

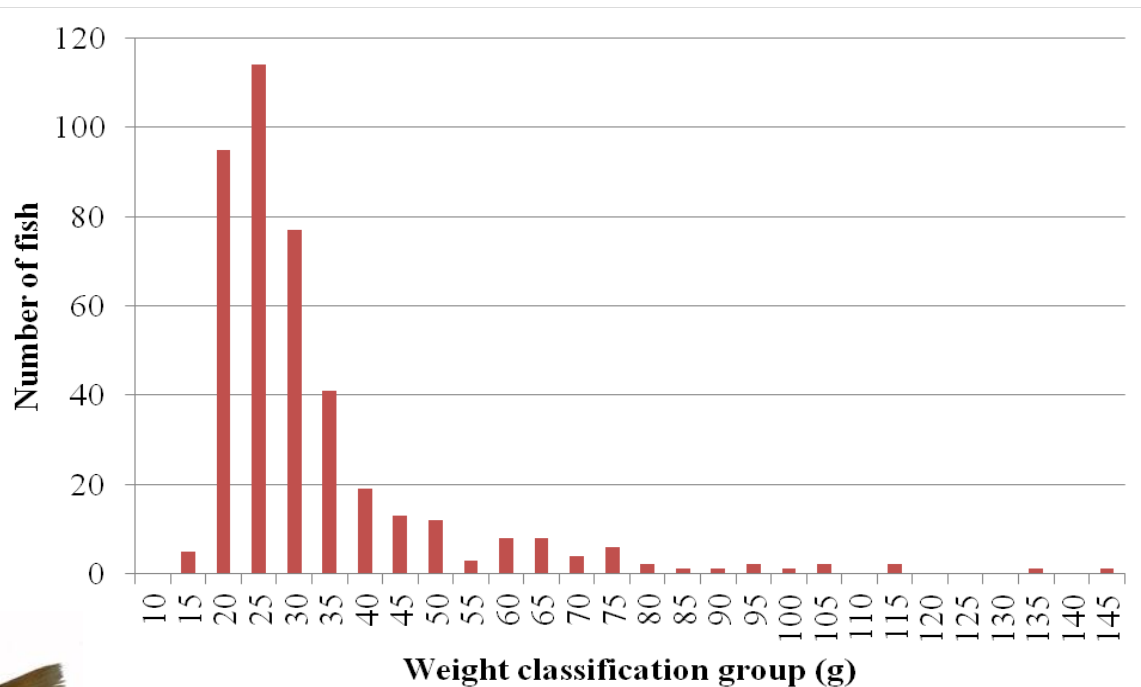
Introduction: Bottlenecks

Growth variation in ongrowing of meagre

Genetic basis?

Environmental basis?

Need to improve feeding methods?



Introduction: Demand feeding

Demand feeding in Atlantic salmon (*Salmo salar*):

- Improved growth rates,
- Improved food conversion ratio (FCR)
- Reduced variation in size
- Reduced aggression in (Noble et al., 2007, 2008)

Demand feeding in European seabass (*Dicentrarchus labrax*):

- Improved growth rates
- Improved FCR (Azzaydi et al., 1998, 2000),

Demand feeding in Atlantic salmon was used to improve feed tables, growth and FCR (Noble et al., 2008)

European seabass feeding in relation to feeding rhythms compared to feeding throughout the day gave the same or improved growth and lower FCR (Azzaydi et al., 2000, 1999).

Research in cages and tanks on salmon and bass gave similar results.

Azzaydi, et al, 1998. Aquaculture, 163: 285-296
Azzaydi, et al, 1999. Aquaculture, 170 253-266
Azzaydi, et al, 2000. Aquaculture, 182: 329-338
Noble, et al, 2007. Aquaculture Res 38, 1686-1691
Noble, et al, 2008. Aquaculture 275, 163-168



Objective:

To compare programmed automatic feeding with auto-demand feeding in tanks.

Conditions to simulate cage rearing conditions (temperature and photoperiod) and programmed automated feeding to follow cage feeding practices.



Methods

Recirculation system (RAS)

Started 4th October 2016 → 6th September 2017

Fish 50g at start, all fish trained to auto-demand

200 → 75 fish per tank

Natural photoperiod

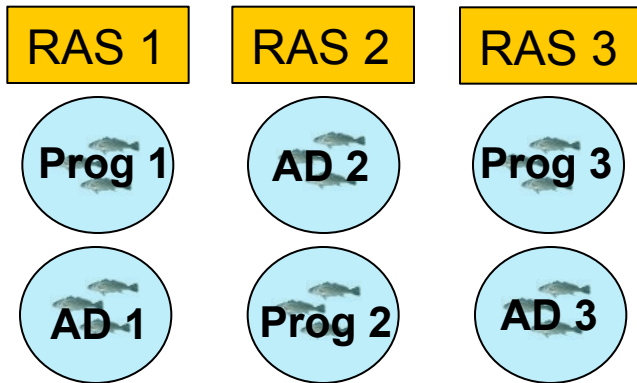
Simulated cage culture temperature

Programmed feeding (Prog) –

- Feeding rate from feeding tables
- Program similar to cage feeding periods
- 50-100g = 3 x 1 hour feeding periods
- 100-300g = 2 x 1 hour feeding periods

