



ANUAL COORDINATION MEETING 2017

**Results on mullet grow-out in farm conditions: a
multipartner trial.**

**WP 23 Grow-out husbandry-grey mullet
Task 23.2, 23.3 and 23.4**

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WP 23 Grow-out husbandry-grey mullet

- **Task 23.2** Compare the effect of feeding an improved grey mullet diet on the grow-out in monoculture of **F1 juveniles** stocked at two different densities in **cement and PP tanks (Israel)**.
- **Task 23.3.**monoculture of **wild caught juveniles** stocked at two different densities in **cement ponds in Greece**.
- **Task 23.4.**monoculture of **wild caught juveniles** stocked at two different densities in **earthen ponds in Spain**.

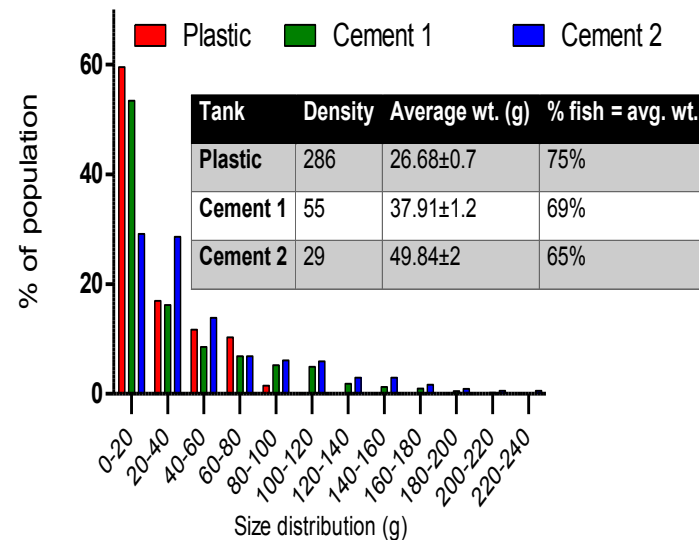
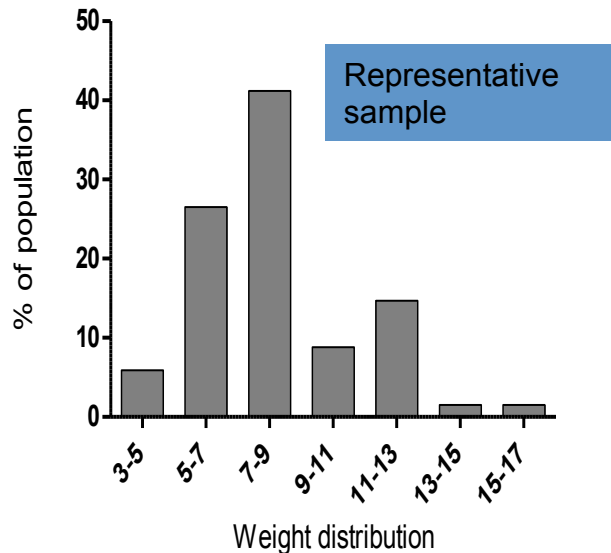
- A series of experiments were carried out testing the effect of different stocking densities on growth and size distribution.



Effect of stocking density (29, 55 and 286 fish/m²)

Experimental design

- two cement (18.5 m²) and one polypropylene (7.2 m²) ponds stocked with F2 fish
- Weight distribution of a representative sample (68 fish) with avg wt of 0.23 ± 8.23 g
- Tanks-open system fed by filtered (10 µm), ambient sea water (40 ‰).
- Used IOLR diet and not IRIDA (similar formula)



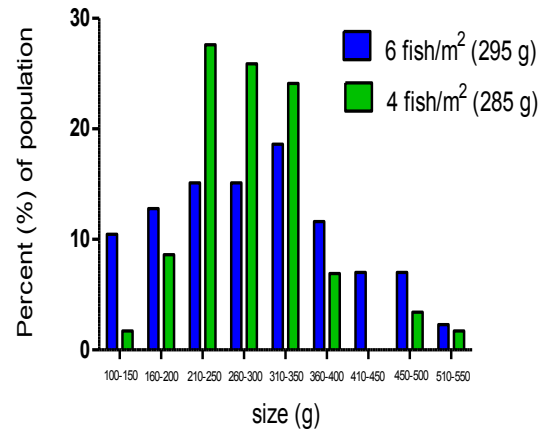
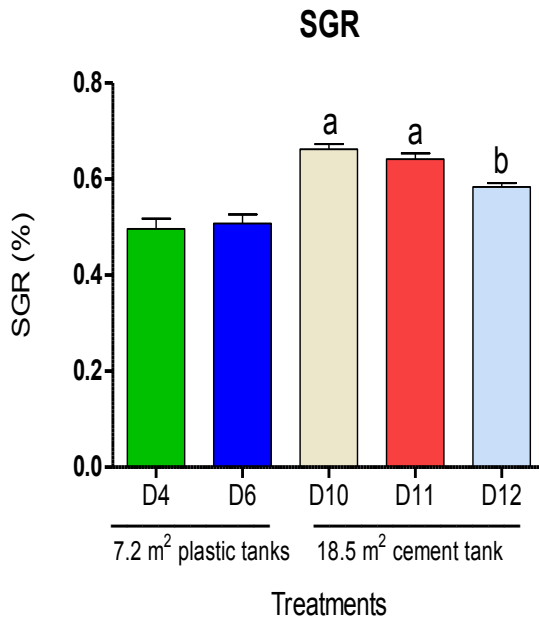
Results and Discussion

- As density decreased - concomitant increase in average weight.
- All density levels > 50% of the population below avg. wt- indication of poor growth of majority of fish
- Implications for monoculture of grey mullet-significant delay in fish growth and poor FCR in farmed fish .

