Risk Factors for Emerging Parasites: The *Enterospora nucleophila* Example

11th March 2020
WEBINAR

ParaFishControl

Ariadna Sitjà-Bobadilla

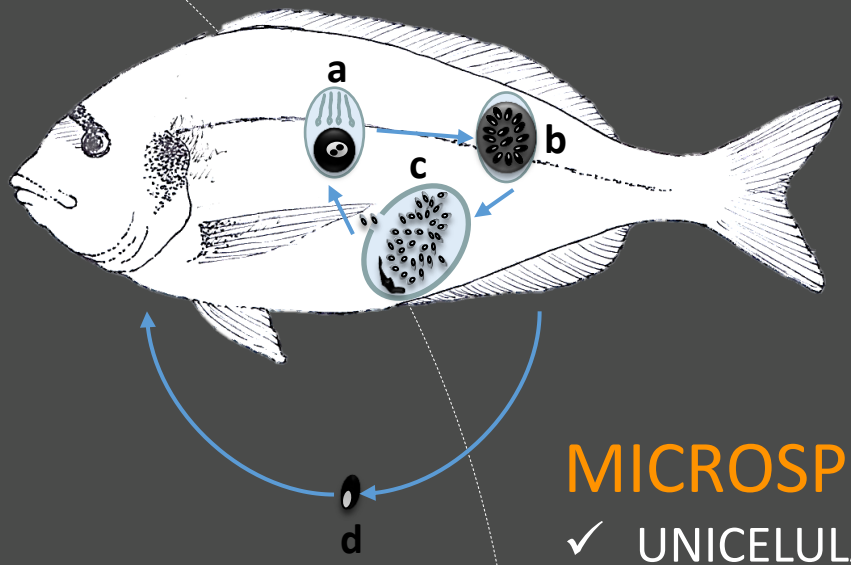
Instituto de Acuicultura Torre de la Sal
Consejo Superior de Investigaciones Científicas
Castellón, Spain

HORIZON 2020

CSIC
Consejo Superior de Investigaciones Científicas

ParaFishControl

1 What is *Enterospora nucleophila* ?

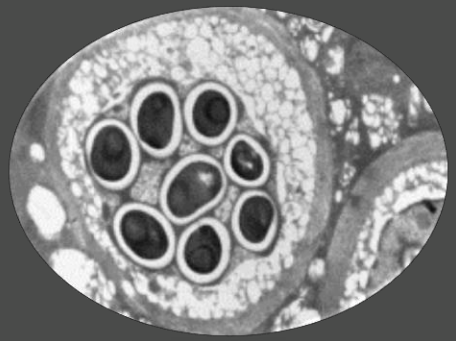


ParaFishControl

MICROSPORIDIAN

- ✓ UNICELULAR
- ✓ OBLIGATE PARASITE
- ✓ INTRANUCLEAR & INTRACYTOPLASMIC
- ✓ DIRECT TRANSMISSION
- ✓ SPORES ARE THE RESISTANT STAGE
- ✓ NON ZOONOTIC
- ✓ Very small spores: 1.67 x 1.05 µm

- ✓ GILTHEAD SEA BREAM



Which is the pathogenic impact ?

How much is spread ?

How to detect it ?

How is transmitted?

Which are the risk factors ?

