Spawning induction of F1 greater amberjack in eastern Atlantic

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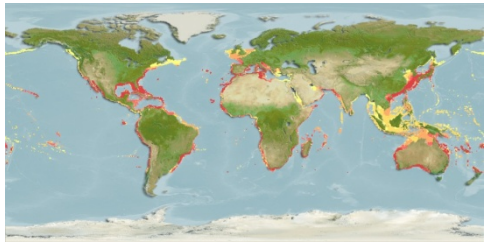
Introduction: The Greater Amberjack

- **Biological:**
  - Cosmopolitan species
  - rapid growth
  - large size

- **Economical:**
  - excellent flesh quality
  - worldwide market availability
  - high consumer acceptability



➢ product diversification and development of value added products

Species of great interest to the aquaculture sector

Introduction: The Greater Amberjack

- **Mediterranean interest (90's):**

- **POSITIVE**
  - fast growth results
  - adaptation to captivity
  - good food conversion

- **NEGATIVE**
  - reproductive failure in captivity
  - scarce production of juveniles
  - pathologies

- **Low productions**

- **Mylonas et al., 2004**

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Aquaculture

Aquaculture 237 (2004) 141–154

www.elsevier.com/locate/aqua-online

Induction of spawning of cultured greater amberjack (*Seriola dumerili*) using GnRHa implants

Constantinos C. Mylonas[a,*], Nikos Papandroulakis[a], Andreas Smboukis[b], Maria Papadaki[a], Pascal Divanach[a]

- **Jerez et al., 2006**

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Aquaculture

Aquaculture 252 (2006) 199–207

www.elsevier.com/locate/aqua-online

Natural spawning of greater amberjack (*Seriola dumerili*) kept in captivity in the Canary Islands

S. Jerez *, M. Samper, F.J. Santamaría, J.E. Villamandos, J.R. Cejas, B.C. Felipe

Introduction: The Greater Amberjack

- **Canary Island (COC-IEO):**

Reproduction

Wild fish keep in captivity

Feeding mackerel

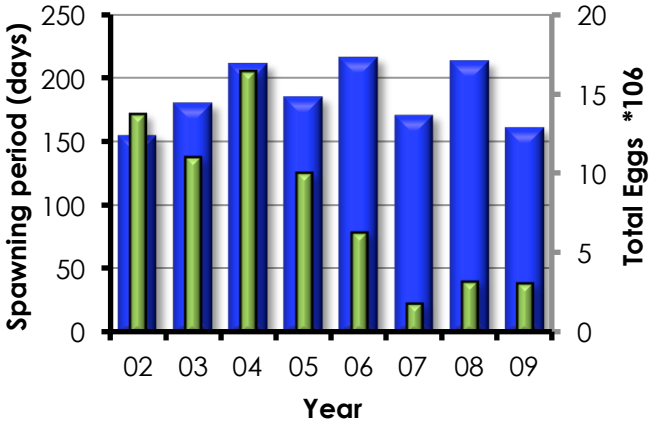
Large volume outdoor tanks

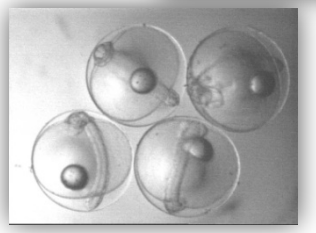
Feeding experimental diet

Natural spawning fertilized eggs

Natural spawning

Broodstock born in captivity (F1)





Unfertilized eggs

Ethylene–Vinyl acetate (EVAc) GnRHa implants

Broodstock of greater amberjack born in captivity (F1)

WP3
Reproduction and Genetics
Greater amberjack

IEO, HCMR

Task 3.4 Development of an optimized spawning induction protocols for F1 greater amberjack in the eastern Atlantic

Task 3.4 **Development of an optimized spawning induction protocols for F1 greater amberjack in the eastern Atlantic**

- **Objective:** The optimization of spawning induction treatment

- **Initial Work Plan:** Repetitive implants with GnRHa the same year:
  - Formation of 4 groups of F1 greater amberjack broodstock
  - Females treated with 0, 25, 50 and 75 μg kg^{-1}
  - Males implanted with 30 μg kg^{-1}

Year	Dose of GnRHa weight of female
2015	50 μg GnRHa kg^{-1}
2016	90 μg GnRHa kg^{-1}
2017	**Untreated fish**

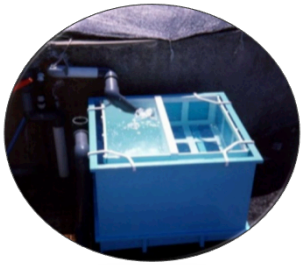
Task 3.4 **Development of an optimized spawning induction protocols for F1 greater amberjack in the eastern Atlantic**