Effect of stocking density (4, 6, 10, 11, 12 fish/m²)

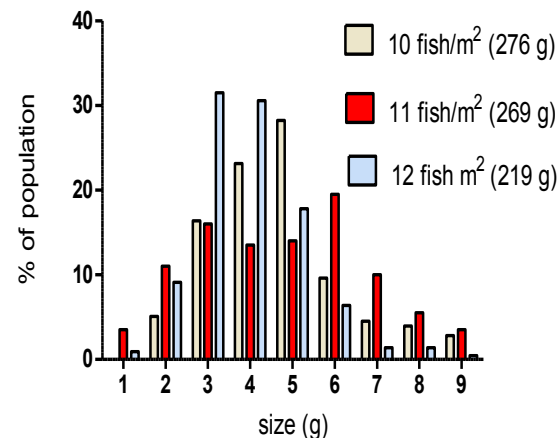
Experimental design

- two cement (18.5 m²) and four polypropylene (3.5 m²) ponds stocked with F2 fish
- Tanks-open system fed by filtered (10 μm), ambient sea water (40 ‰).
- Used IOLR diet and not IRIDA (similar formula)



Conclusions

- Increasing density in larger fish also reduces avg. wt and population skewed to smaller fish
- Taken altogether density has an effect on growth and weight distribution over a range of sizes.
- Improved diet may ameliorate effect.
- Remains bottleneck for mullet monoculture





Task 23.3. Compare the effect of feeding an improved grey mullet diet on the grow-out in monoculture of **wild caught juveniles** stocked at two different densities in **cement ponds in Greece.**



Start month 9
End month 40



Fish recruitment

Fry : 5.000 individuals, ABW=0.28g
September 10 → October 23, 2014.



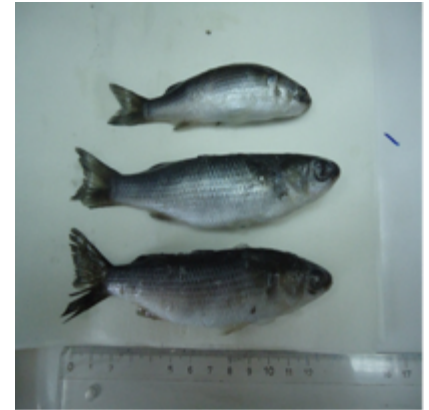
Adaptation period

- Identification HCMR based on the otoliths shape and outline (Tuset et al., 2008)
- 8 months → common field conditions; feed a commercial farm diet (50/21).



Rearing period

- July, 2015 ABW $21\text{g} \pm 1.4$
- 6 grow-out cement ponds at 4 and 6 individuals per m², (80 and 120 fish per pond; 3 replicates density).
- bore water, 22°C, natural photoperiod
- Feed IRIDA mullet 1.5mm (formulation IOLR including *Ulva* spp.)
- feeding 2/day apparent satiation
- Feed intake recorded daily





- **May, 2016** intermediate sampling.
- 15 fish sampled/pond.
- ABW $50\text{g} \pm 10$ (4/m² density)
- ABW $42\text{g} \pm 6$ (6/m² density).



- **November, 2016** final sampling



Results

Density	ABW (g)	SURVIVAL (%)
4 ind/m ²	51.6 ± 11	72 ± 11
6 ind/m ²	51.2 ± 8.5	75 ± 3

Status of the Subtask:

Evaluation of fish performance and chemical analysis (body proximate composition, fatty acid composition of selected tissues) are in progress



Task 23.4. Compare the effect of feeding an improved grey mullet diet on the grow-out in monoculture of **wild caught juveniles** stocked at two different densities in **earthen ponds in Spain.**



- **Wild fry** (Delta Ebro, Spain): 1500 individuals, abw=0,10 g April 2015. Feeding commercial diet for seabream
- **Nursery period:** RAS, 120 L tanks, seawater; feeding 3 times/day to apparent satiation
- **Farm:** 1st July 2015 → pond farm; abw: 3,6 g





- **Farm:**
 - 2 earthen ponds (L3: 1564 m² and L4: 1020 m²) at densities of 0,5 and 1 ind m⁻²
 - Farm conditions: natural thermo and photoperiod
- **Feeding procedure**
 - Irida feed (1.5 mm and 3 mm)
 - automatic feeders till size allow use of demand feeders