1

ONLY ONE ARTICLE PUBLISHED IN 2014

ParaFishControl

ParaFishControl

2

The challenge: to know where is it present and how it enters the farms

ParaFishControl

SAMPLING EFFORT

Parasite dection by qPRC

8 FARMS SURVEYED

2 COUNTRIES

The figures

3 YEARS SURVEY

2 PRODUCTION CYCLES

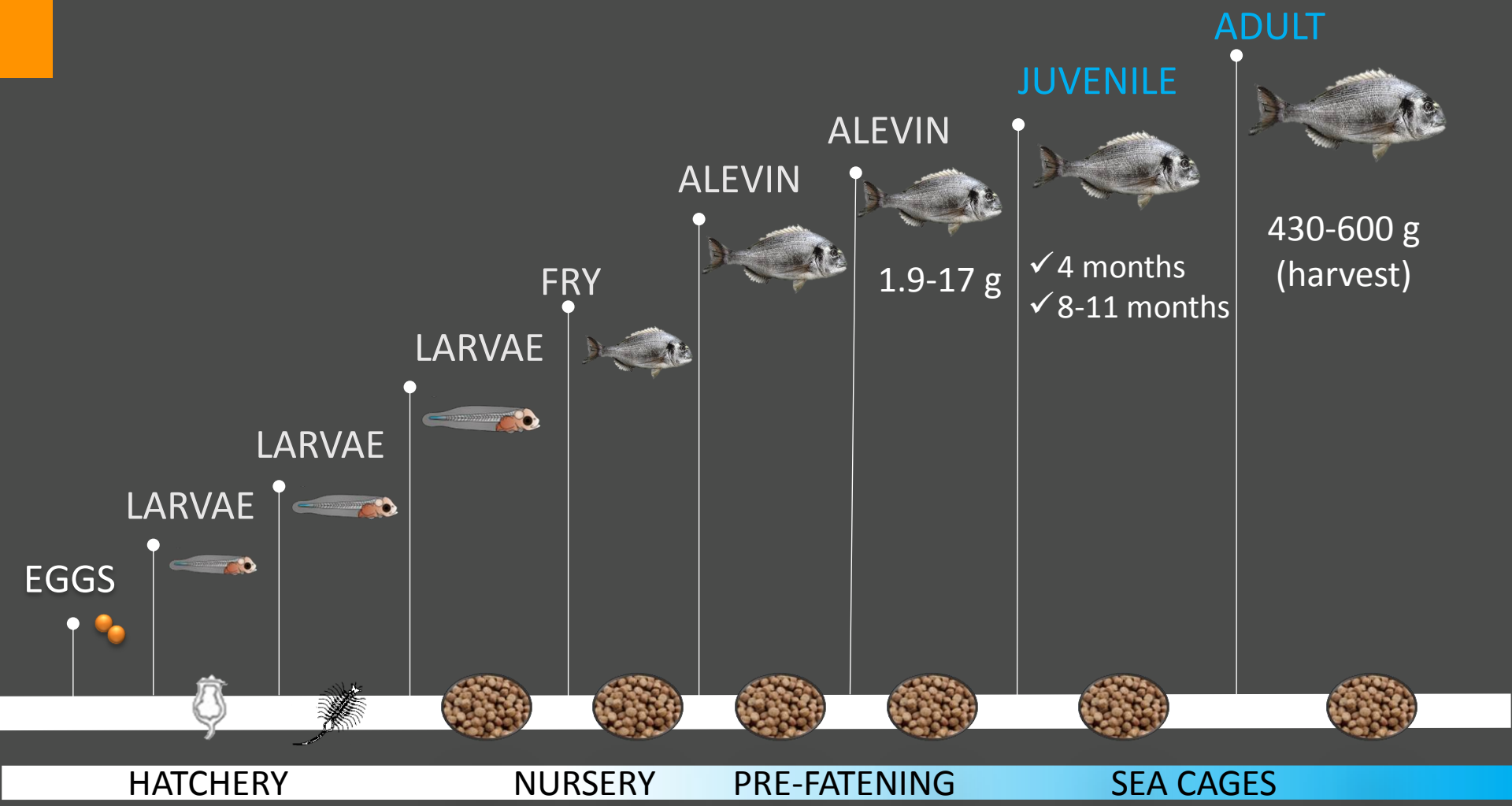
1,930 SAMPLES

FROM EGG TO HARVEST SIZE

SAMPLES TAKEN AT FARMS AND SENT TO IATS-CSIC FOR ANALYSES