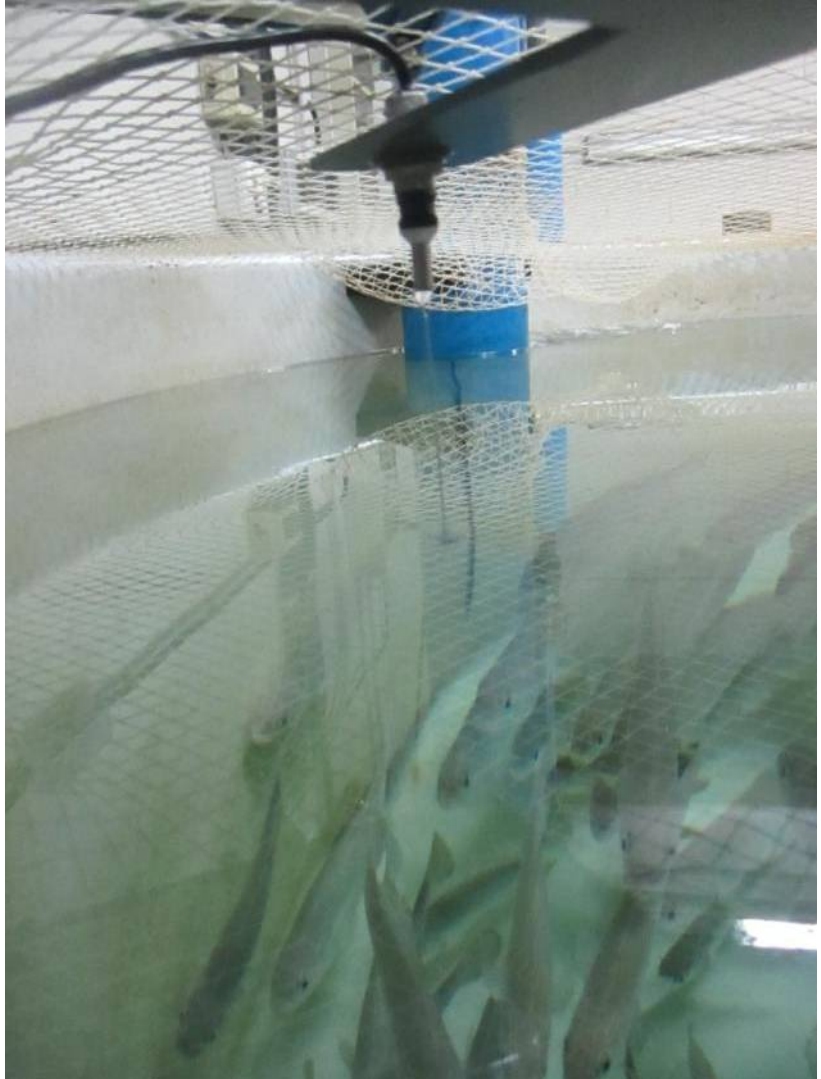
Auto-demand (AD) feeding –

- Pendulum to demand feed
- 5g feed per demand
- Register of time of demand



Methods

Auto-demand or self-feeding systems



Methods

Data registered

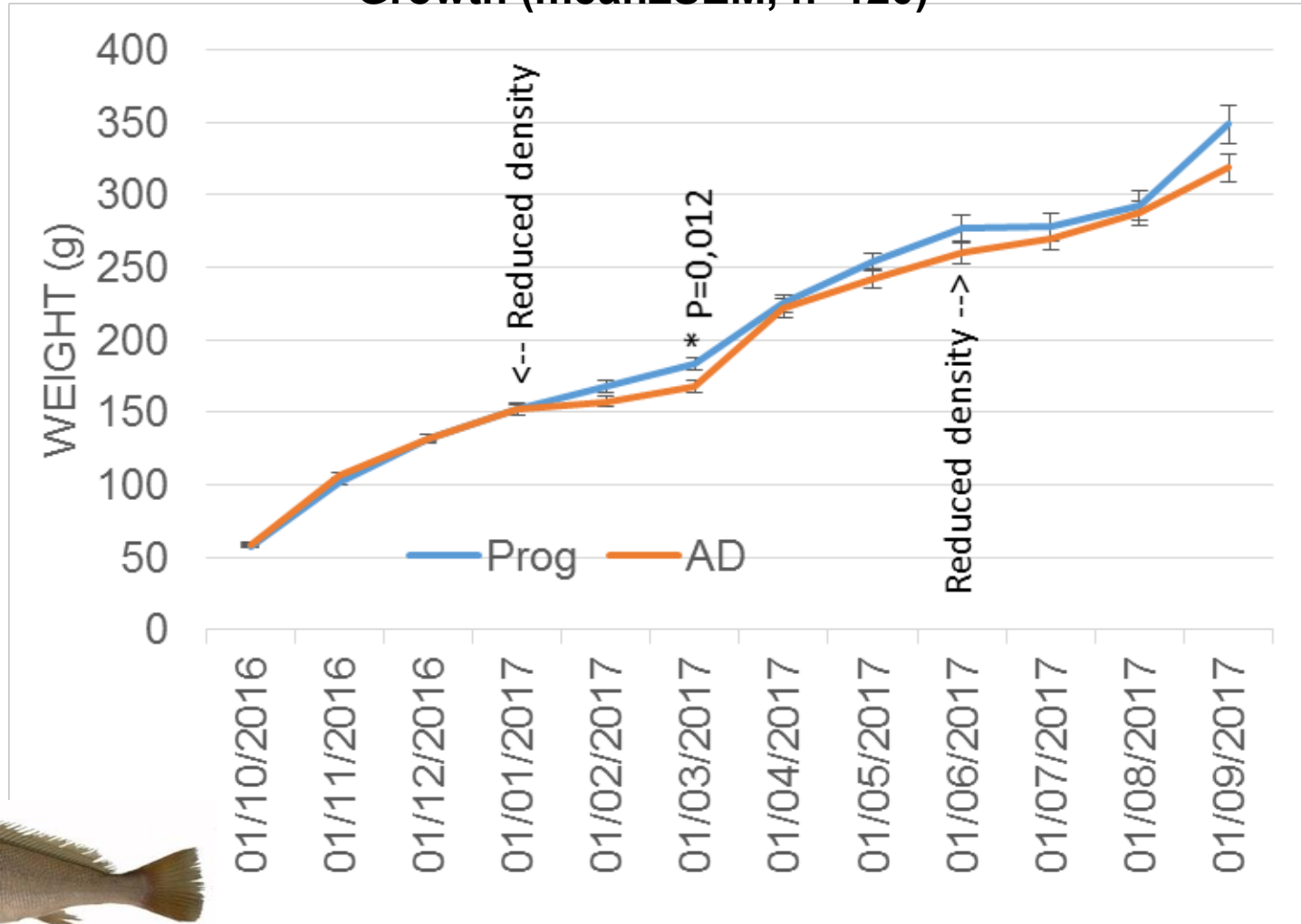
- Activity with two movement sensors
 - Upper 20 cm below the surface
 - Bottom 80 cm from surface (20 cm from bottom)
- Growth
- Size frequency in population
- Fin condition
- Feed conversion ratio
- Timing of demand feeding – feeding pattern





