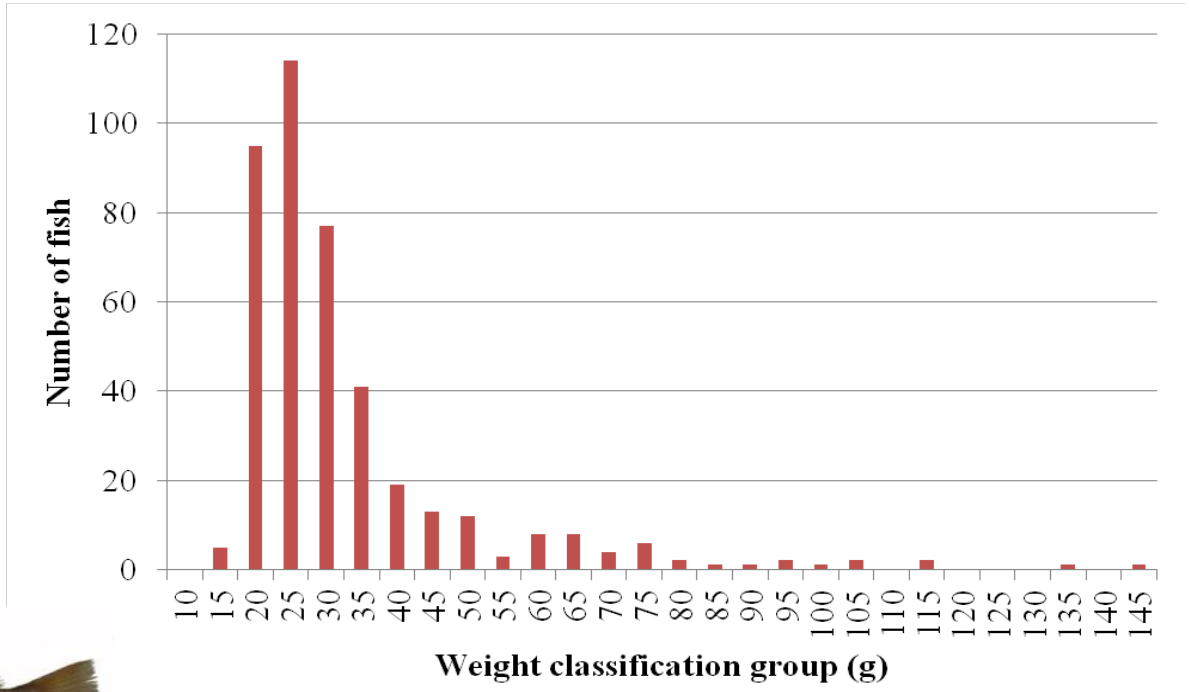
Introduction: Bottlenecks

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

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Meagre

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Objective:

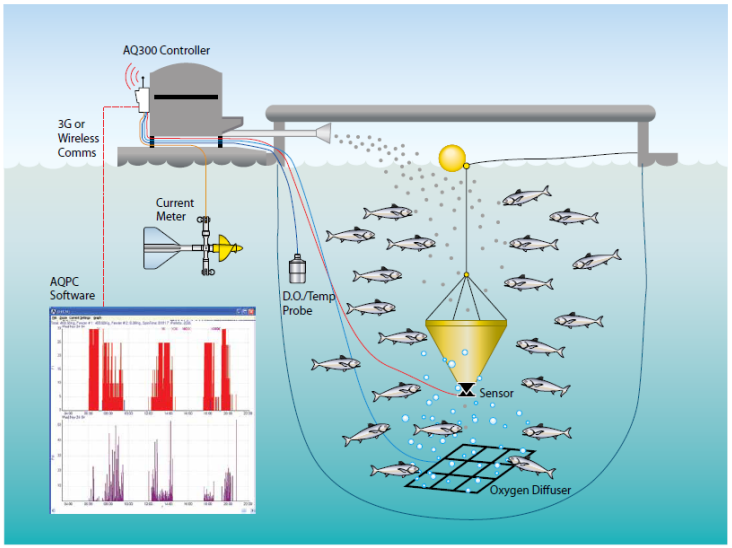
To compare programmed automatic feeding with auto-demand feeding in tanks.