SAMPLING PLAN: CCP OF THE PRODUCTION CYCLE

ParaFishControl



ParaFishControl

C1-F1

Eggs

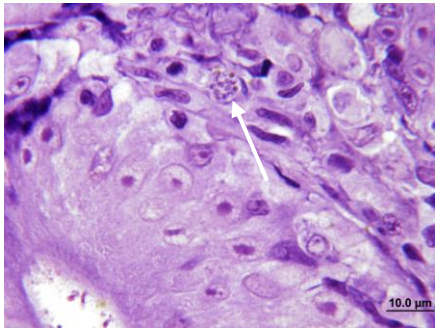
Larvae

Rotifer

Artemia

Fry

Alevin: end of nursery indoors



4 months

8 months

Harvest

10%

57%

25%

C1-F1

11 g

C1-F5

189 g

C1-F5

270 g

C1-F5

600 g

PERIOD II

72.4%

PERIOD I

C1-F1

10 g

C1-F3

130 g

C1-F3

250 g

C1-F3

600 g

C1-F2

17 g

C1-F4

65 g

C1-F4

90 g

C1-F4

460 g

100%

prevalence

40%

53%

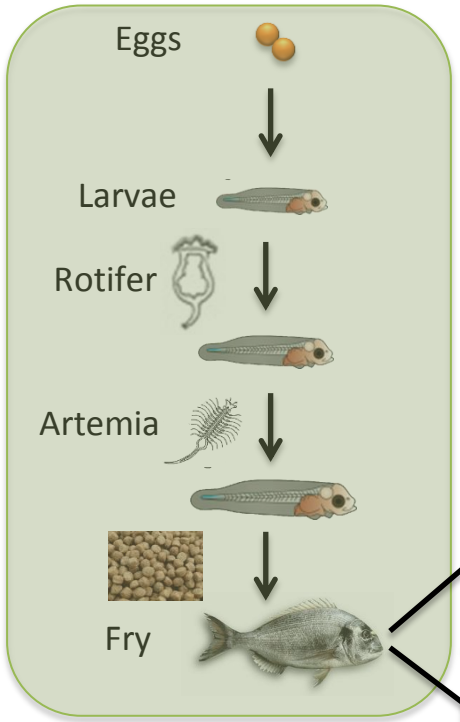
18.6%

Hatchery-Nursery

Alevin: pre-fattening

Sea cages: fattening

ParaFishControl



C2-F1

5.7%

1.1 g

C2-F1-N1

16.7%

C2-F1-N2

4.6 g

C2-F1-N1

2.7 g

8-11 months

248 g

C2-F3

24%

harvest

432 g

17.8%

C2-F3

PERIOD II

C2-F1-N1

37.2%

0.9 g

C2-F1-N1

1.9 g

213 g

C2-F2

50%

430 g

C2-F2

10%

PERIOD I

Hatchery-Nursery

Alevin: pre-fattening

Sea cages: fattening

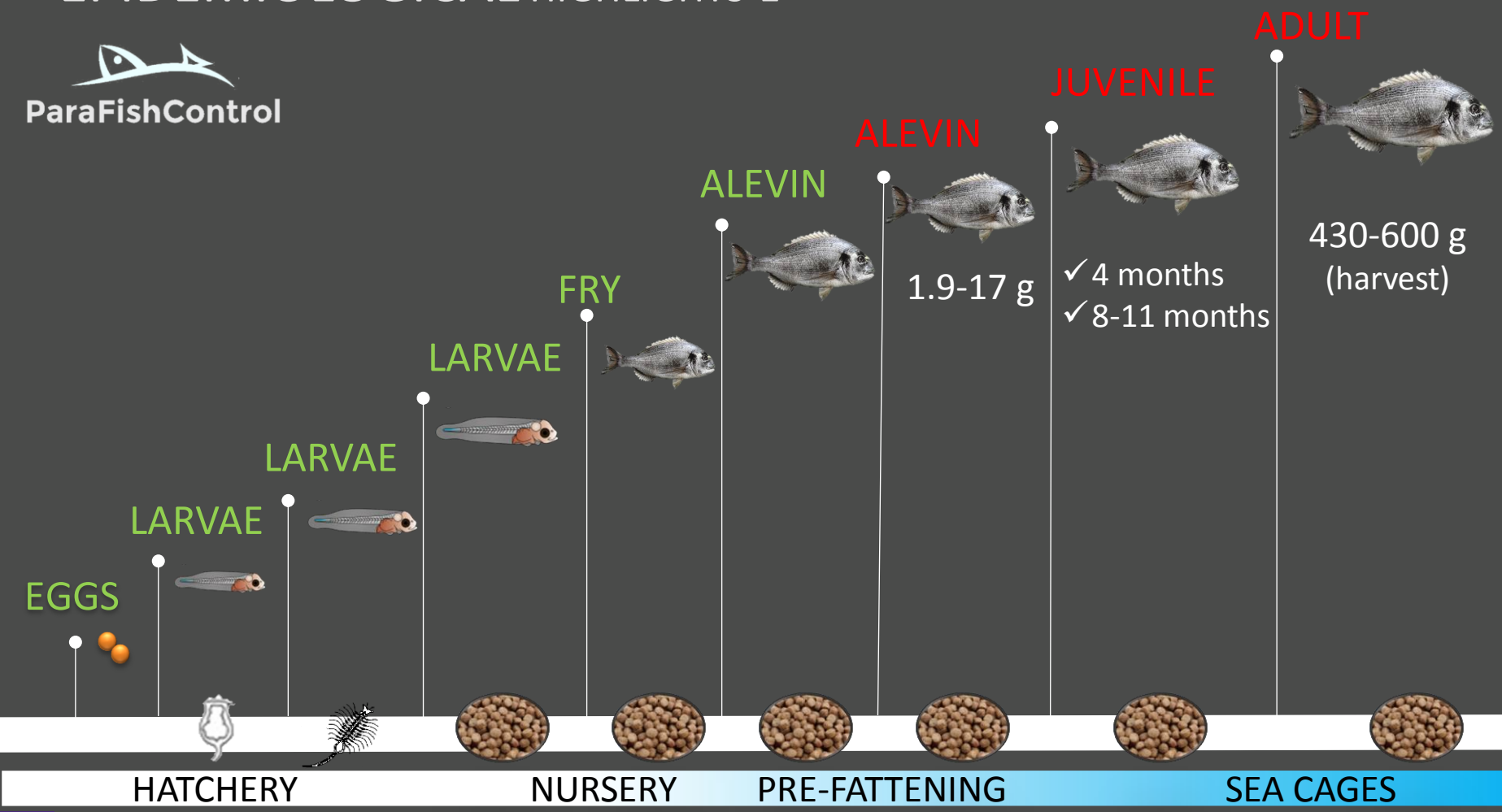