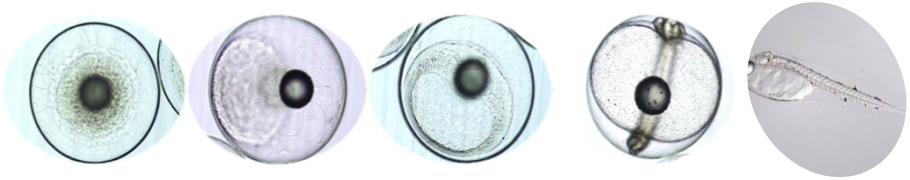
- **Fish sampling during the spawning season**

- Periodical samplings (monthly) in order to obtain gonadal and blood samples
- Repetitive implants with an Ethylene–Vinyl acetate (EVAc) GnRHa according to dose planned

- **Reproductive status and spawning evaluation**

- Sperm and oocyte
- Egg and larvae quality
- Sex hormones levels in blood plasma
- Hematological and biochemical parameters

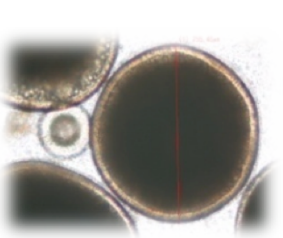


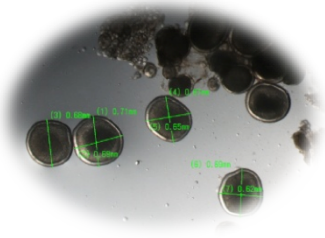


Females 2016

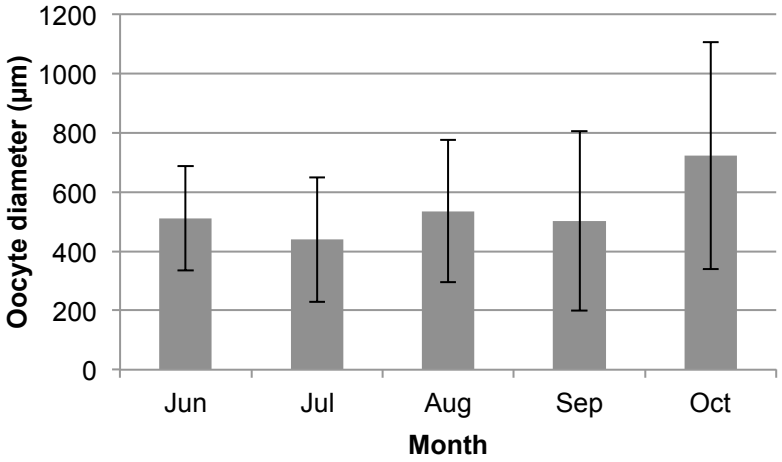
Females 2015-2016

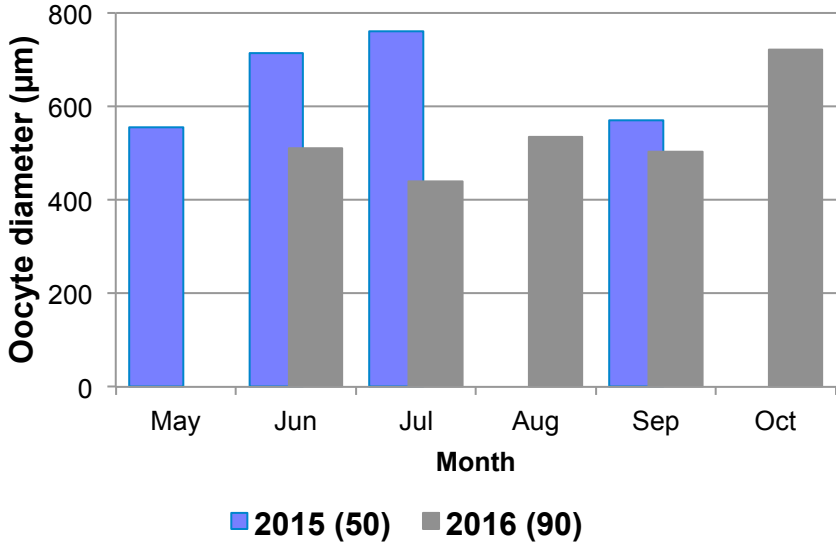
- The females were monthly implanted with 90 µg GnRHa kg^{-1} four times (from June to September)





