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25th AW of the National Reference Laboratories for Fish Diseases, June 1st 2021

Survey & Diagnosis of fish diseases in 2020

European Union Reference Laboratory
for Fish and Crustacean Diseases

NATIONAL INSTITUTE OF AQUATIC RESOURCES, TECHNICAL UNIVERSITY OF DENMARK

Survey & Diagnosis of listed fish diseases in the European Community 2020

An Annual questionnaire

1. **General data:** Number of farms and categorization
2. **Epidemiological data**: Number of outbreaks and increase/decrease in number of infected farms/severity
3. **Laboratory data, NRL and regional laboratories**: total number samples tested and samples tested positive for each disease
4. **Reports from the individual European countries:** general information on aquaculture production, fish health status, disease challenging production.

Report

- The report was collated in May, and is now submitted to all of you for validation.
- Please check if the information given is correct!


European Union Reference Laboratory for Fish and Crustacean Diseases
NATIONAL INSTITUTE OF AQUATIC RESOURCES, TECHNICAL UNIVERSITY OF DENMARK

Report on Survey and Diagnosis of Fish Diseases in Europe 2020

DISCLAIMER The EURL for Fish and Crustacean Diseases and the EU commission have no liability for the accuracy of the information and cannot be held liable for any third-party claims or losses of any damages related to this report.

General production data taken from:

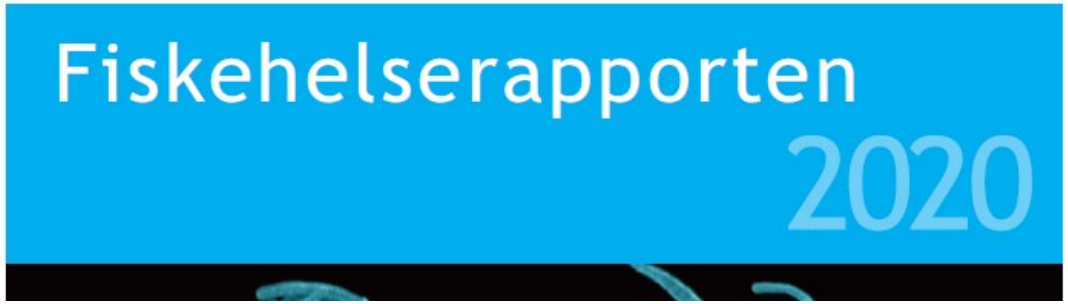
FEAP Data updated are (still) referrig to 2019

Additional information on economy available EUMOFA

Additional relevant sources

National reports

And company reports



IMPACT OF COVID-19 Pandemics

- Expected reduced production – to be assessed.

According to FAO data, **drop in overall output of 1.3 percent in 2020**. 1st decline in global aquaculture production in almost 60 years. large variations occur across the production of different species.

(e.g. Italy estimate reduction of 25% in RT production?

- Reported limited access to fish farms - fewer inspections/sampling/testing large variation country to country

- First experimental attempts of augmented reality for remote guidance inspection