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

Methods

Demand feeding systems

AQ300 **ADAPTIVE FEEDING SYSTEM**



AQ1 on Tanks at Glasgow University

AQ1 SYSTEMS

- Salmon parr
- 6 Tanks (1m³)
- EU funded behavior study
- Sensor in outlet pipe
- Outlet pipe 50mm diameter

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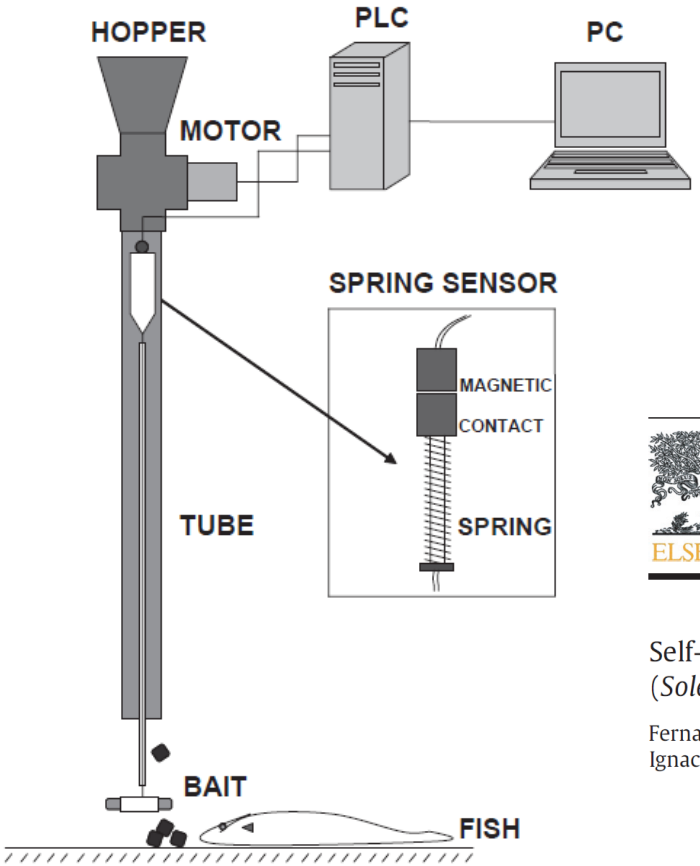

Methods

Auto-demand or self-feeding systems

Aquaculture 364-365 (2012) 198–205

Contents lists available at SciVerse ScienceDirect

Aquaculture

journal homepage: www.elsevier.com/locate/aqua-online

Self-selection of diets with different contents of arachidonic acid by Senegalese sole (*Solea senegalensis*) broodstock

Fernando Norambuena [a], Alicia Estévez [a], Francisco Javier Sánchez-Vázquez [b], Ignacio Carazo [a], Neil Duncan [a,*]