Results

Growth (mean±SEM, n=120)

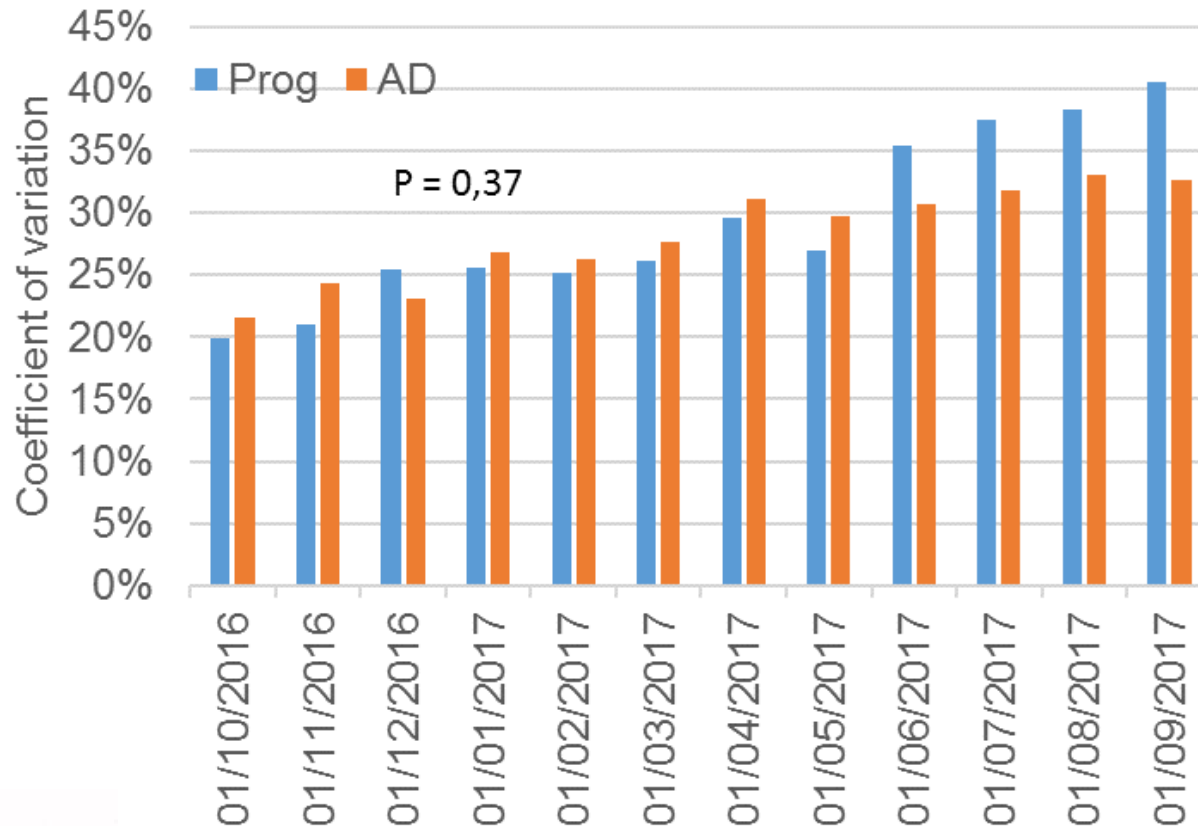




Results

Growth – Size variation - Coefficient of variation (CV)

