UPDATE ON FISH DISEASE SITUATION IN THE MEDITERRANEAN BASIN 2014

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Background the Mediterranean basin

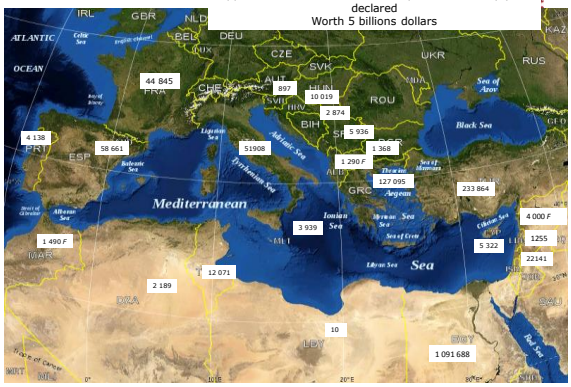
- point of connection for 3 different continents (Europe, Africa, Asia)

- 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)

Production volumes

Approx 1.6 milion Tonns of finfish production every year declared
Worth 5 billions dollars



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	2013
FRANCE	10.000	10.000	9.000	9.000	9.000	9.000	9.000	12.000	12.500	12.500	11.130
ITALY	600	600	600	600	600	500	600	1.000	2.000	1.500	2000
SPAIN	1.500	2.250	1.500	2.000	2.000	2.000	1.500	1.500	1.500	1.600	1.600
TURKEY	1.194	1.650	1.249	1.633	2.740	2.721	5.229	7.079	7.697	3.234	3.234
TOTAL	**12.694**	**13.900**	**11.749**	**12.633**	**13.740**	**13.721**	**15.729**	**20.579**	**20.197**	**15.734**	**16.364**

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Portion Rainbow Trout in the Med

Portion Rainbow Trout	YEAR										
COUNTRY	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
CROATIA	791	800	800	800	800	800	2.000	2.095	2.358	1.232	350
FRANCE	27.000	27.500	25.000	25.000	25.000	25.000	25.000	22.000	23.500	23.500	20.870
GREECE	1.870	2.060	4.892	3.187	2.820	3.420	2.588	2.712	2.712	2.712	2.389
ITALY	37.400	39.000	39.000	39.000	39.000	38.900	40.500	39.000	39.000	36.300	36.000
PORTUGAL	954	916	845	943	937	941	936	951	900	900	1.000
SPAIN	31.500	31.500	25.000	24.000	20.000	20.000	20.000	18.000	18.000	14.400	15.000
TURKEY	39.674	43.432	48.033	56.026	58.433	65.928	75.657	78.165	100.239	111.335	111.335
TOTAL	**139.189**	**145.208**	**143.570**	**148.956**	**146.990**	**154.989**	**166.681**	**162.923**	**186.709**	**190.379**	**186.944**

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

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Common Carp

Carp	YEAR										
COUNTRY	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
CROATIA	1633	1.575	2.180	2.312	1.503	1.546	2.058	1.816	2.891	2.484	2.100
FRANCE	6.000	6.000	6.000	6.000	6.000	6.000	6000	4000	3500	3500	3500
GREECE	107	105	107	136	93	113	114	123	49	49	49
ITALY	650	222	263	700	750	750	750	700	750	750	700
TOTAL	**8390**	**7902**	**6370**	**9148**	**8346**	**8409**	**8922**	**6639**	**7190**	**6783**	**6.349**

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Sea Bass & Sea Bream production –tonns

			YEAR									
Sea bass	COUNTRY		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	CROATIA		1800	1850	2000	2500	2700	3000	3200	2785	2375	3014
	CYPRUS		698	583	589	740	752	703	1237	1500	1096	1621
	FRANCE		4000	4300	5585	4764	3968	3204	2779	3000	2300	1970
	GREECE		34000	35000	45000	48000	50000	45000	4500	43000	41500	48000
	ITALY		9700	9100	9300	9900	9800	9800	9800	8700	7200	6800
	PORTUGAL		1234	1530	1584	1205	1069	444	396	480	500	400
	SPAIN		4700	5492	8930	10480	9840	13840	12495	14370	14270	14700
	TURKEY		26927	37290	38408	41900	49270	46554	50796	47013	65512	51600
		TOTAL	83059	95145	111396	119489	127399	122545	85203	120848	134753	128105