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Methods

Auto-demand or self-feeding systems

Methods

Auto-demand or self-feeding systems

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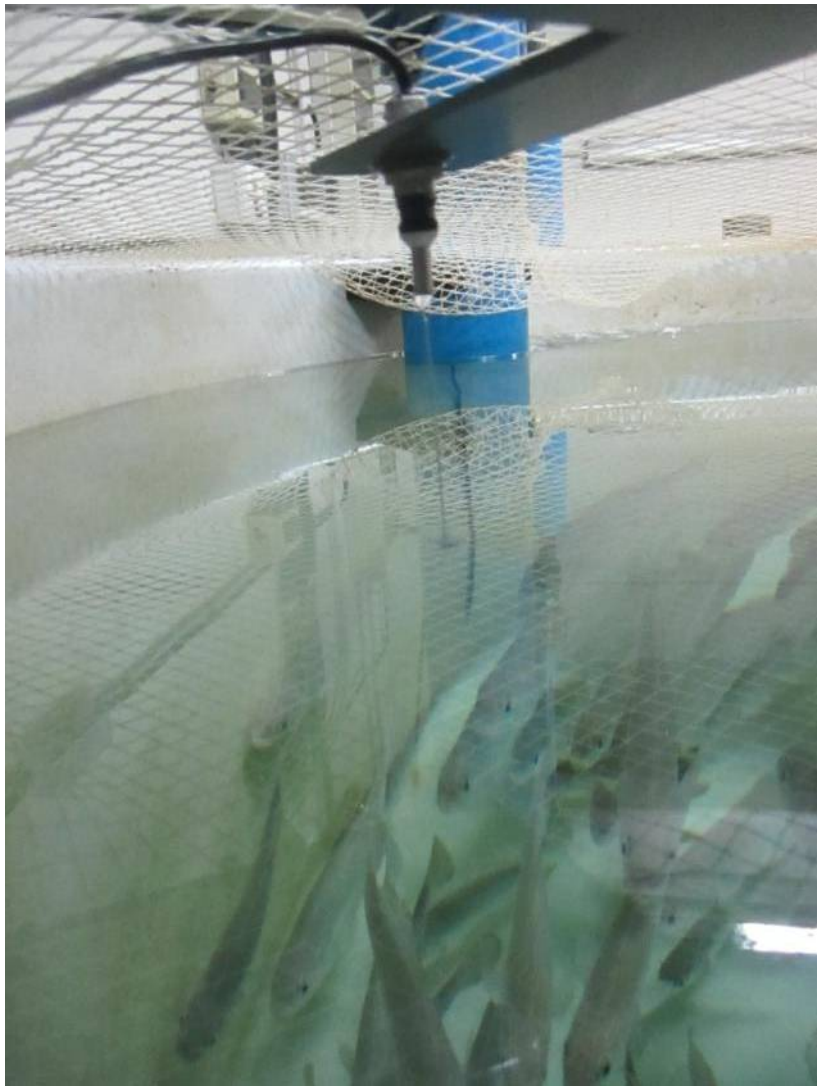
Methods

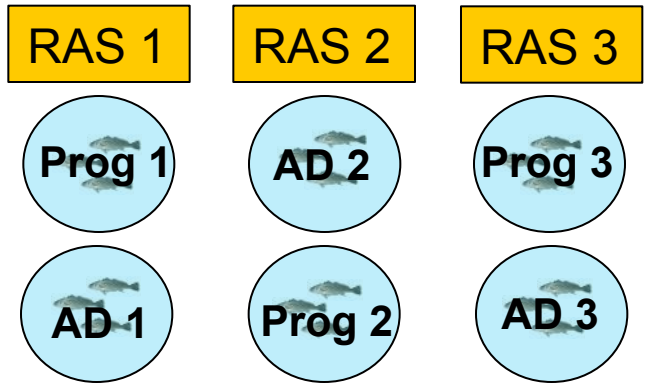
Auto-demand or self-feeding systems

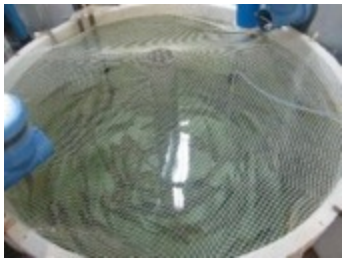


Methods

Auto-demand or self-feeding systems

Methods





Recirculation system (RAS)
Started 4th October 2016
Fish 50g at start, all fish trained to auto-demand
200 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

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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