SAMPLING DATES

Stocking:01/07/2015

Interm. Sampling (farm):
04/02/2016

Interm. sampling: 21/06/2016

Final sampling: 15/12/2016

ACM Barcelona 2017

RESULTS

DATE	POND	INITIAL FISH NUMBER	N (sampled fish)	ABW (g)
01/07/2015	L3	544 (0,5/m2)	-	3,6
	L4	800 (1/m2)	-	3,6
04/02/2016	L3		57	92,65
(farm)	L4		88	33,17
21/06/2016	L3		28	163,55 ± 28,99
	L4		183	62,94 ± 30,78
15/12/2016	L3		157	294,02 ± 138,89
	L4		97	174,48 ± 55,36

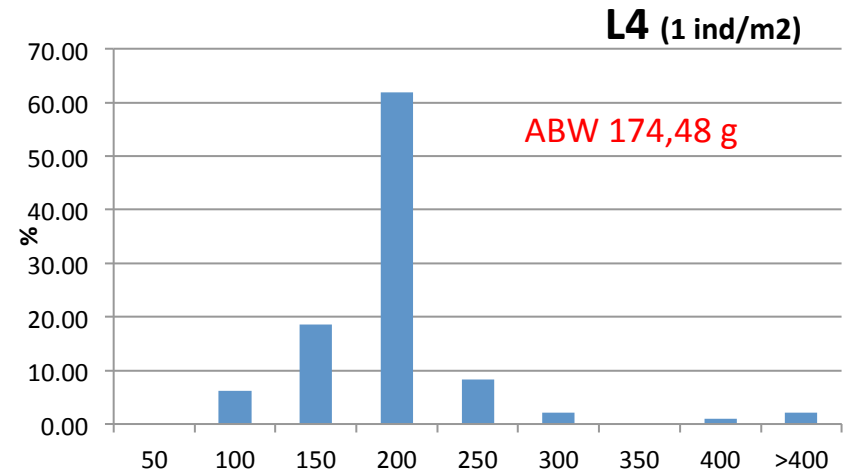
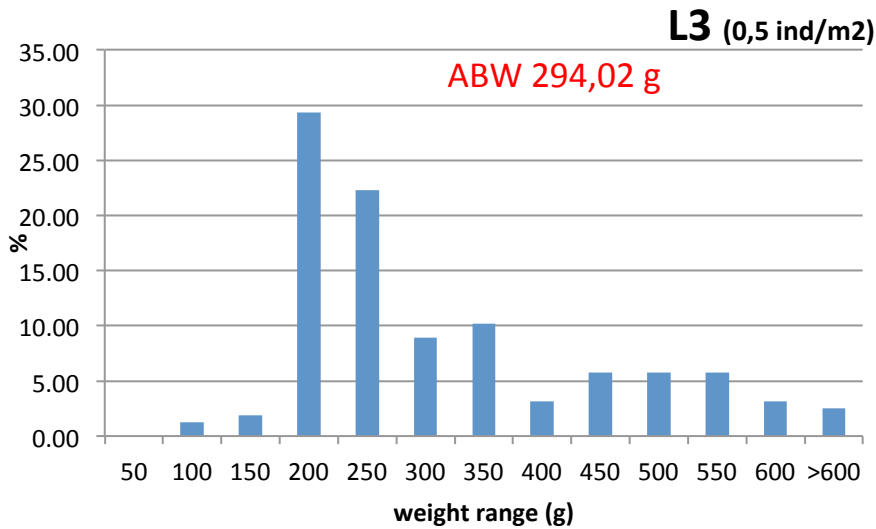
SGR: 0,83 %/DAY (0,5/m2)

SGR: 0,73 %/DAY (1/m2)

FCR: processing...



Size distribution:



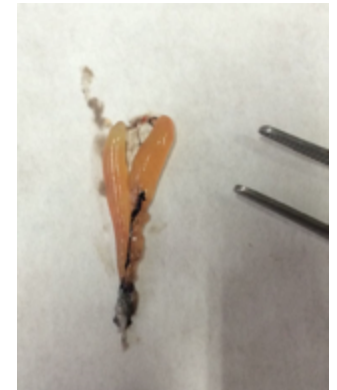
Survival data → not reliable

- Pond L4 was not completely empty
- Presence of intruders (seabream, seabass...)
- Harvesting method not accurate (fish jumping out of the net)





Somatic indexes: CI, HSI, VSI, GSI



- Status WP23.4:
 - Data treatment
 - Lipid class and FA of liver and filet tissue
 - Proximate composition of fish
 - Proximate composition of feed



Summary:

Location	Fish origin	Culture	Density (ind/m ²)	IBW (g)	FBW (g)	SGR	SURV
Israel	F2	PP Cement tank	286, 55, 29	-	27; 38; 50	0,5; 0,7	tbd
Greece	Wild	Cement tank	4 and 6	0,26/ 21	52; 51	tbd	72%; 75%
Spain	Wild	Earthen ponds	0,5 and 1	0,10/ 3,6	294; 174	0,7; 0,8	tbd

CONCLUSION: It seems density can be a key factor on the growth of grey mullet fry in tanks and pond conditions.



Thank you

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