			YEAR									
Sea Bream	COUNTRY		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	CROATIA		1200	1200	1500	1500	1800	2000	2000	1793	2105	2466
	CYPRUS		1356	1465	1879	1404	1600	2572	2799	3065	3121	4444
	FRANCE		1600	1900	2200	1392	1636	1648	1377	1500	1300	1477
	GREECE		48000	50000	66000	79000	94000	90000	74000	60000	72000	75000
	ITALY		9050	9500	8900	9800	9600	9600	9600	9700	8700	8400
	PORTUGAL		1685	1519	1623	1930	1635	1383	851	1200	1000	1500
	SPAIN		13034	15577	20220	22320	23930	23690	20360	16930	19430	16800
	TURKEY		20435	27634	28463	33500	31670	28362	28157	32187	30743	41700
		TOTAL	96360	108795	130785	150846	165871	159255	139144	126375	138399	151787

DATA FROM FEAP

WHICH SPECIES OF FISH WE HAVE TO DEAL WITH?

Sea bream production –thousands of juveniles

PRODUCTION (tons)		YEAR									
SPECIES	COUNTRY	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Sea Bass	CROATIA	7.000	5.000	10.000	11.000	13.000	8.100	9.000	8.600	8.100	5.100
	CYPRUS	5.600	3.337	3.300	3.117	3.500	3.610	2.522	4.359	5.280	3.955
	FRANCE	28.000	33.000	36.000	34.420	35.307	39.732	39.800	45.742	46.000	46.542
	GREECE	130.000	140.000	152.000	130.000	195.700	180.000	180.000	174.000	184.000	192.000
	ITALY	50.000	50.000	49.000	55.000	55.000	55.000	55.000	48.000	40.000	45.000
	PORTUGAL	6.000	5.531	3.556	2.371	2.214	2.182	1.290	1.500	0	0
	SPAIN	19.200	23.228	24.400	29.200	34.000	24.650	28.199	33.150	36.423	31.125
	TURKEY	100.000	110.000	105.000	147.000	180.000	117.500	105.000	149.000	205.000	160.000
Sea Bass Total		345.800	370.096	383.256	412.108	518.721	430.774	420.811	464.351	524.803	483.722
Sea Bream	CROATIA	2.000	2.000	5.000	6.000	7.000	6.000	6.000	6.900	5.400	5.400
	CYPRUS	9.000	8.086	8.176	12.502	13.000	8.589	8.929	18.479	7.976	14.267
	FRANCE	24.000	34.000	33.000	26.740	31.317	22.300	29.100	41.742	30.400	43.728
	GREECE	142.500	207.000	273.000	220.000	214.000	150.000	160.000	242.000	245.000	266.000
	ITALY	40.000	45.000	61.000	52.000	50.000	48.000	48.000	62.000	70.000	65.000
	PORTUGAL	14.000	14.794	19.252	29.722	21.722	3.810	1.378	1.000	0	0
	SPAIN	48.300	56.235	56.757	67.370	47.282	32.180	36.451	52.900	54.985	51.420
	TURKEY	35.000	75.000	93.000	103.000	80.000	72.000	85.000	140.000	185.000	140.000
Sea Bream Total		314.800	442.115	549.185	517.334	464.321	342.879	374.858	565.021	598.761	586.815
Grand Total		660.600	812.211	932.441	929.442	983.042	773.653	795.669	1.029.372	1.123.564	1.070.537

DATA FROM FEAP

AIM:

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

Questionnaire enriched in 2014

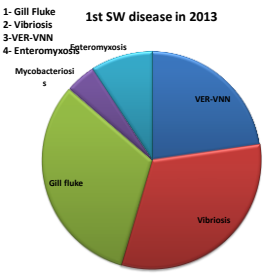
Third disease to be considered for its impact in the aquaculture sector	
Name	
Aetiology	
Symptoms / Diagnosis	
Control methods applied	
Area of interest	
Species affected / size	
Rearing sector affected (Hatchery/nursery/ongrowing)	
DISEASE CHARACTERIZATION	
Impact on production	
Impact on Economy	
Legislative consequences	