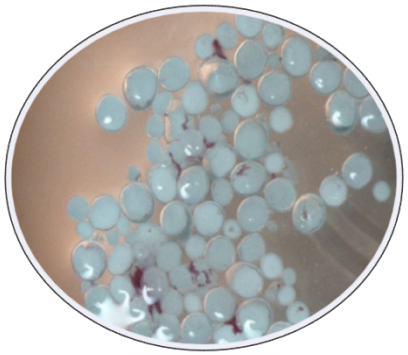
- Oocyte diameter was similar from first (June) to last treatment (September)





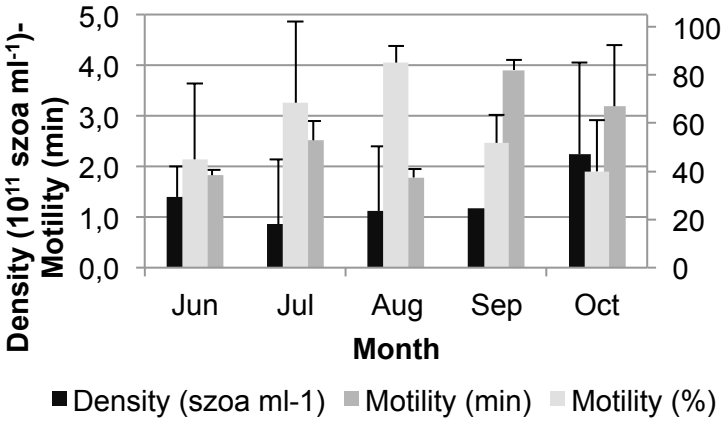
- The females implanted with ~50 µg GnRHa kg^{-1} (2015) increased slightly the oocyte diameter after first treatment (May).

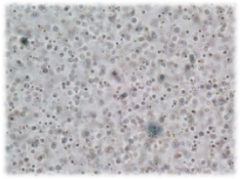
- The oocyte diameter of the females treated with ~90 µg GnRHa kg^{-1} (2016) increased after the last treatment (October)

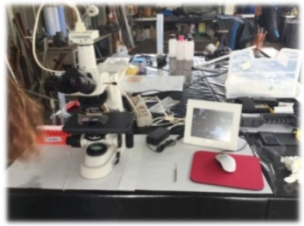


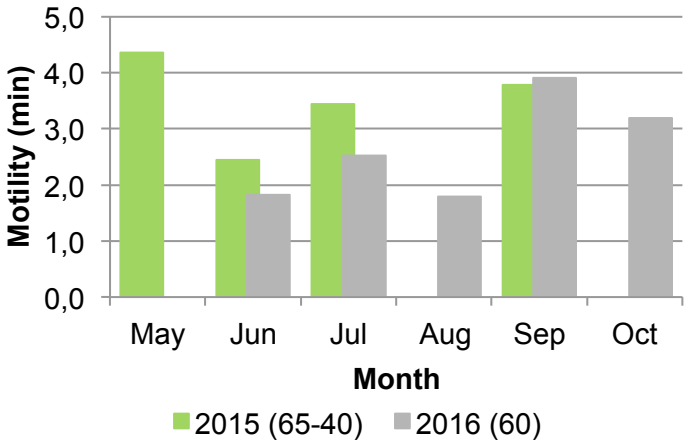
Males 2016

- The males were treated four times with ~60 µg kg^{-1} from June to September
- The higher motility percentage was in August