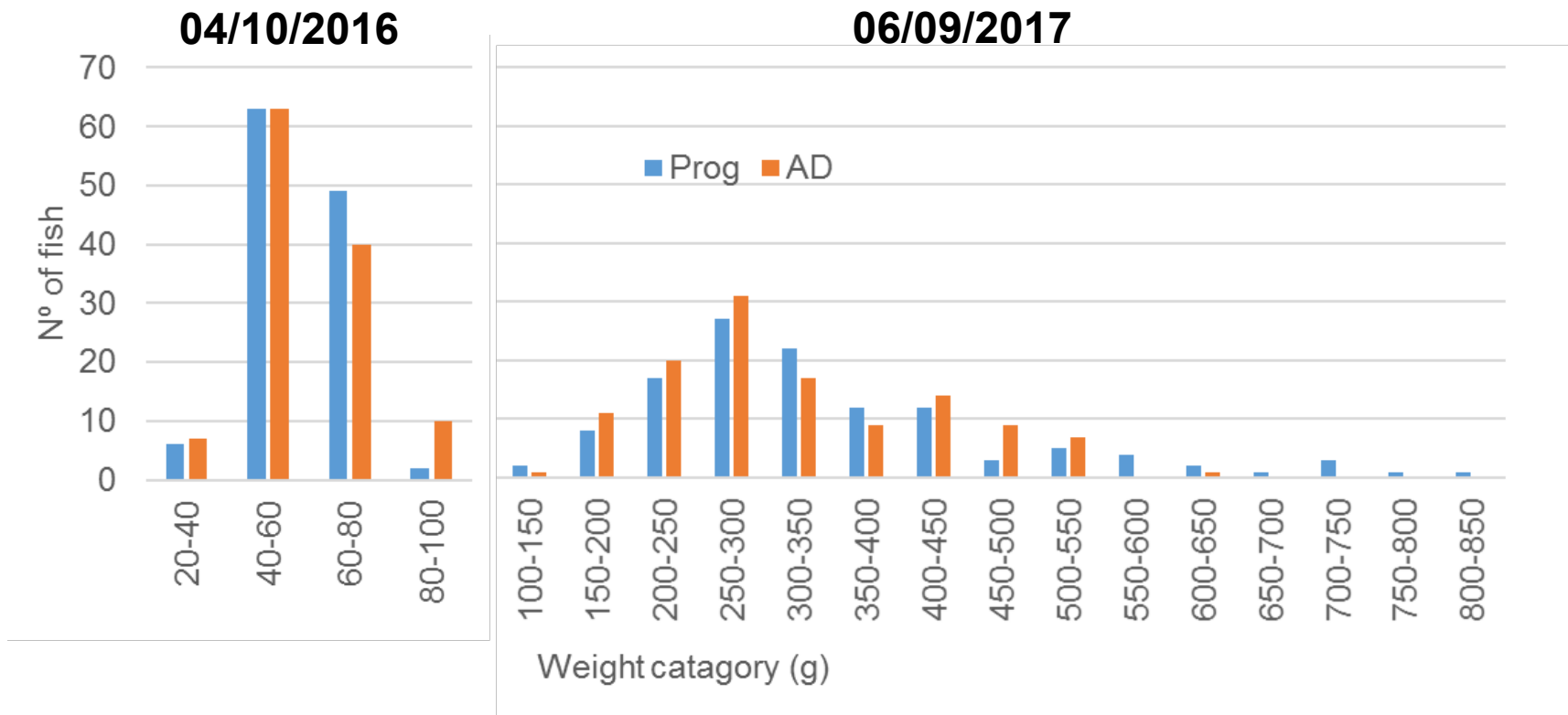
The extent of variability in relation to the mean of the population





Results

Growth – Size variation - Frequency distribution



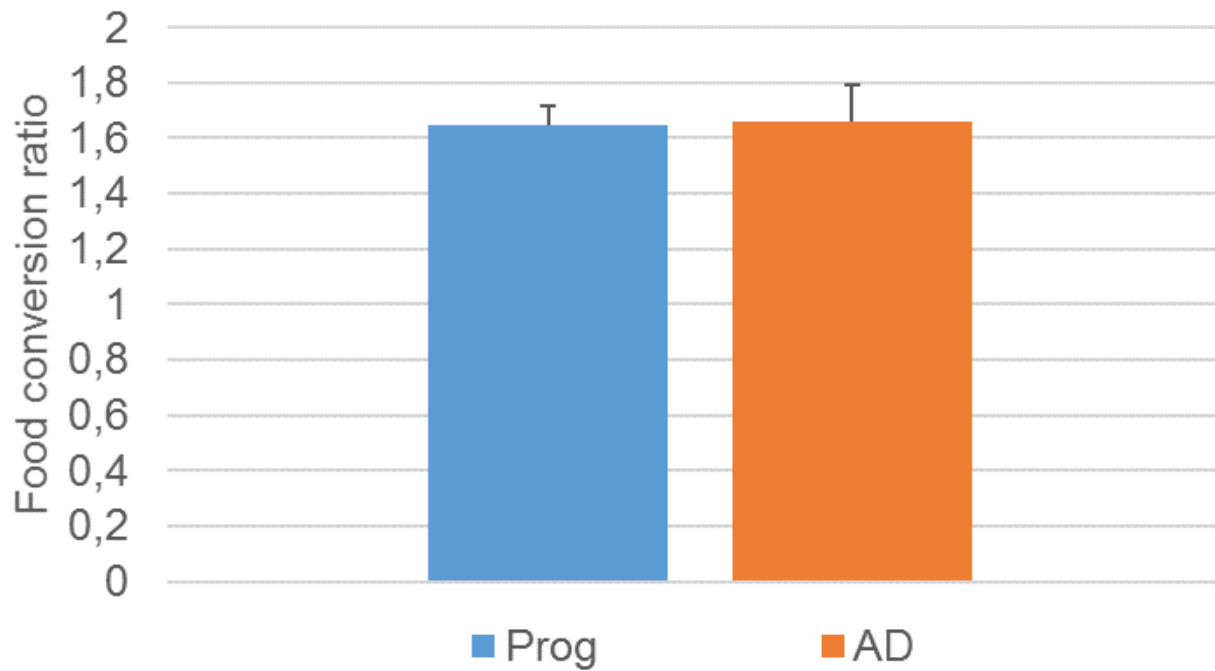
Number of fish in size weight (g) category, sample of 120 fish