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Results

Activity – movement sensors

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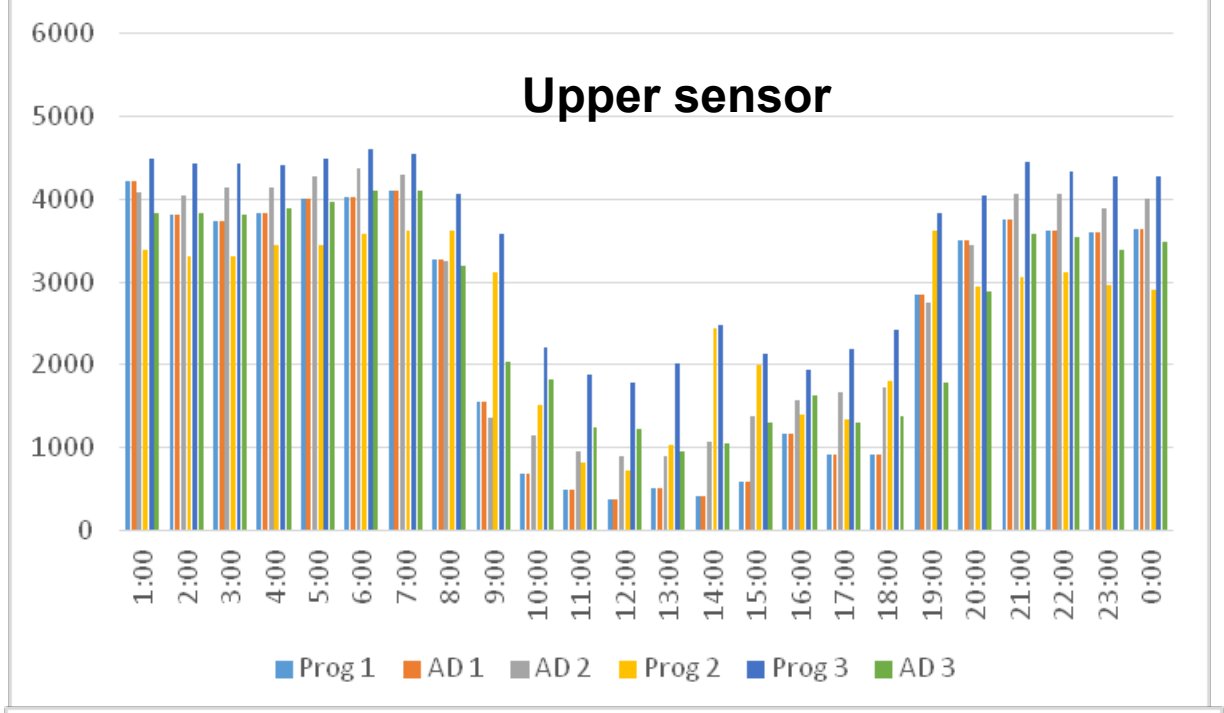