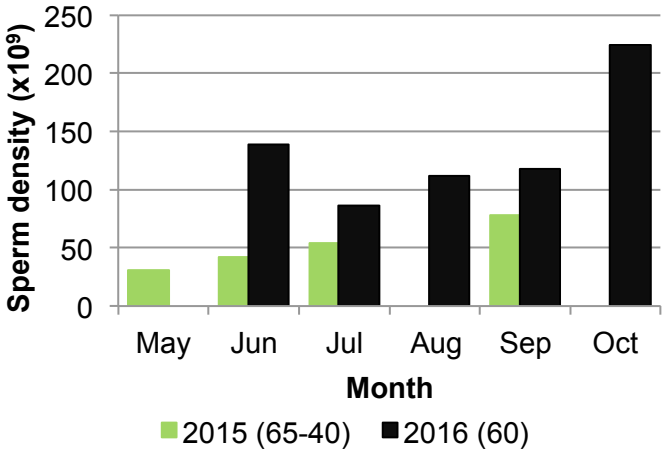


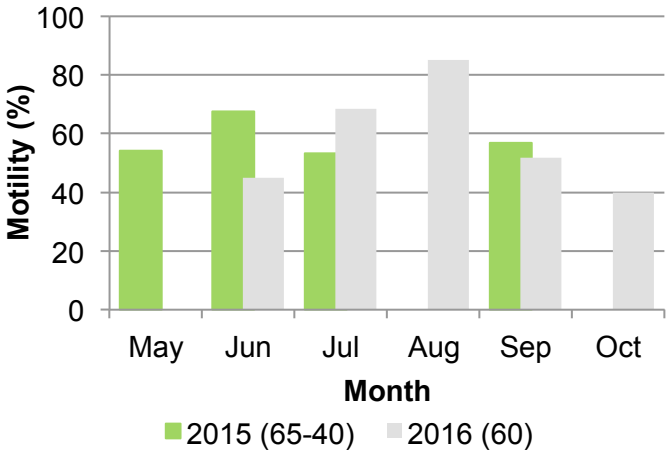




Males 2015-2016

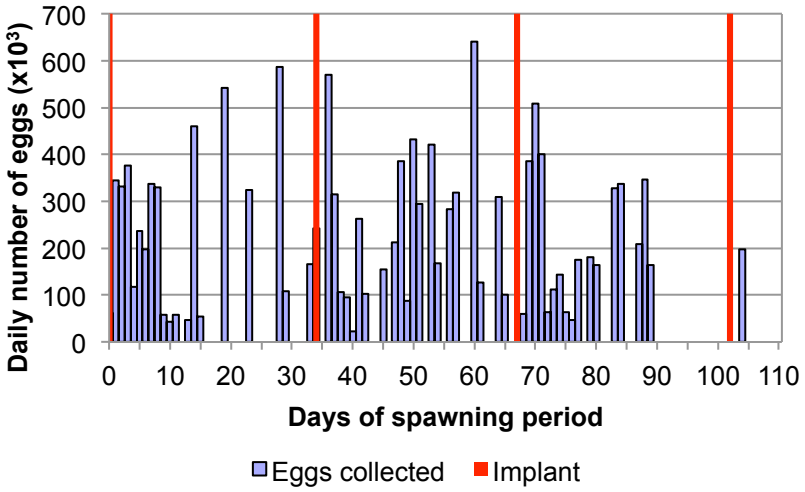
- The quality parameters during the spawning season were similar in both years





Spawning 2016

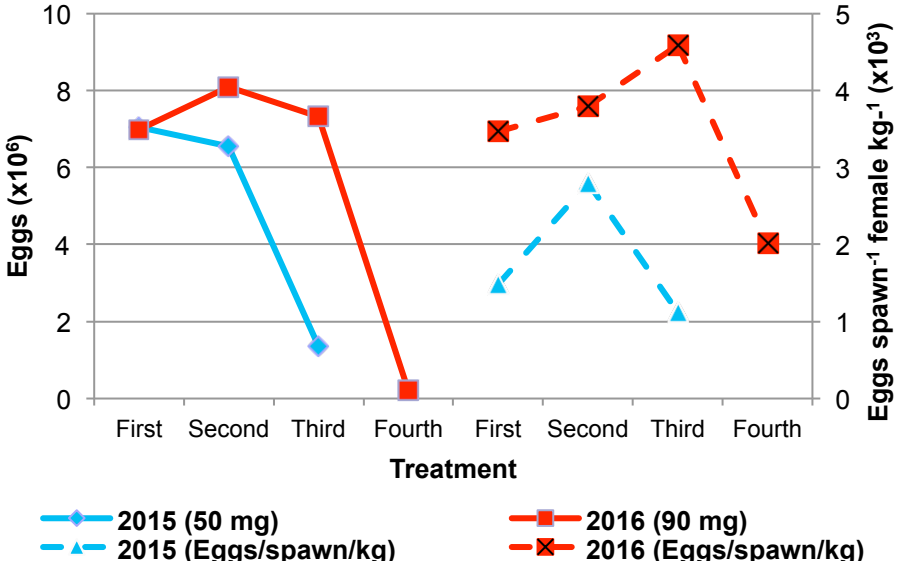
- A total of 22.6 x 10^6 eggs in 61 spawning during 103 days.



- A total of 5 ♀ treated with 90 µg kg^{-1}

Spawning 2015-2016

- In 2015 the spawning season was shorter (only 72 days) and the spawns collected less (52 spawns) as well as fecundity.