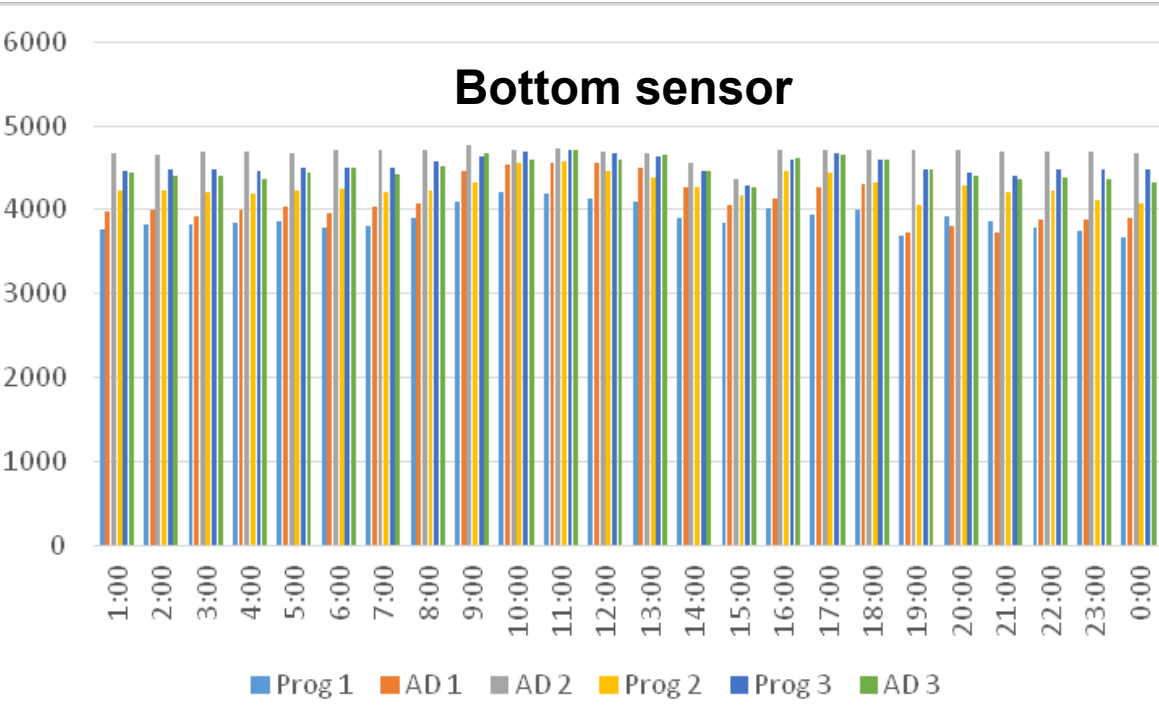
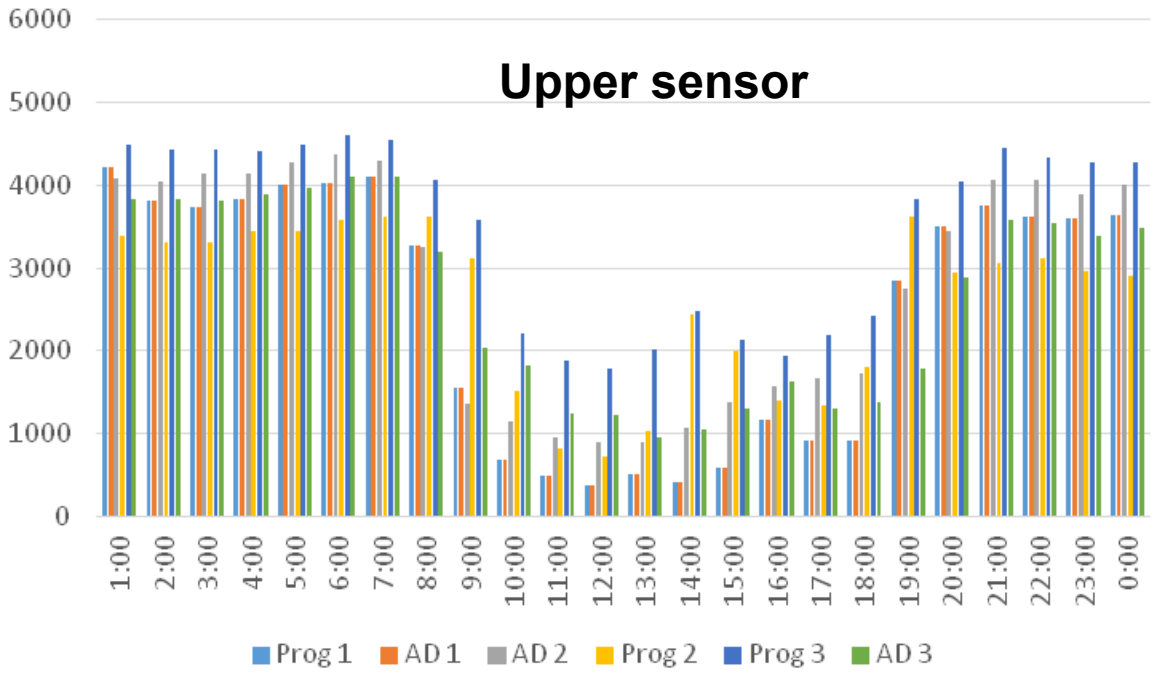
Results

Feed Conversion Ratio (FCR)