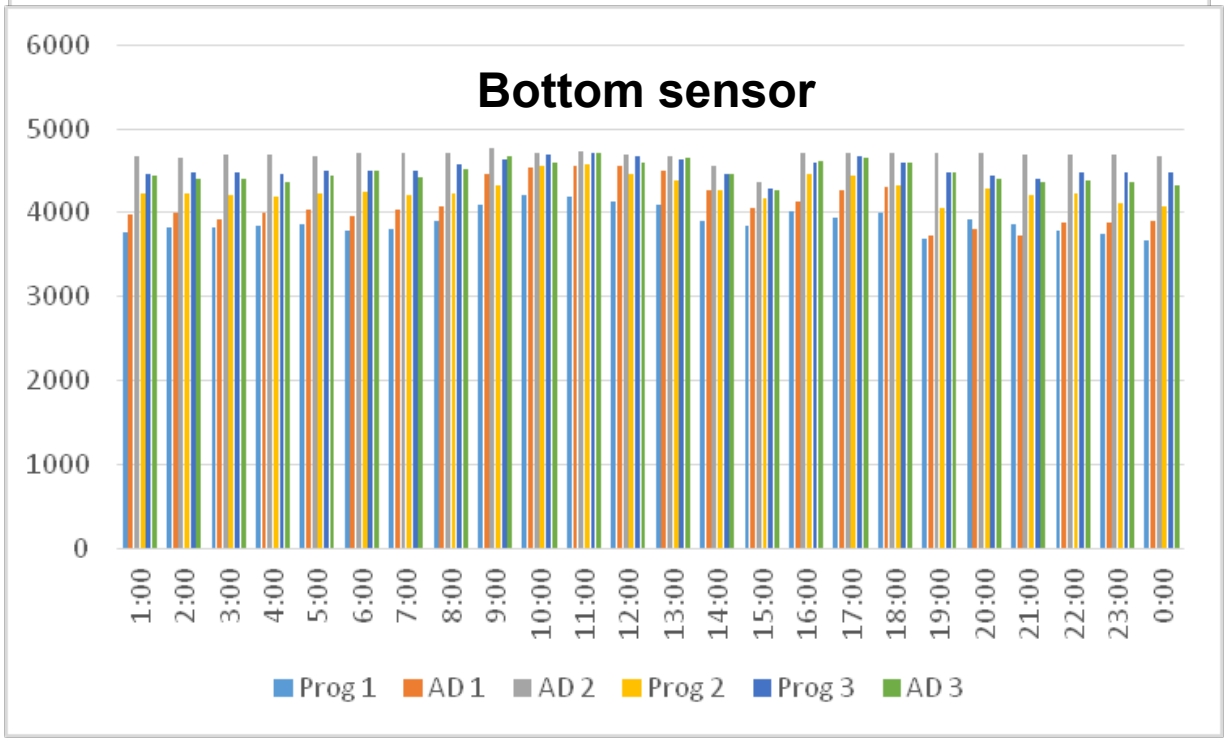

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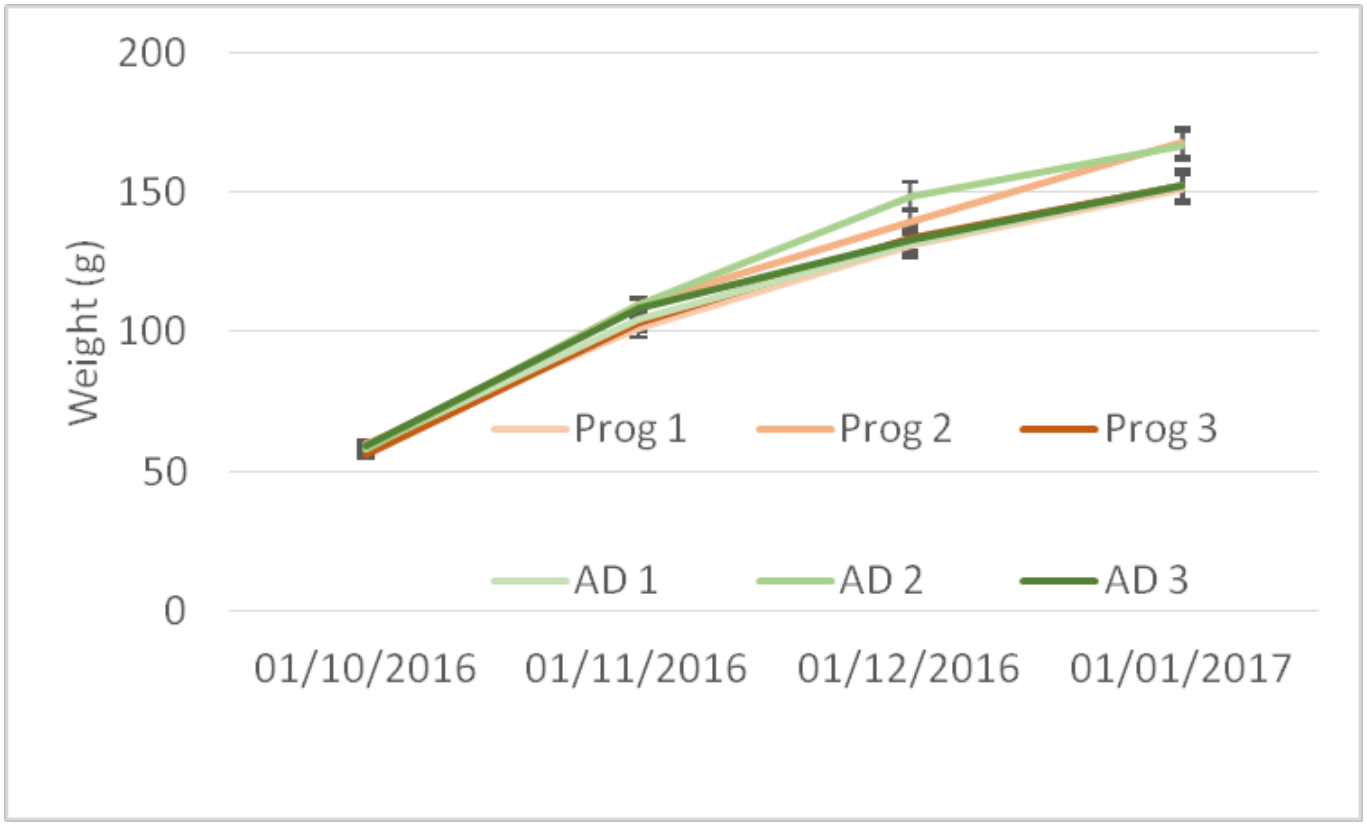
Results