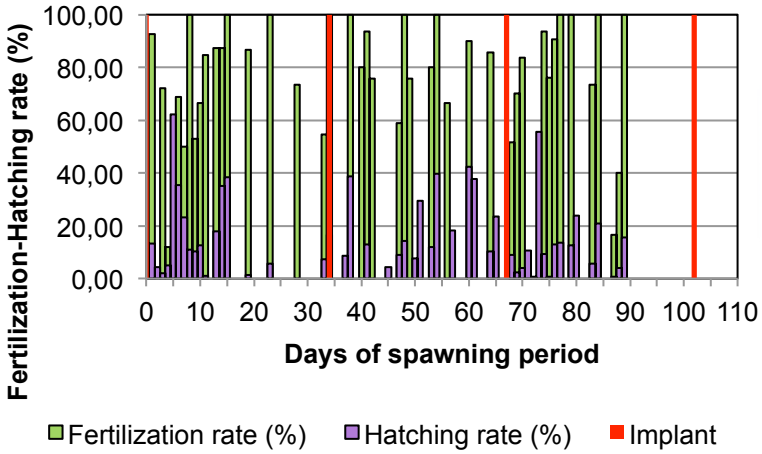


- A total of 7 ♀ treated with 50 µg kg^{-1}

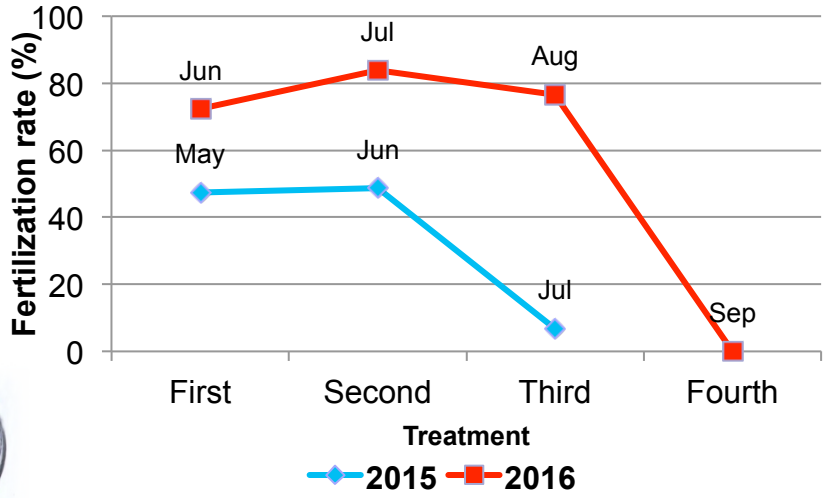
- The highest dose of GnRHa increased the number of spawning obtained after each treatment and the fecundity in 2016.

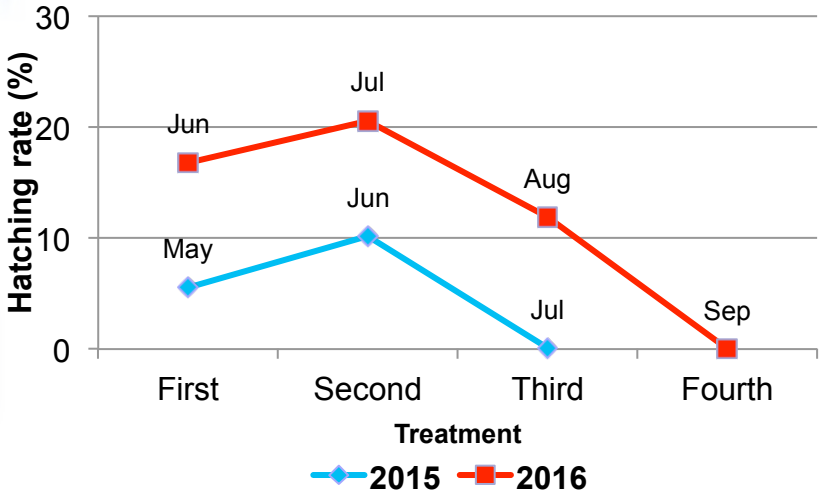
Spawning 2016

- Fertilization (75.1±26.4 %) and hatching rate (15.9±14.5 %) reached the highest values after the 2nd treatment in July.



Spawning 2015-2016





- The fertilization and hatching rate showed similar trends in both years but with higher values in 2016 (10- 20 %)
- The sex ratio (♀:♂) were 1.16 and 1.25 in 2015 and 2016, respectively

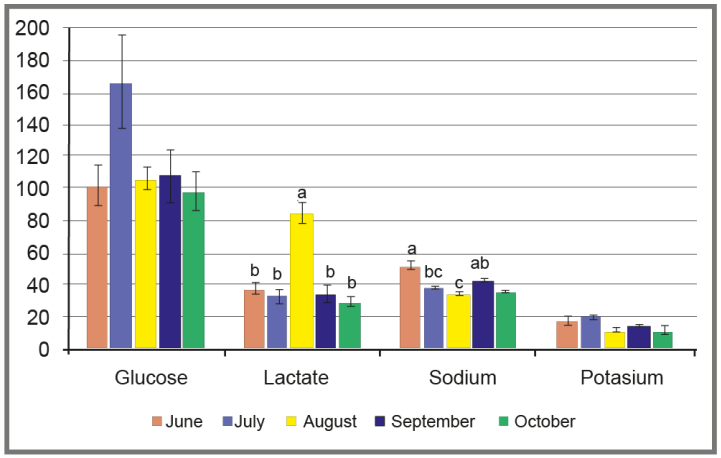
Hematological and biochemical parameters