IMPACT OF COVID-19 Pandemics

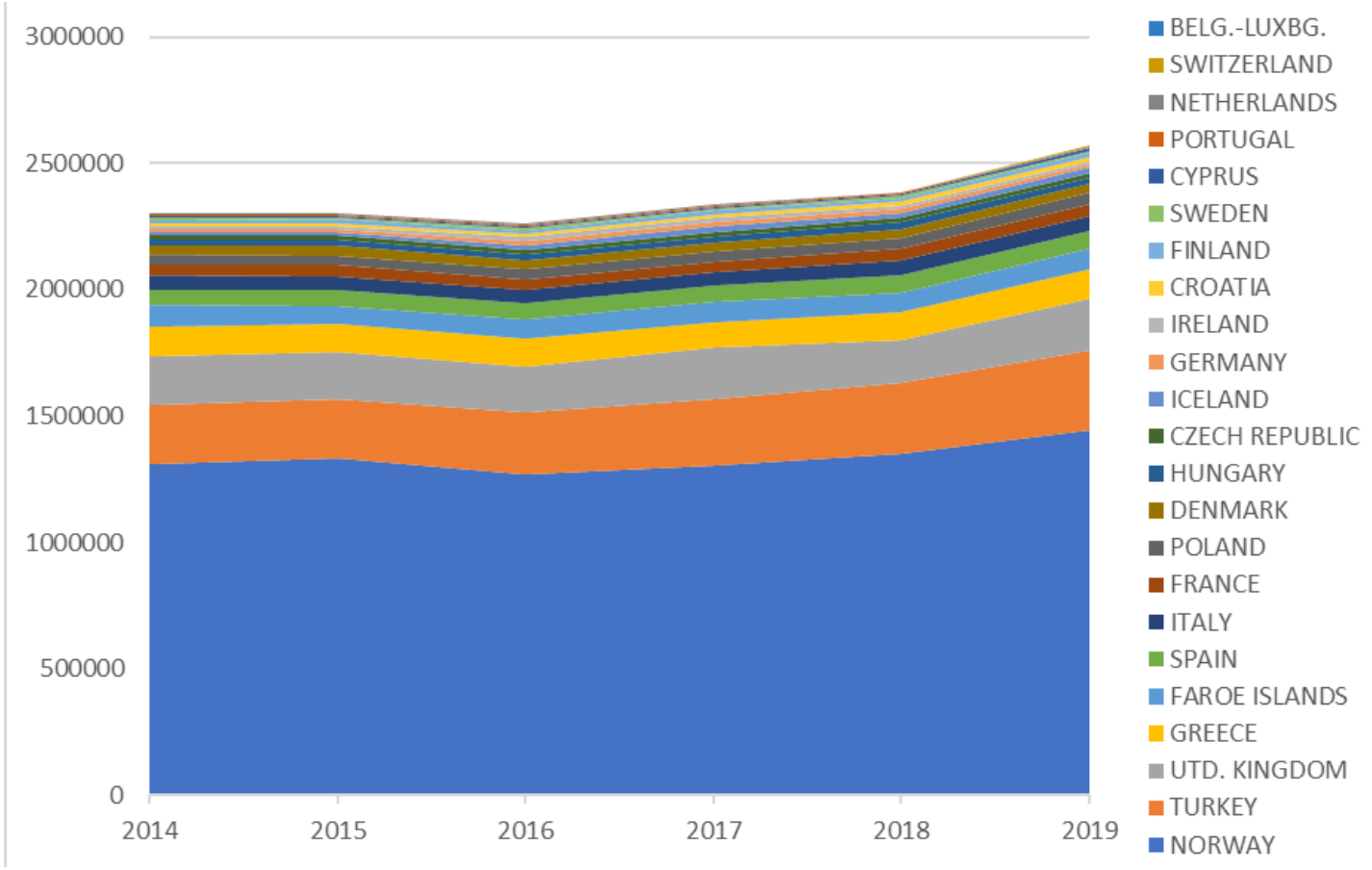
- Production of high value species sold directly to high end restaurants affected

- A number of public and private Labs, redirected to run SARS-COV2 PCR

Veterinary scientist hailed for Faroe Islands' lack of Covid-19 deaths

Debes Christiansen adapted his salmon-testing lab to test for disease among humans

Fish Farming Production in Europe



	2015	2016	2017	2018	2019	2020
Grand Total (tonns)	**2.304.172**	**2.264.000**	**2.339.717**	**2.390.302**	**2.574.333**	**? ↓**

Farmed species of relevance in European aquaculture

Species	2019
AS	**1.665.774,6**

Species	2019
RT table size	**225.200**
RT large size	**160.165**

Species	2019
Carp	**56.085**

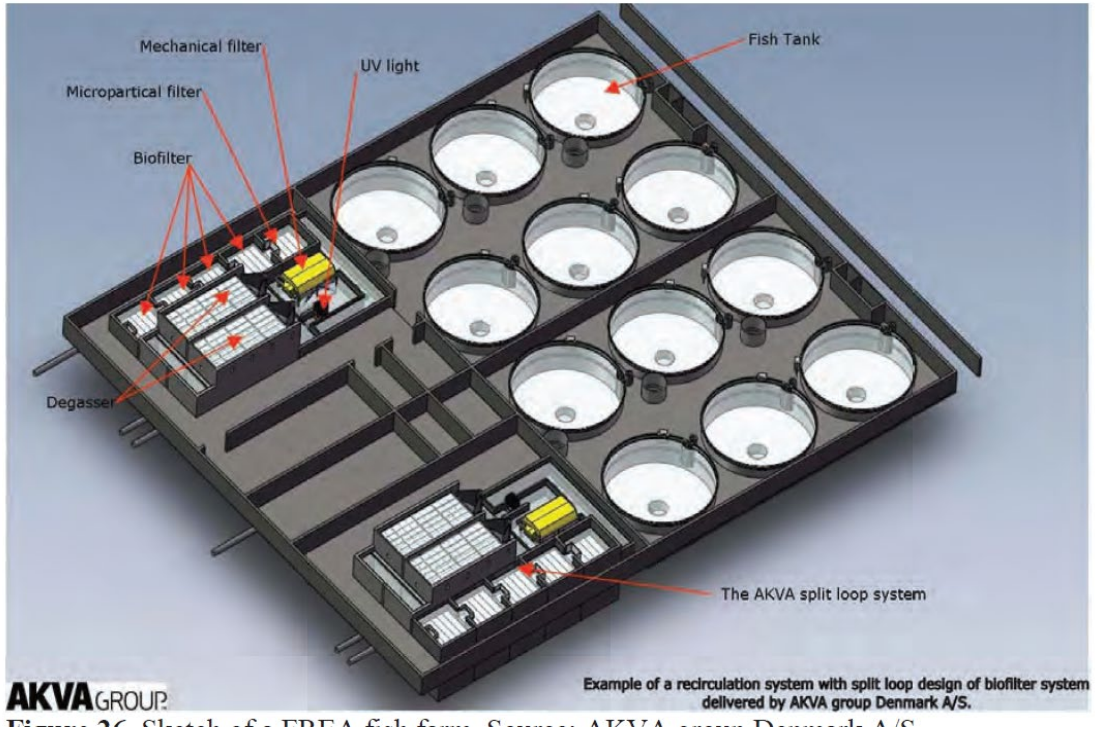
Species	2019
Sea bass	**208.197**
Sea bream	**199.476**