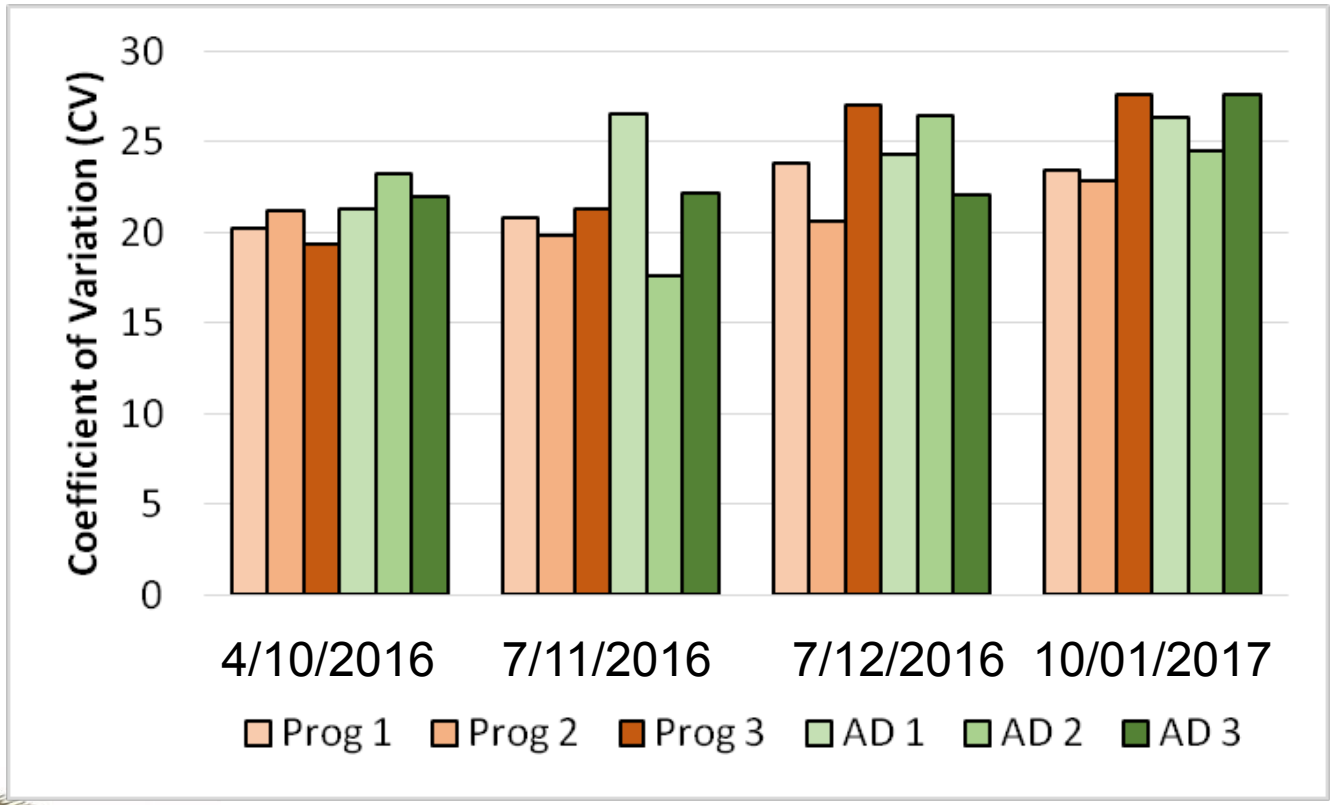
Growth (mean±SEM, n=60)