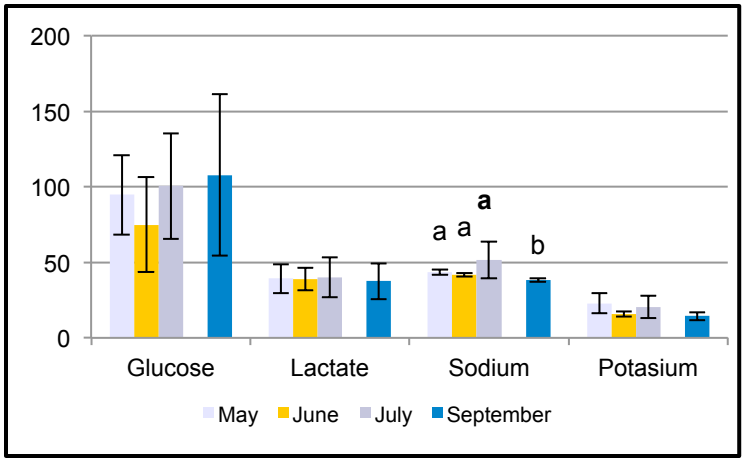
2016

Females	June				July				August				September			
Erythrocytes	248.5	±	52.2	B	222.3	±	78.8	b	413.4	±	79.7	a	167.3	±	77.2	b
Leucocytes	119.2	±	51.7	A	131.7	±	116.9	ab	72.9	±	21.4	a	31.4	±	13.9	b
Hematocrit	47.0	±	7.1		45.1	±	12.1		41.5	±	8.2		42.3	±	10.7	
Triglyceride	255.5	±	223.1		283.5	±	235.1		293.9	±	176.1		210.9	±	176.6	
Cholesterol	163.9	±	20.6		194.2	±	22.4		211.7	±	37.7		216.8	±	56.3	
Protein	47.8	±	10.1	B	59.9	±	11.4	b	45.6	±	8.8	b	89.4	±	13.2	a
Glucose	102.5	±	36.8		166.6	±	76.4		107.5	±	16.9		109.0	±	44.9	
Alkaline phosphatase	93.4	±	17.8		76.1	±	18.8		75.9	±	223		94.4	±	31.1	
Amylase	10.3	±	3.4		10.7	±	2.7		11.4	±	4.3		10.4	±	2.4	
Lactate	38.8	±	10.4	b	33.8	±	11.3	b	85.7	±	15.3	a	35.3	±	13.1	b
Sodium	526.7	±	77.8	a	395.7	±	14.7	bc	351.5	±	16.0	c	439.6	±	25.4	ab
Potassium	18.6	±	6.9	ab	20.9	±	2.9	a	12.9	±	1.7	a	15.3	±	0.89	ab

2015

	May				June				July				September			
Erythrocytes	347.78	±	118.50	a	275.62	±	72.75	a	149.31	±	79.41	b	128.07	±	52.50	b
Leucocytes	866.54	±	475.47		653.21	±	341.54		573.00	±	260.08		694.54	±	247.66	
Hematocrit	45	±	10		52	±	13		35	±	15		37	±	11	
Triglycerides	226.18	±	58.52		172.14	±	129.94		206.25	±	104.28		221.44	±	147.89	
Cholesterol	226.18	±	58.52	ab	336.33	±	170.63	a	275.65	±	93.44	ab	177.86	±	90.10	b
Protein	39.85	±	10.41	ab	44.20	±	12.60	a	49.93	±	14.27	a	28.51	±	8.68	b
Glucose	94.57	±	26.27		74.94	±	31.33		100.39	±	34.85		107.84	±	53.51	
ALT/GPT	12.92	±	3.08		14.72	±	7.55		13.53	±	6.35		21.60	±	11.25	
AST/GOT	23.96	±	16.48		32.71	±	27.36		31.03	±	24.76		14.11	±	4.33	
Alcaline phosphatase	63.11	±	12.60	c	89.74	±	20.90	bc	105.22	±	19.49	b	142.50	±	31.62	a
Cholinesterase	288.81	±	235.19		186.44	±	42.00		235.80	±	125.87		243.72	±	40.21	
Amylase	10.97	±	2.69		15.09	±	4.24		13.26	±	17.99		1.98	±	1.44	
Cortisol	10.82	±	2.66		11.89	±	4.30		32.79	±	8.76		7.69	±	3.37	
Lactate	39.20	±	9.71		38.82	±	7.34		40.09	±	13.15		37.37	±	11.84	
Sodium	435.57	±	18.12	a	415.45	±	11.67	a	516.06	±	123.03	a	381.40	±	101.11	b
Potassium	22.92	±	6.61		15.98	±	1.81		20.53	±	7.39		14.41	±	2.68	