Other species of relevance in European aquaculture

- Salmonids (Artcic charr – 6915 tonns in 2019)
- Sturgeon (166 tonns of caviar produced in 2019)
- Halibut (1594 tonns)
- Turbot (11423 tonns)
- Cleanerfish for sea lice mitigation (22.5 million fish farmed in Norway)

New systems in aquaculture

Model 3 – biofilter- Raibow trout production Denmark



Fully recirculated Aquaculture facility

Indoor facilities

High value species or warmwater species

At least 18 countries reports RAS operations

Production of species in RAS

Clarias gariepinus

Stizostedion Lucioperca

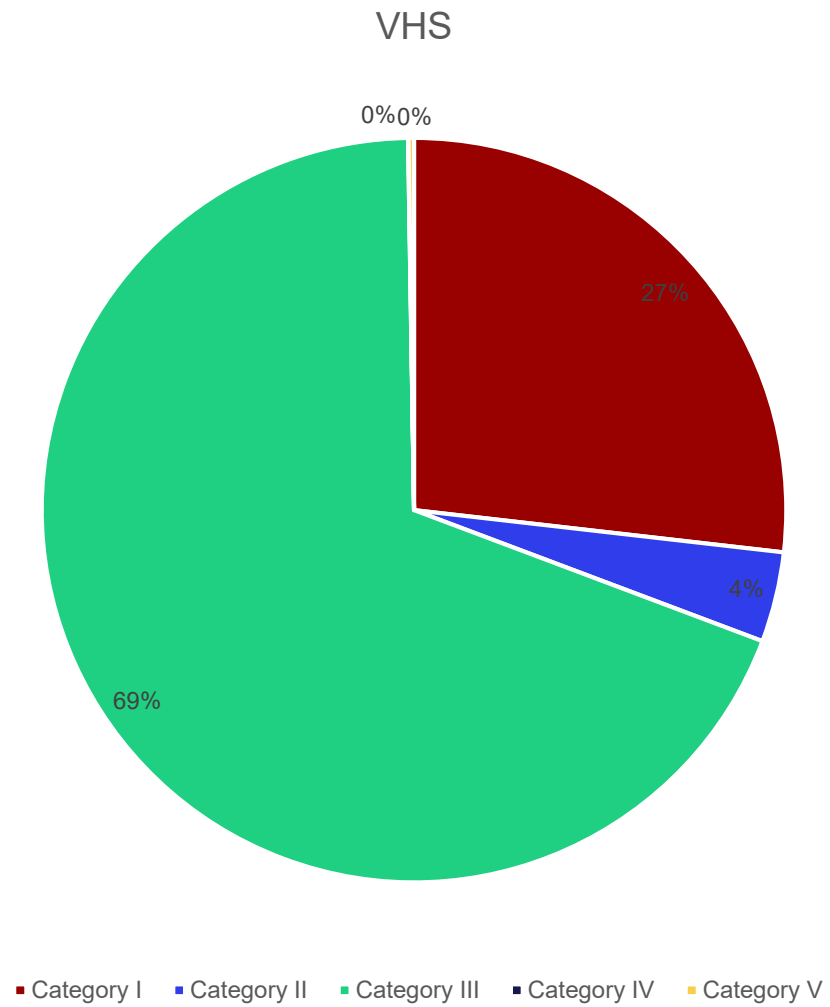
Tilapia niloticus

Pangasianodon hypophthalmus

Seriola lalandi

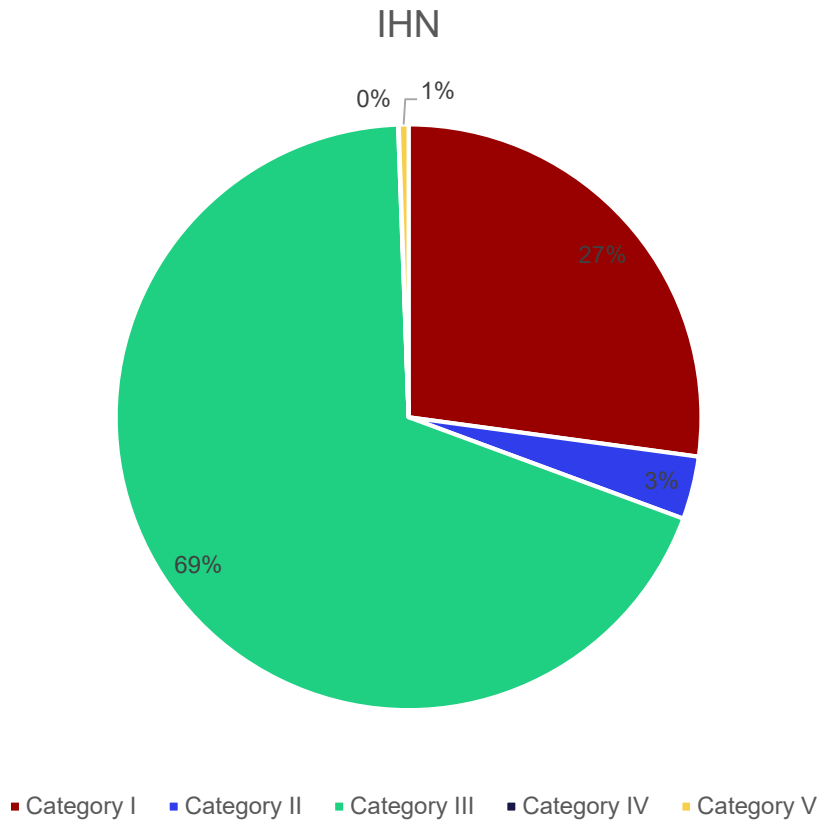
Litopeneus vannamei

Distribution of farms in zones and compartments according to category for VHS



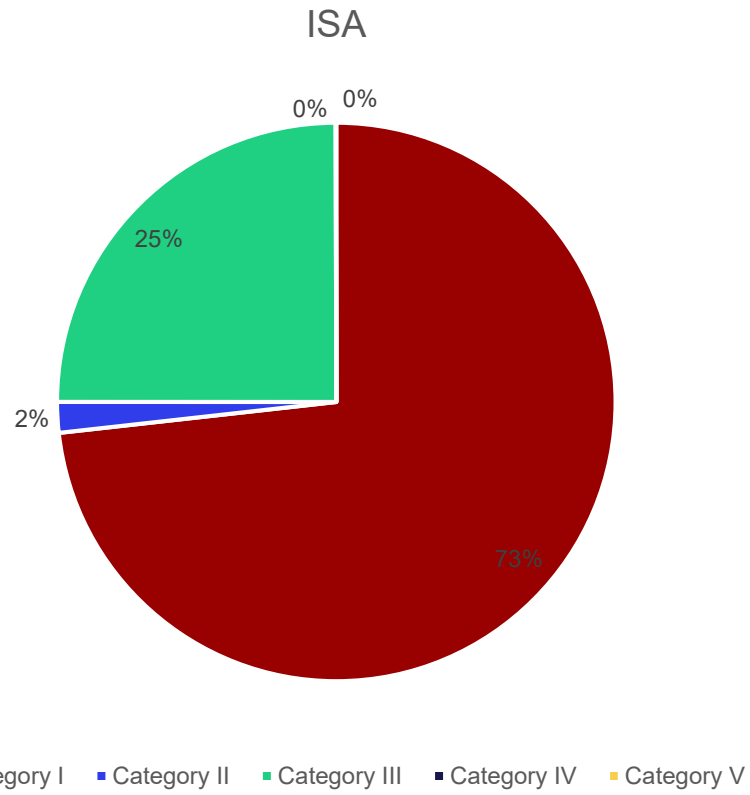
Category	# farms
1	3137
2	458
3	8075
4	2
5	28

Distribution of farms in zones and compartments according to category for IHN including 12601 farms



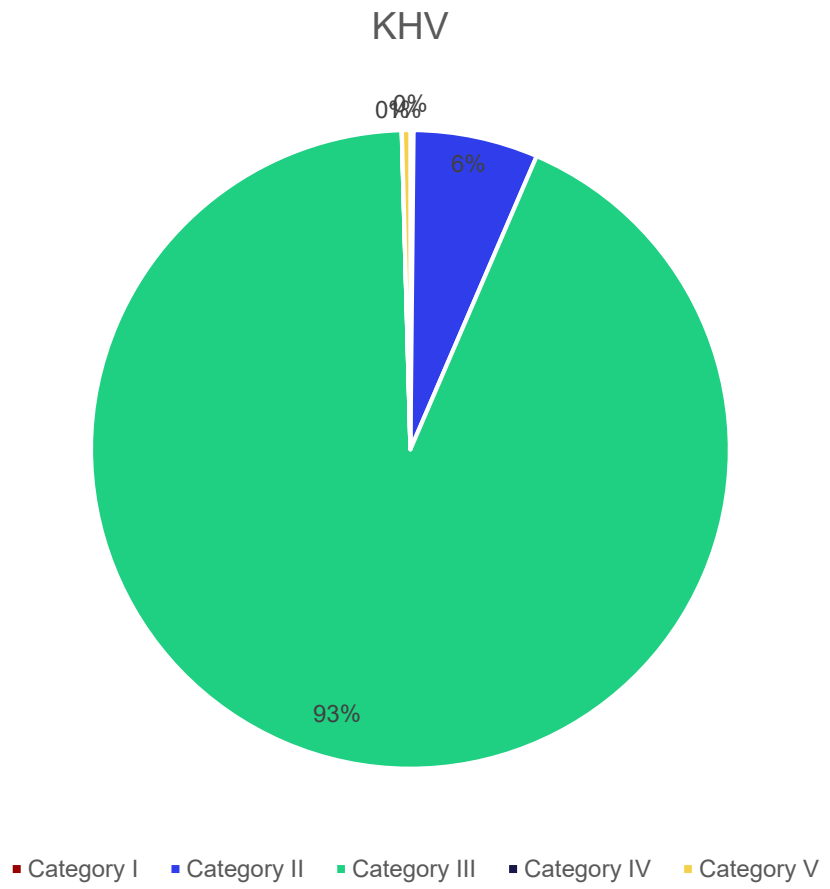
Category	# farms
1	3124
2	400
3	7915
4	4
5	62

