Bass	CROATIA	1.500	1.800	1.850	2.000	2.500	2.700	3.000	3.200	2.775	2.800	
	CYPRUS	447	698	583	589	740	752	703	1.237	1.500	1.096	
	FRANCE	3.750	4.000	4.300	5.585	4.764	3.648	3.294	2.779	3.000	3.300	
	GREECE	42.000	34.000	35.000	45.000	48.000	45.000	45.000	45.000	43.000	43.500	
	ITALY	9.600	9.700	9.100	9.300	9.900	9.800	9.800	8.700	8.700	7.200	
	PORTUGAL	1.388	1.234	1.350	1.584	1.205	1.169	444	396	480	500	
	SPAIN	4.529	4.700	5.492	6.930	10.480	9.840	13.840	12.495	14.370	14.270	
	TURKEY	25.982	28.927	37.290	38.408	41.900	49.270	48.554	50.796	47.013	47.254	
	Sea Bass Total	84.144	81.054	95.145	111.496	118.489	127.389	122.146	125.703	120.813	114.114	

SPECIES	COUNTRY	YEAR										
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Sea Bass	CROATIA	7.000	7.800	8.000	88.000	11.000	13.000	1.000	9.000	8.800	8.300	
	CYPRUS	9.000	5.600	5.537	5.800	3.117	3.500	3.610	2.522	4.358	5.120	
	FRANCE	29.000	28.000	33.000	36.000	34.620	35.307	39.752	39.800	45.742	46.000	
	GREECE	120.000	120.000	140.000	150.000	150.000	195.700	280.000	280.000	274.000	284.000	
	ITALY	40.000	50.000	50.000	40.000	55.000	55.000	55.000	55.000	48.000	40.000	
	PORTUGAL	6.000	6.000	5.531	3.518	2.371	2.214	2.182	1.290	1.500	0	
	SPAIN	13.500	19.200	15.230	24.400	29.200	34.000	24.600	28.100	31.100	36.475	
	TURKEY	100.000	100.000	110.000	105.000	147.000	180.000	127.500	105.000	149.000	100.000	
	Sea Bass Total	313.000	405.600	470.000	503.500	421.000	618.713	620.710	620.813	668.475	660.147	

DATA FROM FEAP

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WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Sea bream production – tonns and thousands of juveniles

SPECIES	COUNTRY	YEAR										
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Sea Bream	CROATIA	923	1.200	1.300	1.500	1.500	1.800	2.000	2.000	1.719	2.400	
	CYPRUS	1.181	1.356	1.485	1.879	1.404	1.600	2.572	2.799	3.065	3.121	
	FRANCE	1.100	1.600	1.900	2.200	1.392	1.688	1.648	1.977	1.500	1.300	
	GREECE	55.000	48.000	50.000	66.000	79.000	94.000	90.000	74.000	60.000	72.000	
	ITALY	9.000	9.050	9.300	8.900	9.800	9.600	9.600	9.600	9.700	8.700	
	PORTUGAL	1.449	1.685	1.519	1.623	1.930	1.635	1.383	851	1.200	1.000	
	SPAIN	12.442	13.034	15.577	20.220	22.320	23.930	23.690	20.360	16.930	19.430	
	TURKEY	16.735	20.435	27.034	28.463	33.500	31.670	28.362	28.157	32.187	30.711	
	Sea Bream Total	87.838	96.569	108.795	130.785	150.846	165.873	158.255	139.148	136.365	118.671	

SPECIES	COUNTRY	YEAR										
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Sea Bream	CROATIA	2.000	2.000	2.000	5.000	4.000	7.000	6.000	6.000	6.500	3.400	
	CYPRUS	14.000	9.000	8.088	8.176	12.502	13.000	8.959	8.929	18.479	7.976	
	FRANCE	39.500	24.000	34.800	39.000	26.740	31.317	22.900	29.100	41.742	30.400	
	GREECE	340.000	341.500	207.000	278.000	238.000	214.000	150.000	140.000	242.000	240.000	
	ITALY	30.000	40.000	45.000	42.000	52.000	50.000	48.000	48.000	42.000	70.000	
	PORTUGAL	14.000	14.000	14.794	19.252	29.722	23.722	3.810	1.578	1.000	0	
	SPAIN	44.200	46.300	54.105	56.757	67.170	47.262	52.180	34.451	52.900	54.885	
	TURKEY	20.000	35.000	75.000	93.000	103.000	80.000	72.000	85.000	140.000	237.000	
	Sea Bream Total	517.300	613.800	560.123	586.126	517.846	468.321	412.638	374.679	540.471	570.661	

DATA FROM FEAP

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AIM:

**Continue survey established in 2013
targeting main problems, follow trends and
highlight emergence of new disease**



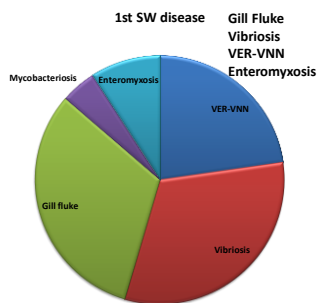
Contributions from 24 Experts

22- Marine

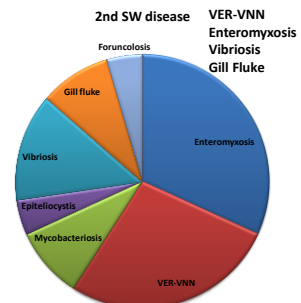
20- Freshwater

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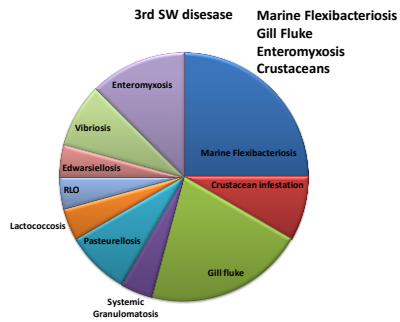
Salt Water Results



Salt Water Results-2



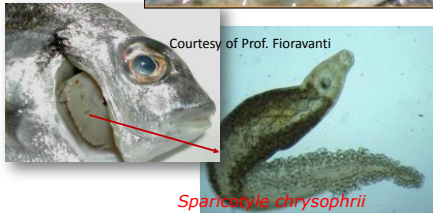
Salt Water Results-3



Results Marine - Parasites



PARASITIC DISEASES OF SPARIDS: ENTEROMYXOSIS AND SPARICOTYLOSIS – EMERGING: INTESTINAL MICROSPORIDIOSIS DUE TO ENTEROSPORA NUCLEOPHILA	
Name	Enteromyxum leei (Myxozoa) – Sparicotyle chrysophrii (Monogenea, Polyopisthocotylea) – Enterospora nucleophila (Microsporidia, Enterocytozoonidae)
Aetiology	ENTEROMYXOSIS : enteritis (progressive weight loss in gilthead seabream, high mortality in sharpsnout seabream) SPARICOTYLOSIS : gill anemia in gilthead seabream INTESTINAL MICROSPORIDIOSIS : anorexia, poor growth, emaciation in gilthead seabream
Symptoms / Diagnosis	Diagnosis: Clinical diagnosis, necropsy, parasite detection/identification / + histology & PCR for <i>E. nucleophila</i>
Control methods applied	Reduction of biomass density (if feasible) - lack of licensed effective antiparasitic treatments
Species affected / size	ENTEROMYXOSIS : gilthead seabream >100-150g, sharpsnout seabream <80g and other sparids SPARICOTYLOSIS : gilthead seabream INTESTINAL MICROSPORIDIOSIS : gilthead seabream Ongrowing
Rearing sector affected (Hatchery/nursery/ongrowing)	During last years, Enteromyxum leei has led to the progressive abandonment of sharpsnout seabream farming in the Mediterranean area During last year, the first case of intestinal microsporidiosis due to Enterospora nucleophila has been observed in Italy



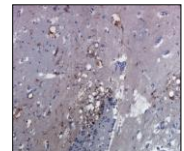
Sparicotyle chrysophrii

tation name 17/04/2008

Results – Marine - VIRUS



- VER/VNN remains high impact disease in the Med. in 2013 had a lower impact
- Sea bass remain target species mainly at larval/nursery stage, with implication for market size as well
- Different species including Sea bream, meagre, sole, Grouper, etc.
- Industry needs for commercial vaccine



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Results – Marine 3 - Bacteria



Major constraint for Marine aquaculture despite the availability of therapeutic treatment and (few) vaccines

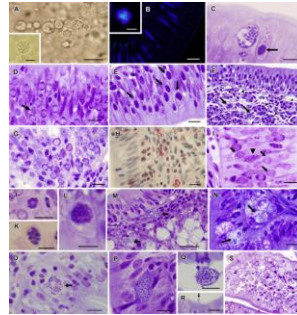
- **Vibrio (*Vibrio Anguillarum* plus non conventional vibriosis i.e. *Vibrio harveyi*): uncoordinated swimming behavior, progressive weight loss, exophthalmos, keratitis, skin lesions)**

- Pasteurella (Photobacterium damsela subsp. Piscida)
- Tenacibaculum (T. Maritimum)
- Mycobacteriosis (zoonosis)
- Aeromonas



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Results Marine -5 Emerging



FROM
Oswaldo Palenzuela^{1,4}, Maria José Redondo^{2,4}, Ann Cail³, Peter M. Takvorian⁵, Maria Alonso-Naveiro⁶, Pilar Alvarez-Pellitero⁷, Ariadna Silió-Schadler⁸ International Journal for Parasitology Volume 44, Issues 3–4, March 2014, Pages 189–203

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Results Marine -4 Emerging



- Rickettsia Like Organism in sea bass
- Diff. Diagnosis with VER-VNN
- Congestion of the brain corneal opacity, abnormal swimming behaviour