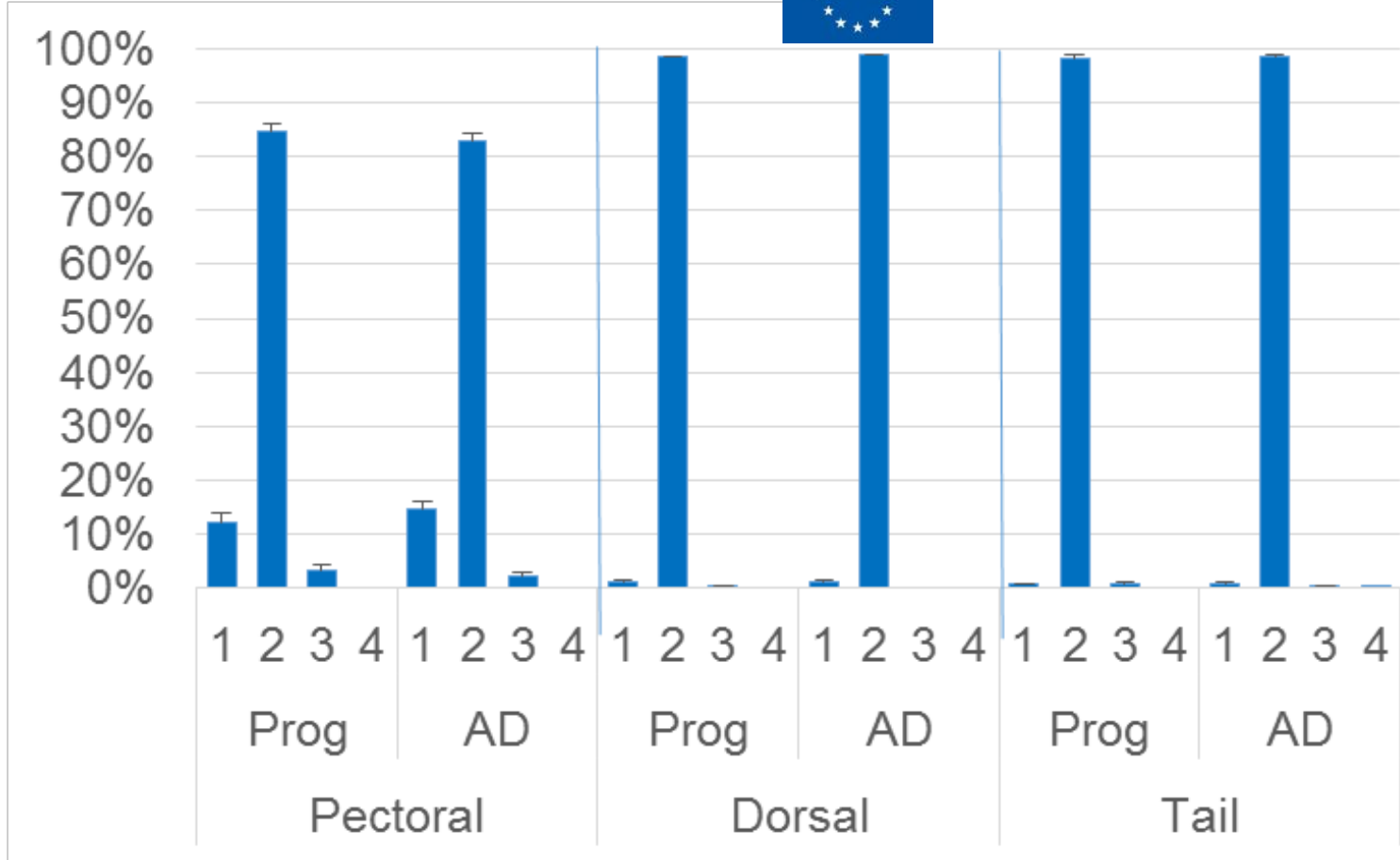
**Results
Behaviour
Activity – movement
sensors**

Meagre





Results
Fin
condition
Mean from
the entire
years

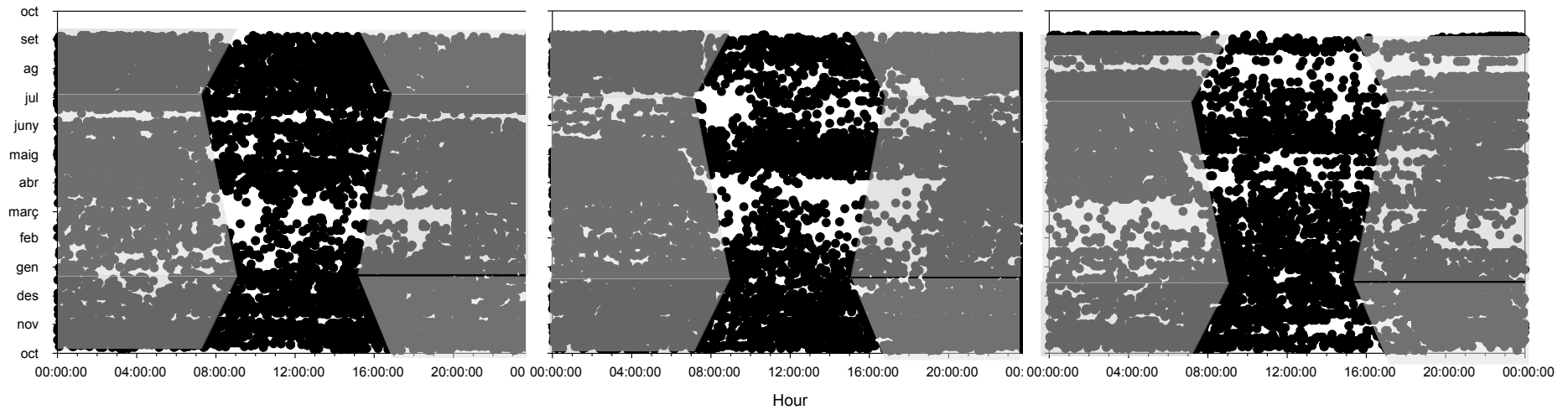


1 = Perfect fin; 2 = Light of fin damage;
3 = Heavy fin damage; 4 = No fin
N=180 / month n=12 months