Distribution of farms in zones and compartments according to category for ISA including 6666 farms with susceptible species



Category	# farms
1	4834
2	117
3	1648
4	0
5	2

Distribution of farms in zones and compartments according to category for KHV including 10871 farms with susceptible species



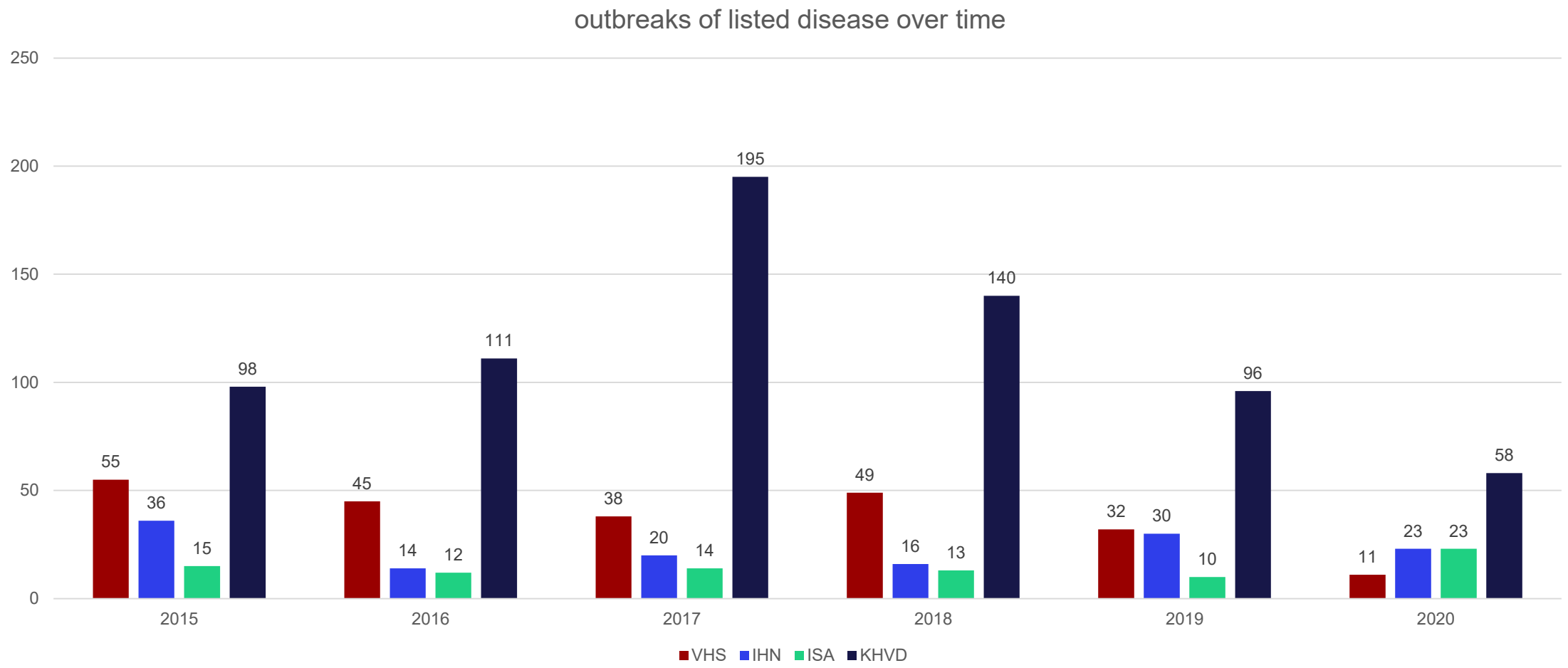
Category	# farms
1	20
2	794
3	11709
4	1
5	54

New health categorization to be implemented Regulation 2020/689

- There will be no more cat. III (expected to be transient status)