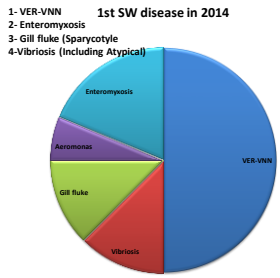
Contributions from 18 Experts

16- Marine

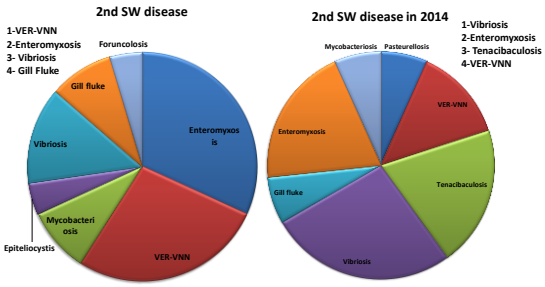
9- Freshwater

Salt Water Results

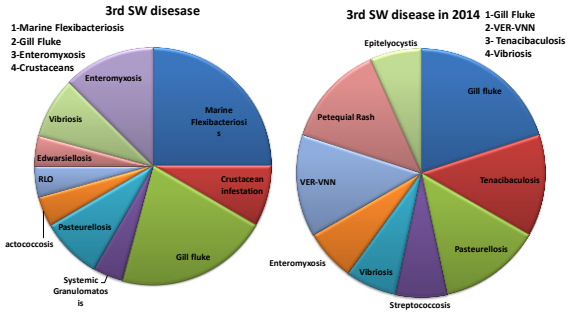




Salt Water Results-2

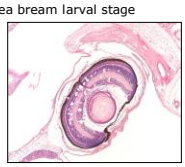
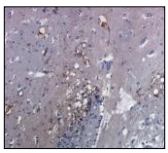


Salt Water Results-3



Results – Marine - VIRUS

- VER/VNN is by far the most important disease in 2014
- Sea bass remain target species mainly at larval/nursery stage, with implication for market size as well
- Arising problem for Sea bream larval stage

VER- VNN IMPACT

- The disease has been bottleneck for development of market in north africa of sea bass farming
- New market of pre-fattened bass

- Production converted to sea bream NODA at larval stage
- additional guaranties for some countries regarding movement of fish

Larger groups of fry are needed. A single positive case in a batch can block a whole shipment and it is not easy to find such large amounts of certified fish in the

Mortalities are difficult to be evaluated in cages. The remaining number of fish after an VNN episode are always difficult to evaluate and then to manage (food required, logistics, sales…).

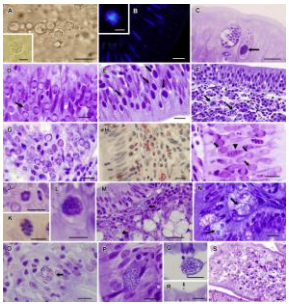
Carcasses appropriate disposal and treatment is not always easy. Costs

Survivors are maintained in cages for many months. Although they are considered less susceptible to new outbreaks, they are a true risk as they act of virus carriers and new naïve fry that are incorporated in the vicinity cages they can become easily infected

Results Marine – Parasites complex

Name	PARASITIC DISEASES OF SPARIDS: ENTEROMYXOSIS AND SPARICOTYLOSIS
Aetiology	Enteromyxum leei (Myxozoa) - Sparicotyle chrysophrii (Monogenea, Polyopisthocotylea)
Symptoms / Diagnosis	ENTEROMYXOSIS: enteritis (progressive weight loss in gilthead seabream, high mortality in sharpsnout seabream) SPARICOTYLOSIS: gill anemia in gilthead seabream Diagnosis: Clinical diagnosis, necropsy, parasite detection/identification + PCR for early stages of E. leei
Control methods applied	Reduction of biomass density (if feasible) - lack of licensed effective antiparasitic treatments
Area of interest	
Species affected / size	ENTEROMYXOSIS: gilthead seabream >100-150g, sharpsnout seabream <80g + other sparids and non sparids SPARICOTYLOSIS: gilthead seabream
Rearing sector affected (Hatchery/nursery/ongrowing)	Ongrowing During last years, Enteromyxum leei has led to the progressive abandonment of sharpsnout seabream farming in the Mediterranean area

Results Marine - Emerging



FROM
Oswaldo Palenzuela[a, 1], María José Redondo[a, 1], Ann Cali[b], Peter M. Takvorian[b], María Alonso-Naveiro[a], Pilar Alvarez-Pellitero[a], Ariadna Sitjà-Bobadilla[a] International Journal for Parasitology Volume 44, Issues 3–4, March 2014, Pages 189–203

Sea Bream Parasites IMPACT

It is difficult in these cases to evaluate if it is better to eliminate the fish or maintain them in the facilities. Unpredictable results on growth, but a risk for the other tanks/cages. Low performance of the fish is sometimes worse that a dead fish…you are losing the value of the fish and the farm is leaking resources for a long period.