Results

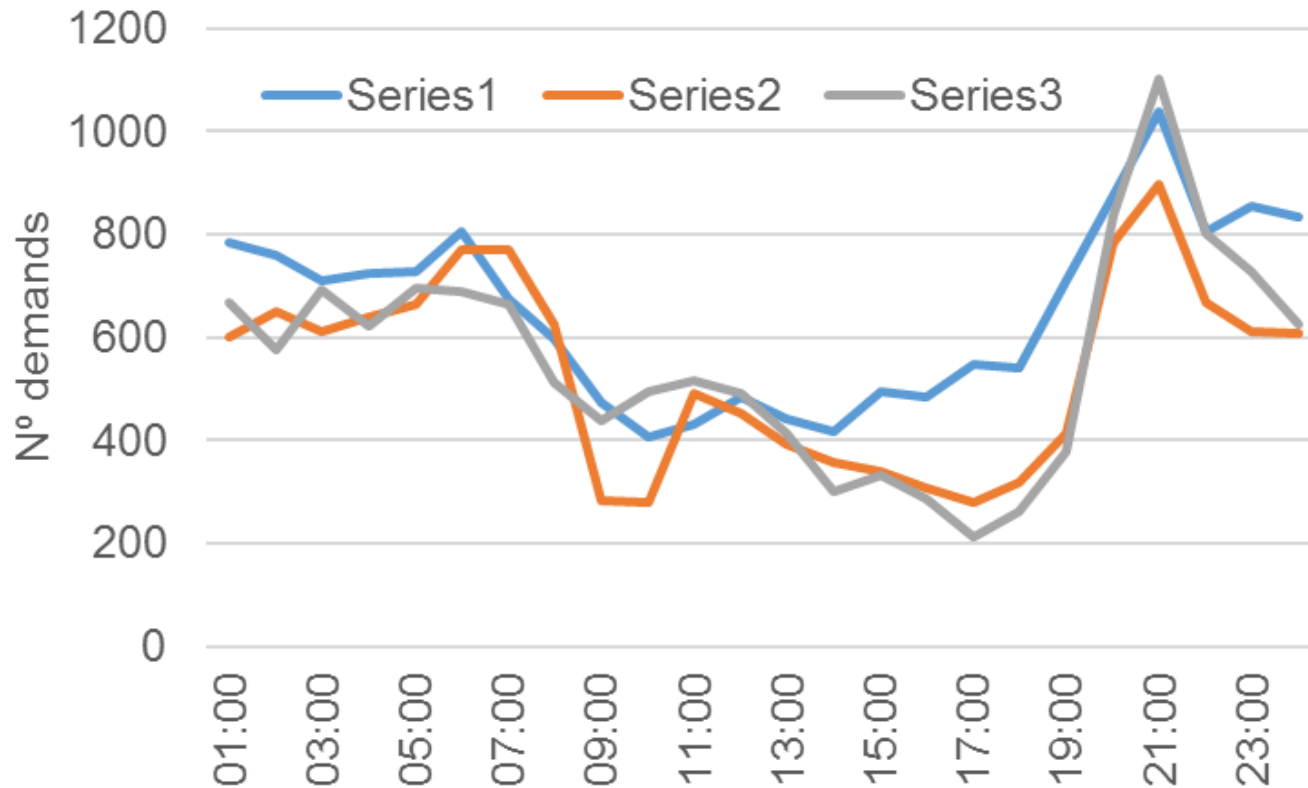
Behaviour – feeding activity – feeding pattern