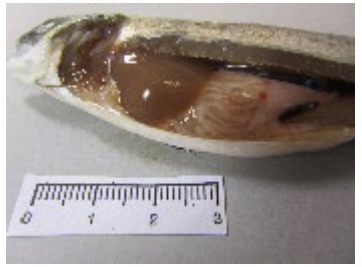
Health Category	Health status	Intro from	Dispatch to
I	Approved Disease Free	I	I, II, III
II	Approved Eradication program (surveillance or eradication program)	I or II 6 year max	II, III
III	Non approved disease free	I-II	III

Reported outbreaks of listed disease



Disease outbreaks - VHS

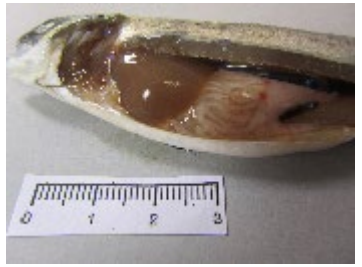
- 11 outbreaks reported in 2020
  - 5 reported in Germany ; situation varies depending on the Lander
  - 2 Belgium (not known route of introduction)
  - 1 Czech Republic
  - 2 reported in France only two outbreaks of VHSV were detected, in one specific area, following sampling performed for the national eradication plan ; **no clinical signs had been observed before**. epidemiological investigations led to additional sampling in a fish farm located downstream, on the same river. Once again, VHSV was isolated. Sequencing of complete G gene showed an almost perfect identity between the 2 isolates (99.9%).
  - 1 outbreak in Italy
  - In 2020 Vaccination for VHS/IHN project started in Italy in 2020 (see presentation from Andrea Marsella later on).



Disease outbreaks - IHN

- 23 outbreaks reported
- 21 in Germany – high number of outbreaks from 2019
- 1 outbreak in France: Two outbreaks were detected in 2020, one through targeted surveillance, and the other following an increase of mortality in a salmonid fish farm. To notice that in 2020, French laboratories began to perform VHS and IHN diagnosis by real-time RT-PCR as official methods recognized by the ministry of agriculture. Some late Cts were observed for samples corresponding to asymptomatic fish. Homogenates were sent to NRL for confirmation, but despite an effective sequencing, the isolation of the virus was not so obvious. This lack of consistence between cell culture and PCR analysis triggered some interrogations, notably regarding the real status of the farm and the necessary fallowing of facilities.

- 1 outbreak in Slovakia



Disease outbreaks - ISA

- 23 outbreaks reported in Norway. Situation in fast development in 2020.

- New diagnostic manual made available on EURL website

- See MINI-ISA SESSION with presentations from colleagues of NVI after this talk

Disease outbreaks - KHV

- 58 outbreak reported

- 42 in Germany
- 11 outbreaks in England in 2020, all in recreational coarse fisheries
- 5 Croatia
- 4 Czech republic
- 4 Hungary
- 1 Denmark
- 2 Slovakia
- 1 Scotland
- 1 Switzerland

Pics from CEFAS Gov.uk

Other fish diseases problems in *Atlantic salmon*

Company perspective

MAIN CAUSES OF REDUCED SURVIVAL

	INFECTIOUS		NON-INFECTIOUS	
	FISH NUMBERS	BIOMASS	FISH NUMBERS	BIOMASS
1	CMS	CMS	Treatments	Treatments
2	Winter sores	Gill infections	Environmental	Environmental
3	Gill infections	PD	Poor performers	Poor perfomers
4	PD	Winter sores	Other non-infectious	Physical damage

(CMS, Cardiomyopathy Syndrome; PD, Pancreas Disease)