prevalence

ParaFishControl

3 Epidemiological consequences

EPIDEMIOLOGICAL HIGHLIGHTS-1

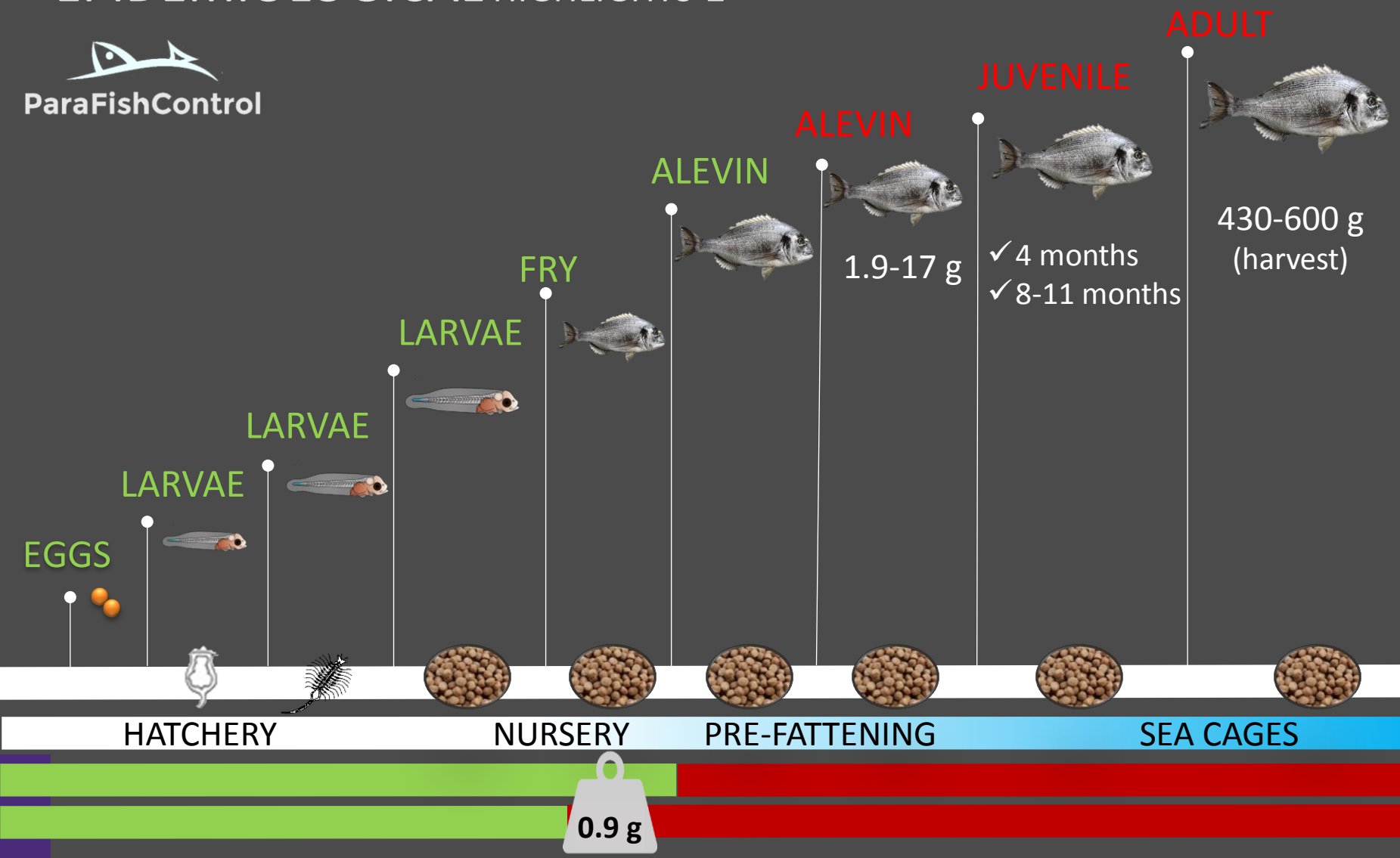
ParaFishControl



Fish were negative for the parasite in both countries, in all the periods and sampled facilities from the egg to the fry stage just after weaning, including the live prey they were fed during this time, no matter what type of water rearing system was used (flow-through or borehole)