Results

Behaviour – feeding activity – feeding pattern

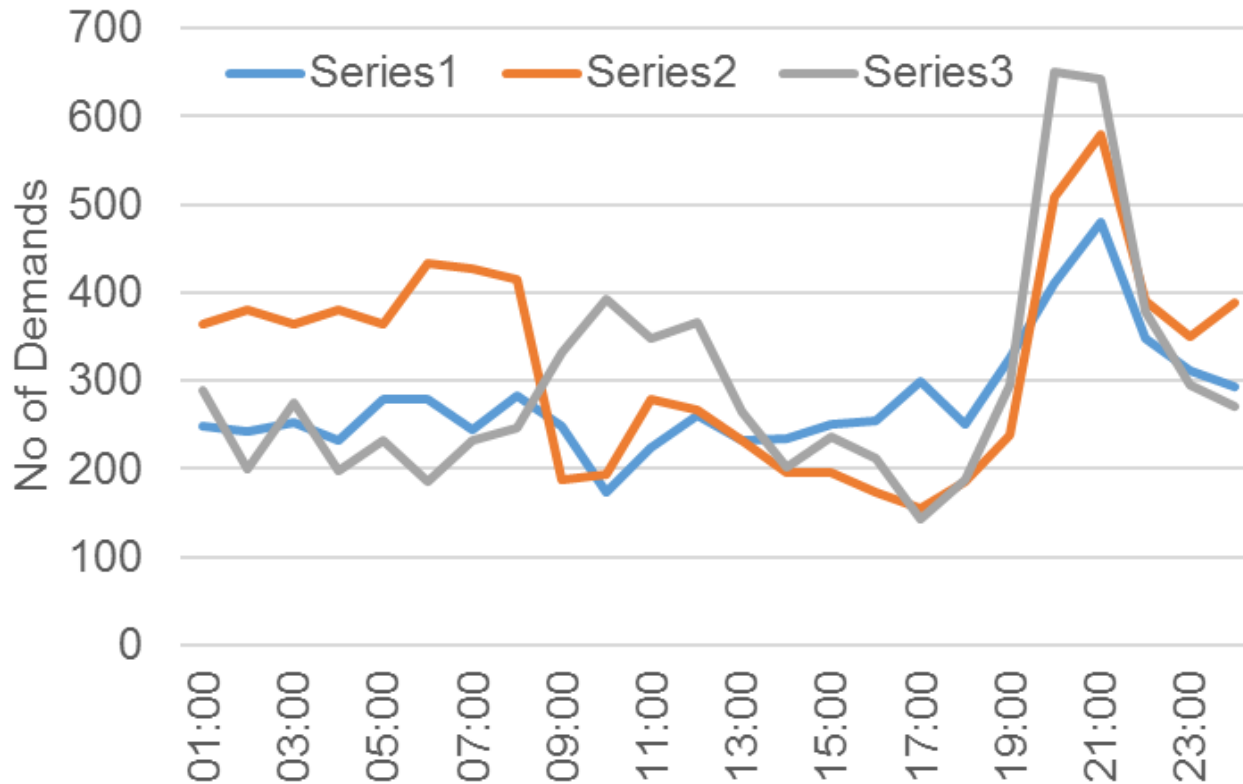
Cumulative demands per hour for feed during all the years



Results

Behaviour – feeding activity – feeding pattern

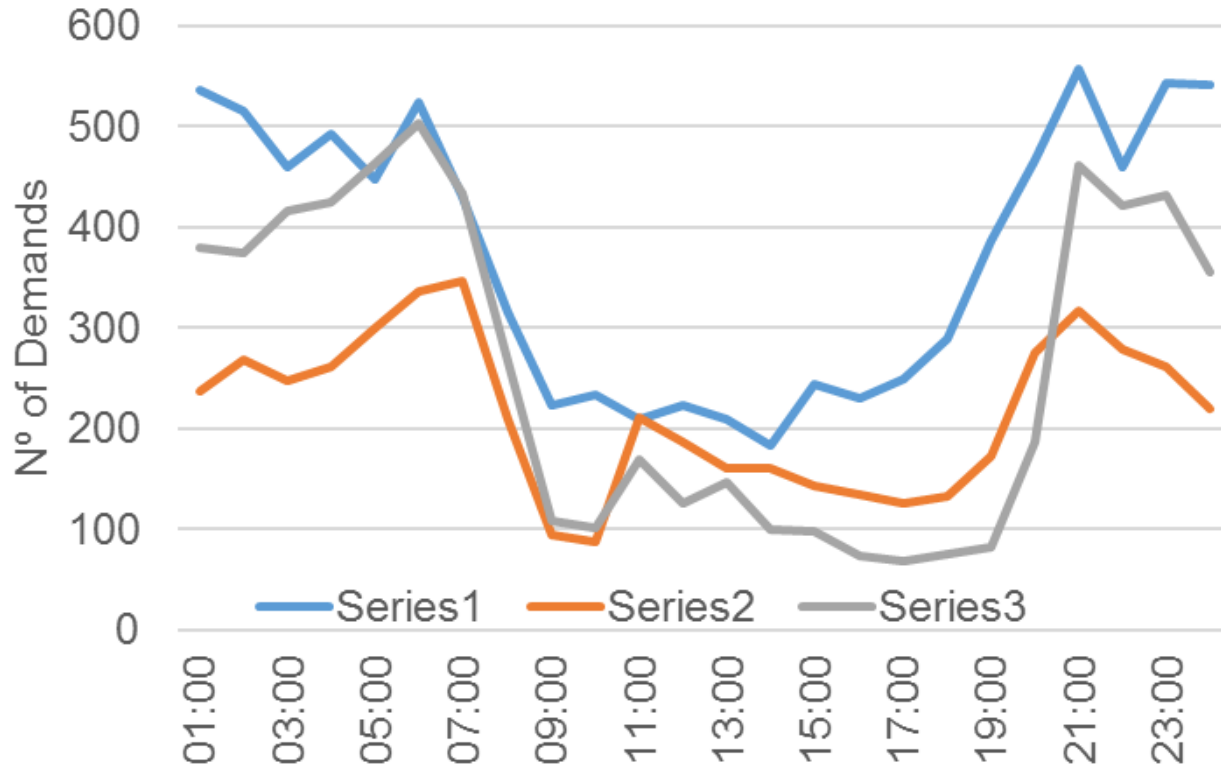
Cumulative demands per hour for feed 4 Oct – 21 April



Results

Behaviour – feeding activity – feeding pattern

Cumulative demands per hour for feed during 22 April – 6 Sept





- **Non-aggressive fish that feeds during the 24 hours cycle, favoring feeding during the night (nocturnal?)**
- **However, grow out practices of 2 – 3 feeding periods during the day light hours gives the same growth, FCR and size variation as auto-demand feeding when the fish prefer to eat.**
- **Comparing parameters between programmed feeding and auto-demand feeding:**
 - **No difference in growth**
 - **Similar size variation**
 - **Similar low levels of fin damage**
 - **No difference in FCR**
- **Feeding during the entire 24 hours cycle with higher levels during the night**
- **Meagre rise to fill all the water column during the night and stay deeper in the tank during the day**



Gracias por su atención
El fin.