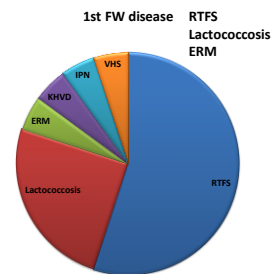
Courtesy of Dr. Zrnčić



Courtesy of Dr. Zrnčić

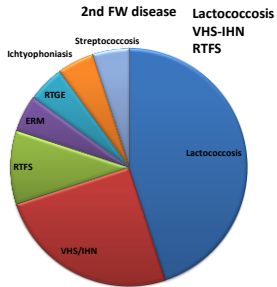
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FreshWater results 1



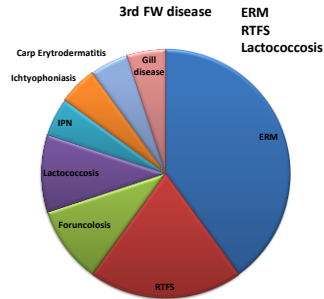
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FreshWater results 2



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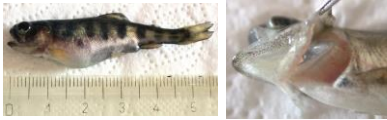
FreshWater results 3



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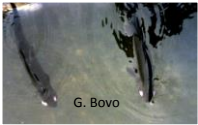
Results – FW - RTFS



Fotos: Morten S. Bruun

Name	RTFS (Rainbow Trout Fry Syndrome)
Aetiology	<i>Flavobacterium psychrophilum</i>
Symptoms / Diagnosis	Lethargy, skin darkening, gill anemia, exophthalmos, enlarged abdomen, enlarged spleen, fast increasing mortality. On field, diagnosis is simply done with spleen prints on glass slides and microscopic examination after fuchsin or safranin coloration. This can help in a rapid diagnosis since these bacteria are still difficult to be cultured.
Control methods applied	Strict environmental hygienic measures can help to prevent the infection together with all the measures that can increase fish welfare, avoiding in particular tank overcrowding. At present the best solution seems to be the use of medicated feed with florfenicol (authorization V5 derogation).
Species affected / size	Rainbow trout are becoming sensitive in growing sizes, up to 50 g. Brown trout may show a cutaneous, not systemic infection.
Rearing sector affected (Hatchery/nursery/ongrowing)	Not very often in hatchery. More frequently in nursery and sometimes at the beginning of the ongrowing sector.

Name	Lactococcus
Aetiology	<i>Lactococcus garvie</i>
Symptoms / Diagnosis	Lethargy, dark skin pigmentation, unmistakable heavy exophthalmos sometime with eye lesions and enudeations, swimming ataxy and nervous symptoms, mortality. On field diagnosis is simply done with brain prints on glass slides and microscopic examination after Gram coloration. Bacteria grow well on common TSA.
Control methods applied	Re-occurrence of the disease after some years. The best way to control this disease is the vaccination. Treatment with antibiotics did not provide satisfying results
Species affected / size	Rainbow trout and brook trout starting from about 100 g
Rearing sector affected (Hatchery/nursery/ongrowing)	Ongrowing sector.



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Results –Virus



Courtesy of Dr. Anna Toffan



Courtesy of Dr. Giuseppe Bolvi



Courtesy of Dr. Anna Toffan

Challenges and improvements for the future



Impact description need to be further characterize

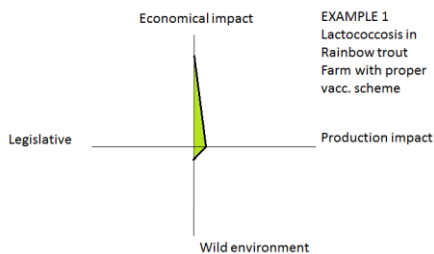
What is impact?

- Diseases characterized by high mortality at preliminary life stage (i.e. Rainbow trout and IPN) – production impact
- Moderate mortality close to market size (Sea bass and atypical vibriosis or Mycobacteriosis) – Economical impact
- Great effort for prevention (Vaccination against lactococcosis in Rainbow trout)- no mortality high economical impact
- Legislative impact (listed diseases)
- Impact on wild environment???

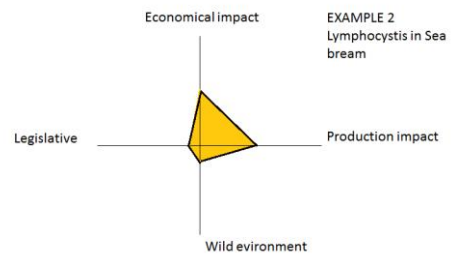
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Better define each disease in different context fingerprint of fish diseases in different areas



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Thank all of you for your attention



And thanks all experts for providing interesting replies:

[A. Colorni](#) [M.L. Fioravanti](#) [M. Ramalla](#) [J. C. Raymond](#)

[R.Giavenni](#) [P.P. Patamello](#) [M. Sotelo](#) [Isabel Marquez](#)

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