Cost of fingerlings
Cost of feed
Extra-man power to remove dead fish and properly dispose them + cost of disposal
Decrease of conversion rate and growth ratio + weight loss in adult gilthead seabream affected by Sparicotylosis

Results – Marine 3 - Bacteria

Major constraint for Marine acquaculture despite the availability of terapeutic 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 damselae subsp. Piscida)
- Tenacibaculum (T. Maritimum)
- Mycobacteriosis (zoonosis)
- Aeromonas

Bacterial diseases - Impact

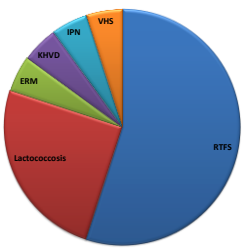
- Pasteurellosis high cumulative mortality, 25% fry, 10% caged fish

- Vibriosis (especially atypical) - Severe. Losses can rise up to 10% even more, growth penaltiesVery costly due to mortality but also reduced FCR, loss of growth, cost of preventive and curative measures, declassified fish at harvest

FreshWater results 1

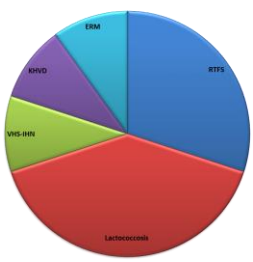
1-RTFS
2-Lactococcosis
3- ERM

1st FW disease in 2013



1-Lactococcosis
2-RTFS

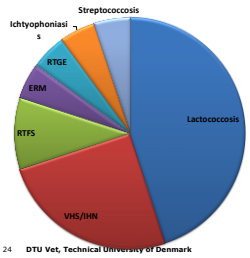
1st FW disease in 2014



FreshWater results 2

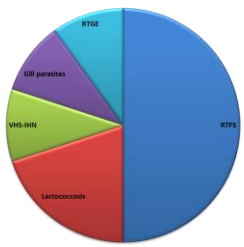
1-Lactococcosis
2-VHS-IHN
3-RTFS

2nd FW disease in 2013

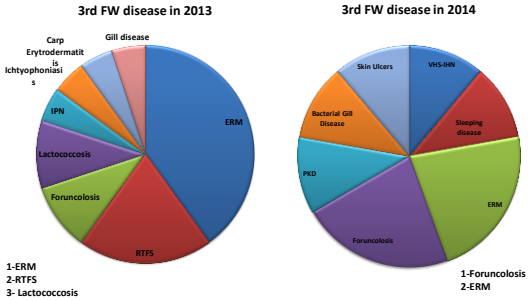


1-RTFS
2- Lactococcosis

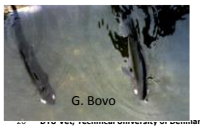
2nd FW disease in 2014



FreshWater results 3



Name	Lactococcosis
Aetiology	**Lactococcus garvie**
Symptoms / Diagnosis	Lethargy, dark skin pigmentation, unmistakable heavy exophthalmos sometime with eye lesions and enucleations, swimming ataxy and nervous symphoms, 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 satysfying results
Species affected / size	Rainbow trout and brook trout starting from about 100 g
Rearing sector affected (Hatchery/nursery/ongrowing)	Ongrowing sector.



Lactococcosis – Impact

Impact on production	When the disease becomes chronic it is present in farm all the year round, even during winter, while in past it was a temperature depending disease. Significant mortality of market size fish, long withdrawal due to prescription on derogation. Necessity of vaccination.
Impact on Economy	Died fish, their removing and carrying away, vaccination, medicated feed. Loss of growth. Need of important investment in vaccination plans

Results – FW - RTFS

Fotos: Morten S. Bruun

Name	RTFS (Rainbow Trout Fry Syndrome)
Aetiology	**Flavobacterium psychrophilum**
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 fuchsine 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 VS 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.

RTFS Impact

- Impact of bacterial diseases higher in the juveniles stages compared to previous years. Often related to water quality problem
- losses of juveniles and growth – size dispersion and slow grower – impact on the immune system of the fish

Results – FW - Forunculosis

Pictures kindly provided by Morten S.Bruun

Third disease to be considered for its impact in the aquaculture sector	
Name	**Furuncolosis**
Aetiology	Aeromonas salmonicida
Symptoms / Diagnosis	Lethargy, melanosis, gill aneurismal lesions, hemorrhages at the base of pectoral fins. Only few fish can show classical body lesions as furuncles or open hemorrhages as a result of furuncles.
Control methods applied	Medicated feed. Potentiated sulfonamides work well.
Species affected / size	Rainbow, brown and brook trout, arctic charr, grayling and withe fish / from few grams going on
Rearing sector affected (Hatchery/nursery/ongrowing)	Nursery and ongrowing

Don' t Forget at the EAFP 2015

Thank all of you for your attention

And thanks all experts for providing interesting replies:

J. C. Raymond	M.L. Fioravanti
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