Results

Coefficient of variation (CV)

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



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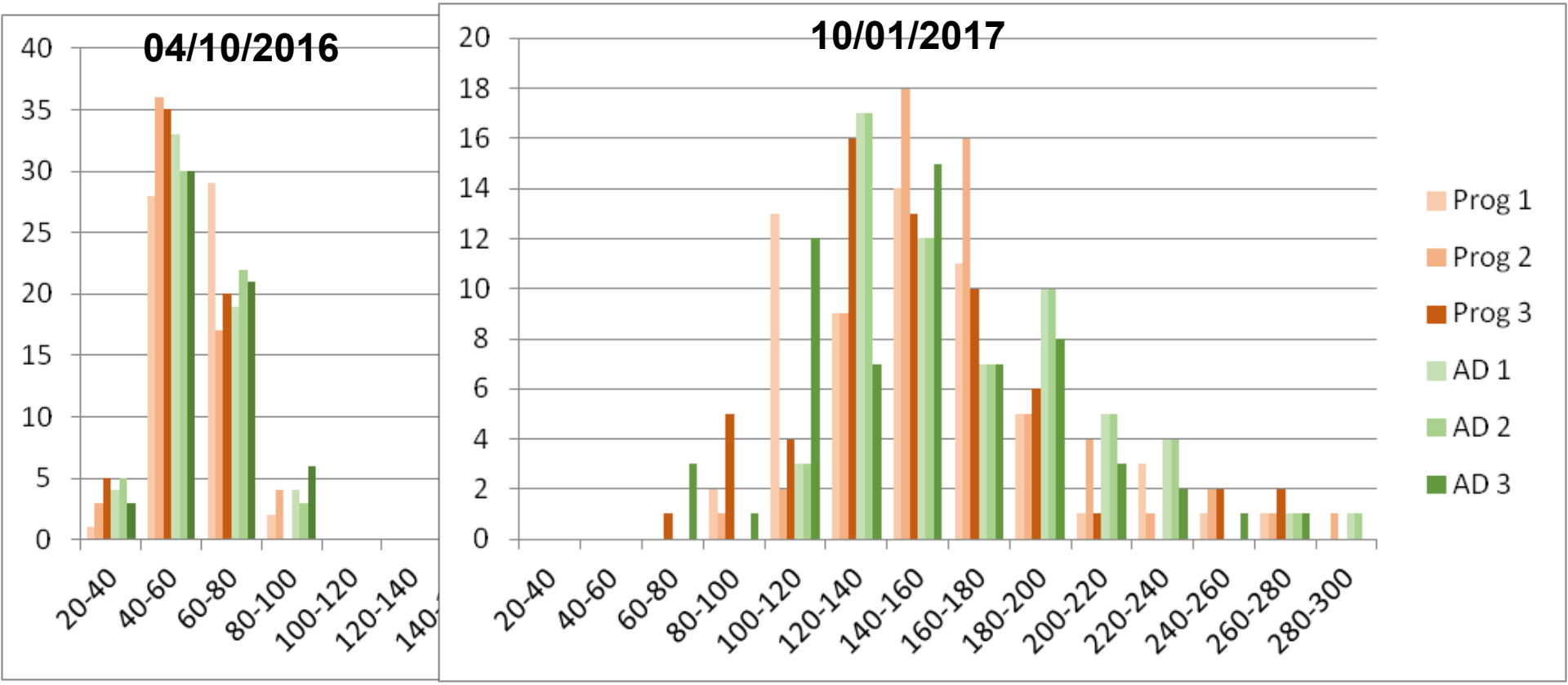
Results