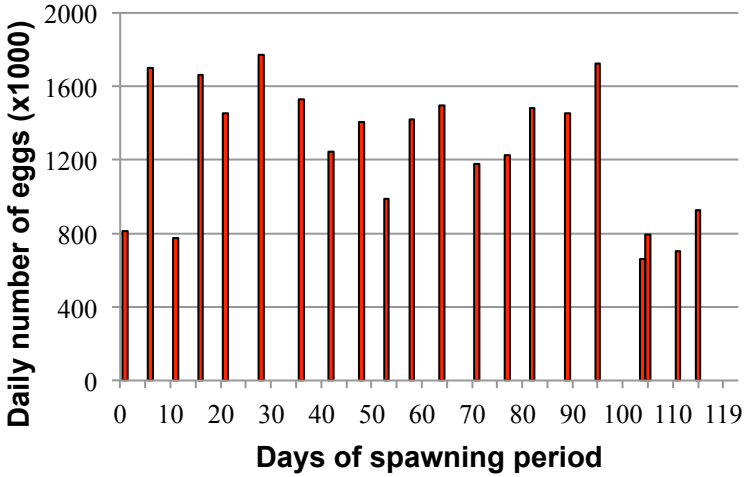




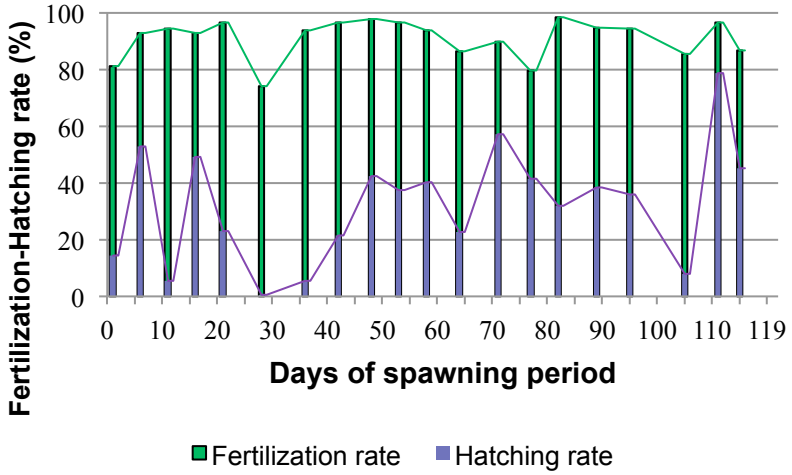
- The hematological and biochemical parameters suggests that the physiological condition of F1 greater amberjack broodstock are not affect by the repetitive implants treatments.

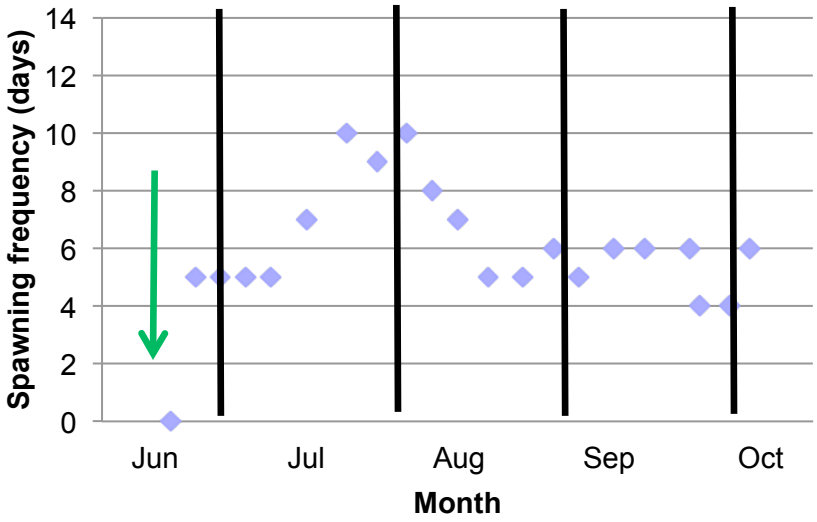
Spawning 2017

- A total of 25 x 10^6 eggs in 21 spawning during 125 days.