Mowi report 2020 – all sites world

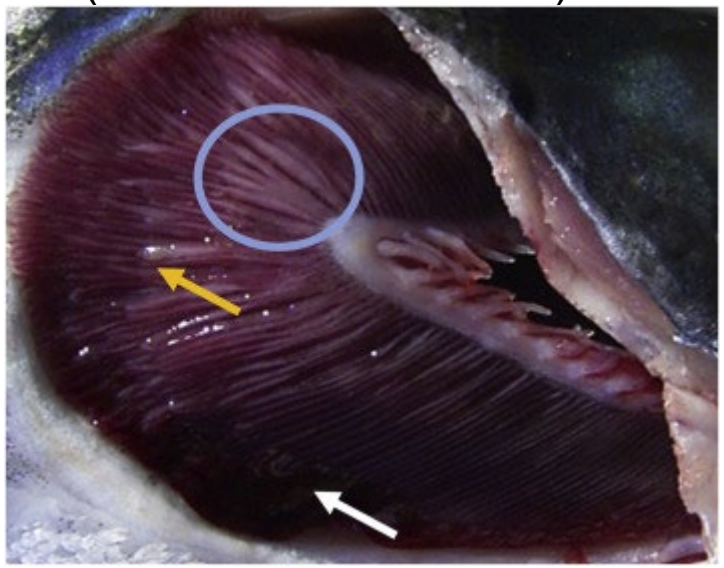
Mowi report 2019

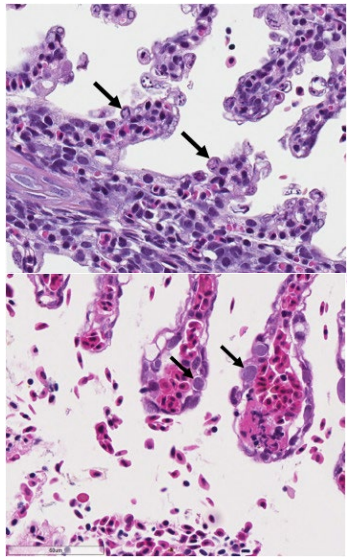
RESULTS

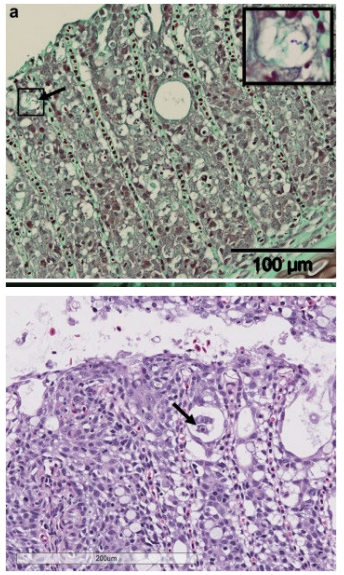
While survival rates generally increased in 2020 relative to 2019, **losses to Cardiomyopathy Syndrome (CMS), Heart and Skeletal Muscle Inflammation (HSMI), gill infections, winter sores and algal blooms increased in 2020. This was mainly attributed to additional fish handling to address the sea lice challenge**. Although losses to Pancreas Disease (PD) increased slightly in 2020, our management approaches and practices meant losses were still consistently well below the peaks observed in 2008 and 2011.

Other fish diseases problems in Europe
Atlantic salmon

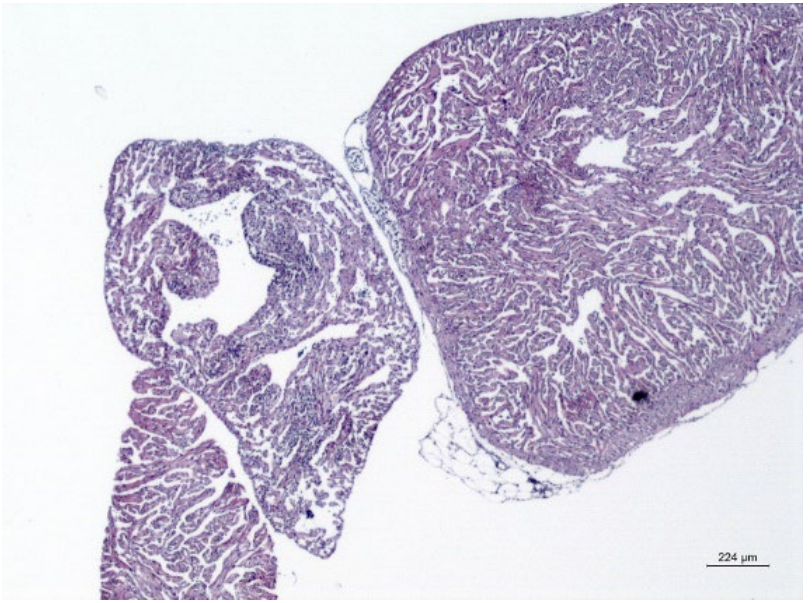
- In **salmon** farming it is **sea lice (and its treatment!)**
- Viral disease #1 **CMS cardiomyopathy syndrome** followed by PD, HSMI
- **AGD amoebic gill disease** and **CGD complex gill diseases** (amoebic gill disease, salmon gill poxvirus, *Paranucleospora theridion* etc..)
- Ulcers (*Moritella* and *Alivibrio*).







Herrero et al.,2018



CMS histopath –
Iburg unpubl.

Other fish health problems in Europe
Atlantic salmon

Water quality parameters essential to be controlled in RAS systems:

H2S

Nitrogen

In intensive indoor system, accident linked to technology can cause severe and acute losses.

General considerations whether is biology or technology driving the development of these systems.

Atlantic salmon – wild fish Red skin disease

New syndrome observed in wild salmon returning to the river in spring.