EPIDEMIOLOGICAL HIGHLIGHTS-2

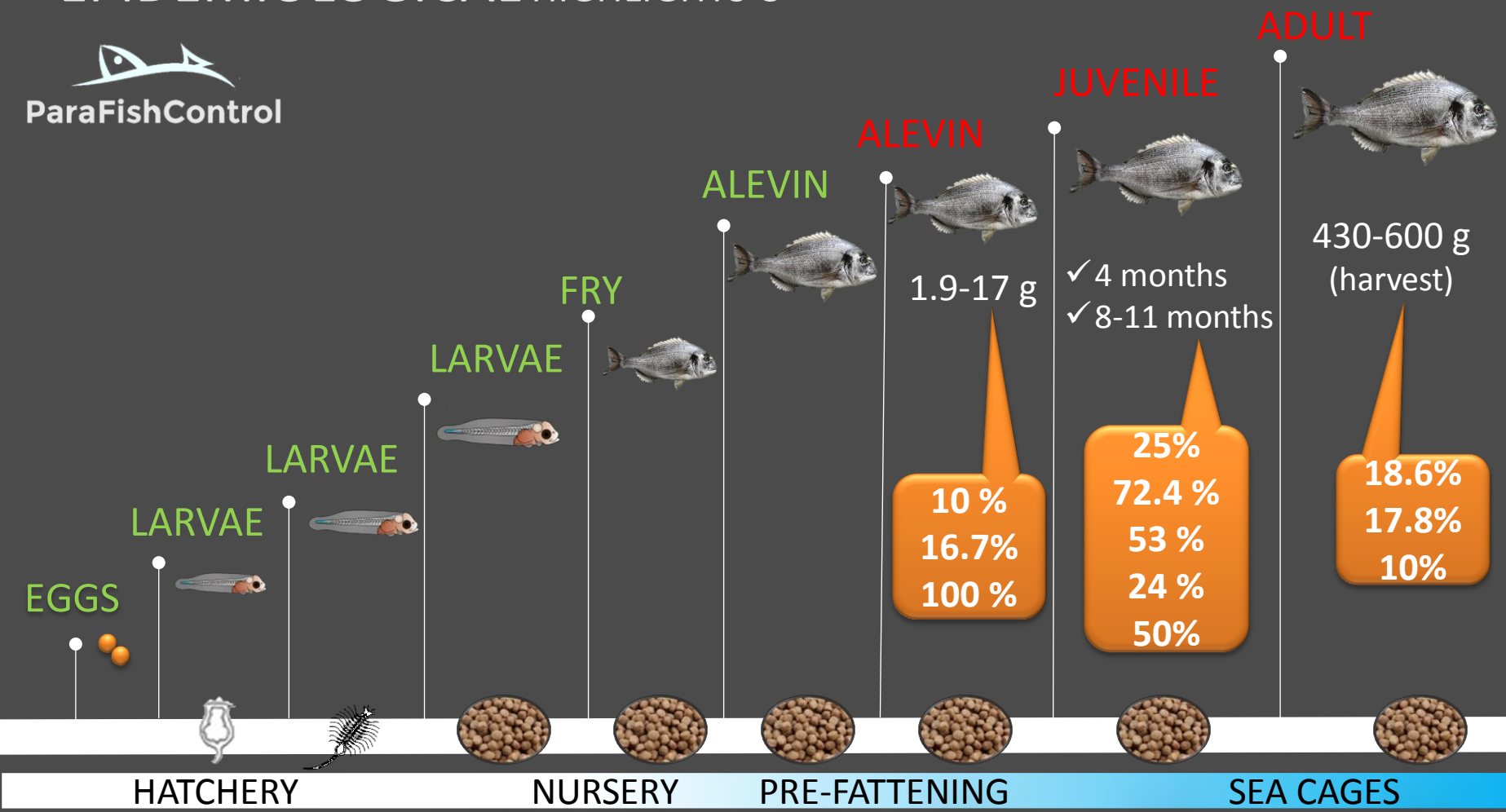
ParaFishControl



- ✓ The first positive cases were detected either when entering or when leaving the nursery
- ✓ The smallest fish harbouring the parasite weighed 0.9 g