- Fertilization rate over 70 % and average hatching rate 32.6 ± 20.0 %

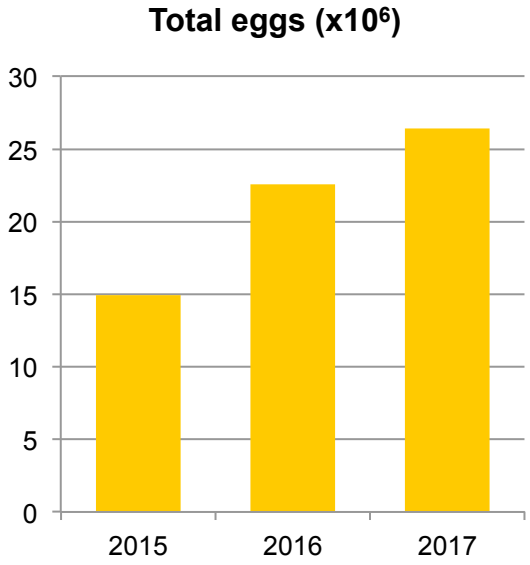


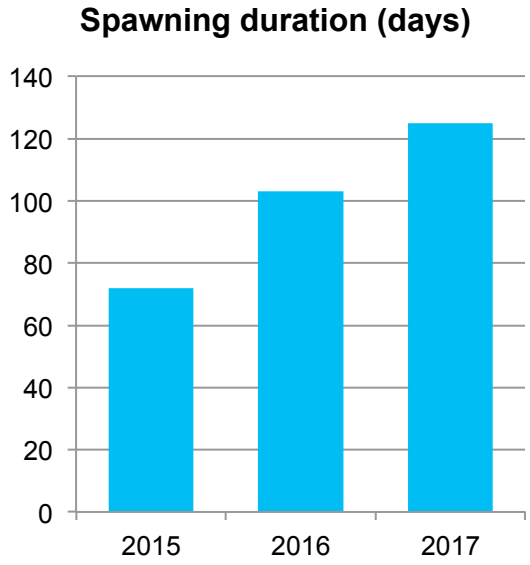


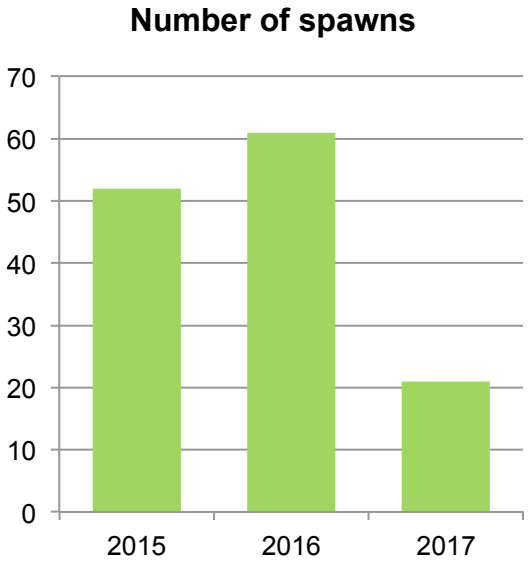
- Spawning frequency change during spawning season

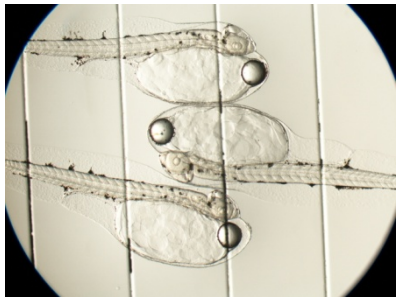
Spawning 2015-2016-2017

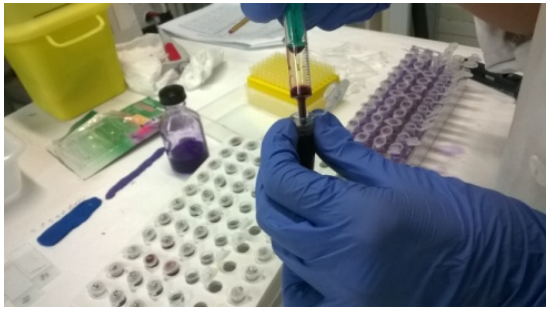
- Increase of a total eggs released
- Larger spawning period
- Less number of spawns collected in untreated fish











Task 3.4 **Development of an optimized spawning induction protocols for F1 greater amberjack in the eastern Atlantic**

Summarizing

1- The implants of GnRHa induced the spawning of F1 greater amberjack broodstock in eastern Atlantic.

2- The F1 females treated with a dose of 50 µg per Kg and males with 60 µg per Kg released fertilized eggs.

3- The highest dose tested improved the reproductive performance of F1 greater amberjack broodstock.

4- The F1 greater amberjack spawned spontaneusly after the hormonal treatment in two previous years.

THANK YOU FOR YOUR ATTENTION