Unknown aetiology

Ongoing project to understand aetiology across nordic countries

Received: 12 July 2020 | Revised: 6 October 2020 | Accepted: 7 October 2020

DOI: 10.1111/jfd.13288

ORIGINAL ARTICLE

Journal of Fish Diseases WILEY

A multi-biomarker study on Atlantic salmon (*Salmo salar* L.) affected by the emerging Red Skin Disease in the Baltic Sea

Fabian G. Weichert[1] | Charlotte Axén[2] | Lars Förlin[1] | Pedro A. Inostroza[1] | Ulrike Kammann[3] | Annikki Welling[4] | Joachim Sturve[1] | Noomi Asker[1]

4.1 | Conclusion

In conclusion, it was shown that the emerging RSD among Atlantic salmon is associated with a significant osmotic haemodilution, an interference with the carbohydrate, specifically the glucose metabolism and alteration of the immune system. Although the inflammatory response and haemodilution are definitely disease responses, it remains to be elucidated whether the other physiological alterations seen are part of the aetiology or a disease response.

Other fish diseases problems in Europe Rainbow trout

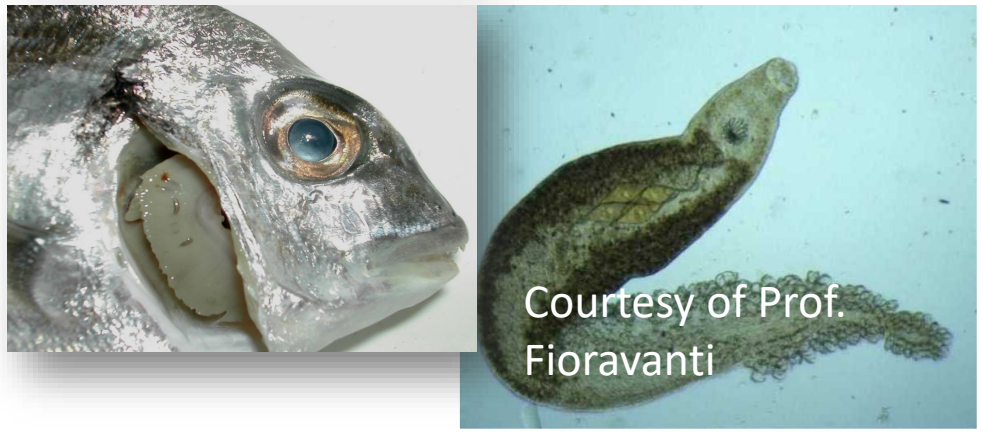
- In **rainbow trout** the major concerns are flavobacteriosis (RTFS), bacterial kidney disease (BKD), red mark syndrome (RMS), enteric redmouth (ERM) Of relevance reported also lactococcosis and proliferative kidney disease (PKD)

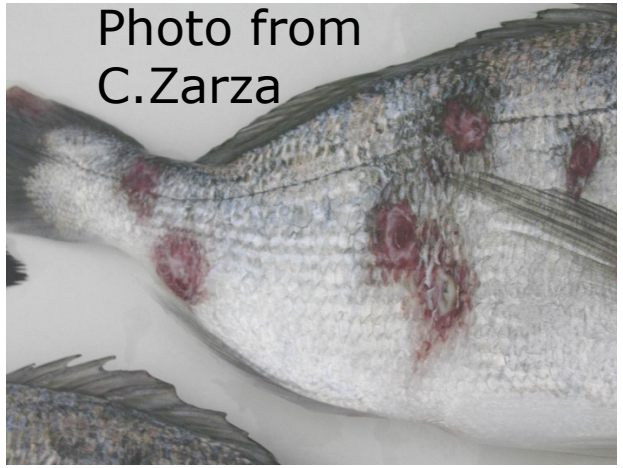
- and infectious pancreatic necrosis (IPN) with increased number of outbreaks/mortality associated with

- In Denmark findings and disease outbraeks linked to PRV-3 in RAS

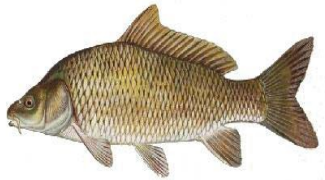
Other fish diseases problems in Europe seabass and seabream

- In **seabass** and **seabream** it is primarily VNN/VER (Re-assortant strain in Sea bream Hatcheries, *Aeromonas veronii*, Tenacibaculosis, *Lernathropus kroyeri* infection,
- *Sparicotyle* sp. , Red rash syndrome in Gilthead sea bream
- *Vibrio harveyi* infectionin Sea bass reported as relevatn in Italy and Croatia





Other fish diseases problems in Europe carp



- CEV still many new findings in Belgium, The Netherlands, Croatia, Denmark, England, Hungary, Ireland, Serbia, Italy, Czech Republic, France, Austria, Poland, Germany.
- See presentation from Czech republich for furhter info

Conclusion on S&D 2020

- Production in EUROPE – probably reduction
- New productions (RAS)
- Impact of COVID-19 pandemics
- VHS detection of virus without symptoms (France)
- IHN detection with increase of virulence
- 29 ISA outbreaks in Norway – situation in development
- 48 outbreaks of KHV (changes in upcoming legislation)
- Relevance of non-infectious disease (algal bloom in sea cage – water quality for RAS produced Salmon)

Thank you for all the significant work, efforts and time used for compiling these data!!

And please use the report!

Thank you for your attention!