EPIDEMIOLOGICAL HIGHLIGHTS-3

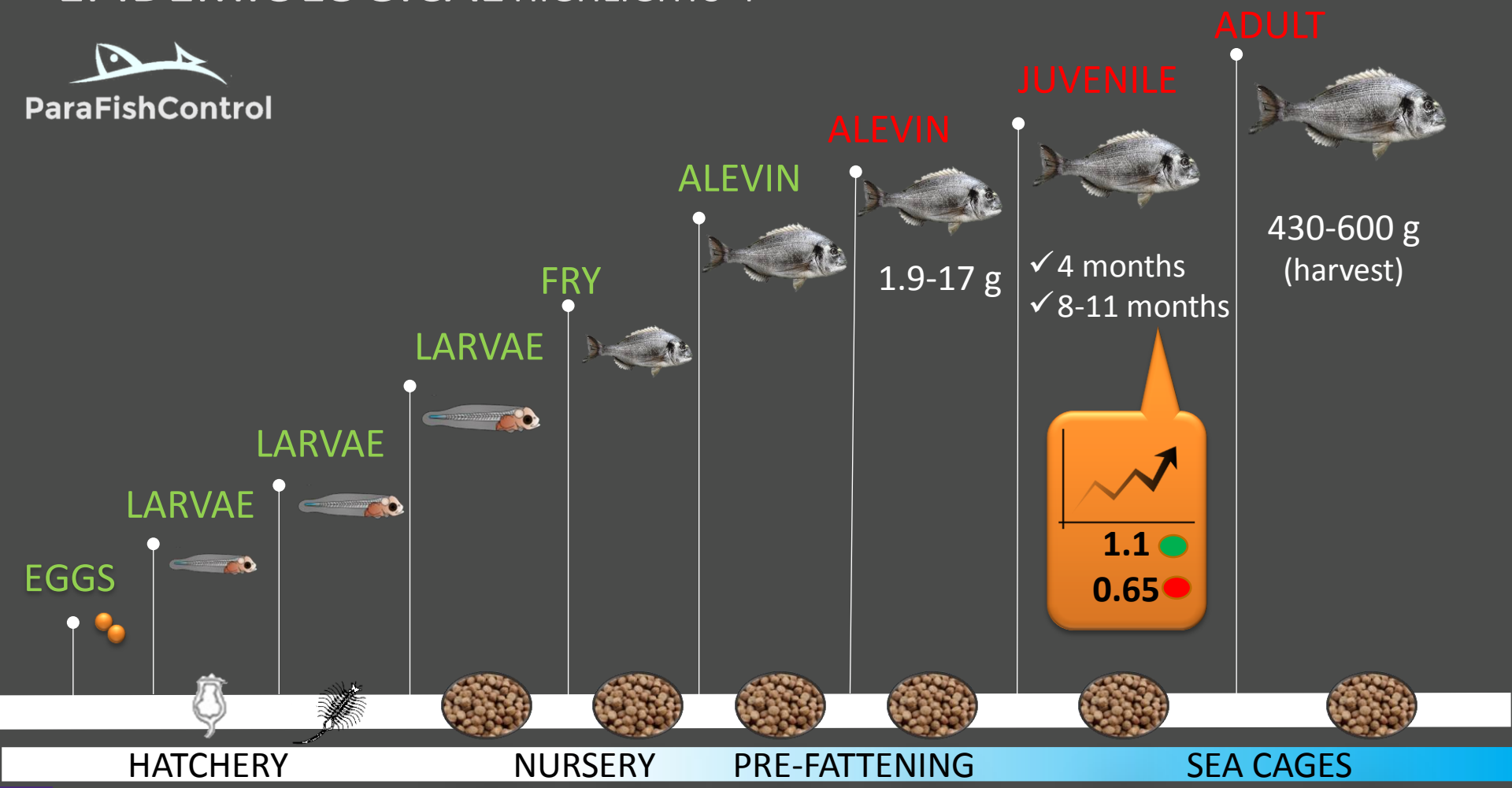
ParaFishControl



- ✓ Both countries entered fish positive for the microsporidian at cages with variable prevalence
- ✓ At 8 months in sea cages all farms were positive, even those that entered negative
- ✓ All the sea cages farms, locations, production periods and countries were positive
- ✓ There is a decreasing trend with age, but still positives at harvest size

EPIDEMIOLOGICAL HIGHLIGHTS-4

ParaFishControl

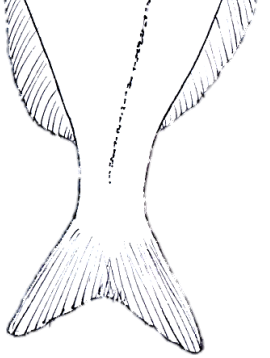


- ✓ Fish that entered cages with high infection levels, performed worse than those that entered without the infection: SGR of infected stocks was up to 40.9 % worse after 8 months in cages
- ✓ No clear difference in parasite infection between fish stocks entered in winter or summer

ParaFishControl

4 Conclusions

ParaFishControl



No vertical transmission

Live feed not involved

Some **filtration** procedures **reduce risk**

WATER IS THE SOURCE OF INFECTION

FISH CAN GET INFECTED from 0.9 g to HARVEST SIZE

qPCR is more efficient than histology **to detect the parasite**

FISH are seeded in sea cages already **infected**

Fish that enter the sea cages with high infection values PERFORM WORSE

TAKE-HOME MESSAGE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under GA number 634429.This output reflects opinions only from the author (s).The European Commission is not responsible for any use that may be made of the information it contains.

ParaFishControl

This project has received funding from the European Union's Horizon 2020 research and innovation programme under GA number 634429.This output reflects opinions only from the author (s).The European Commission is not responsible for any use that may be made of the information it contains.

ParaFishControl

Thanks

Ariadna.sitja@csic.es

CSIC-IATS Fish Pathology Group

pixabay

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634429. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.

Thanks for your attention

@parafishcontrol.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under GA number 634429.This output reflects opinions only from the author (s).The European Commission is not responsible for any use that may be made of the information it contains.