Frequency distribution



Number of fish in size weight (g) category, sample of 60 fish

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Results

Fin condition - 4 October 2016

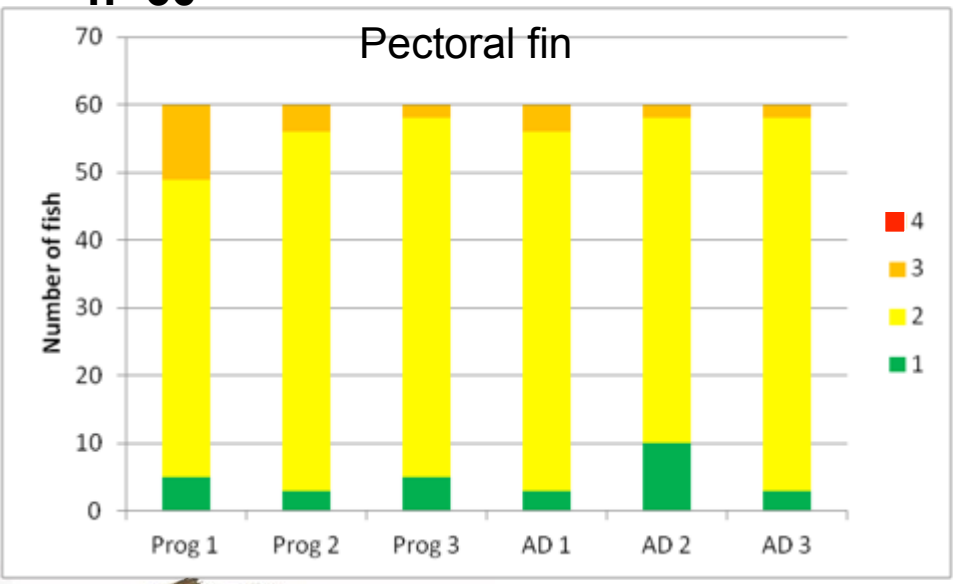
1 – Perfect fin

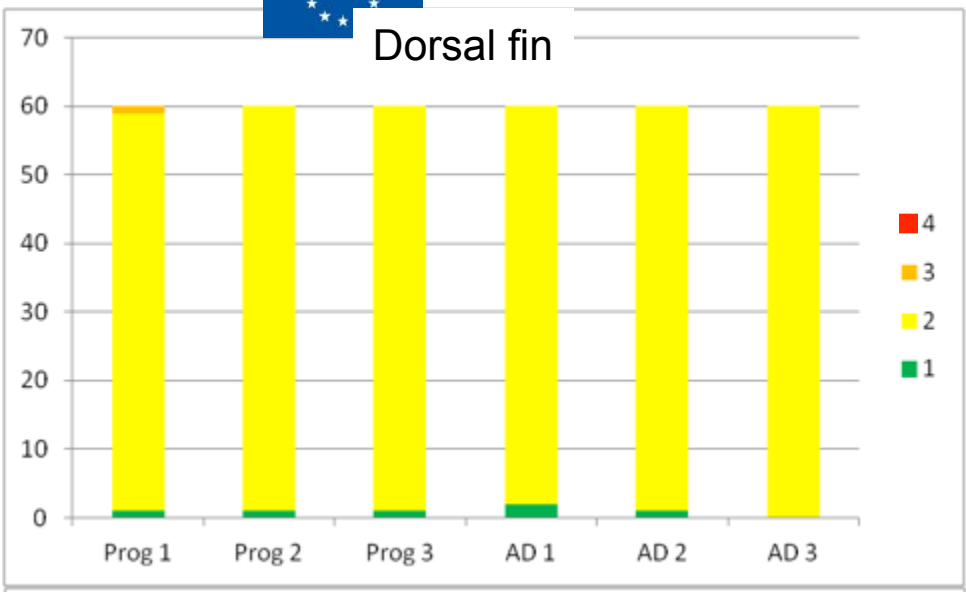
2 – light of fin damage

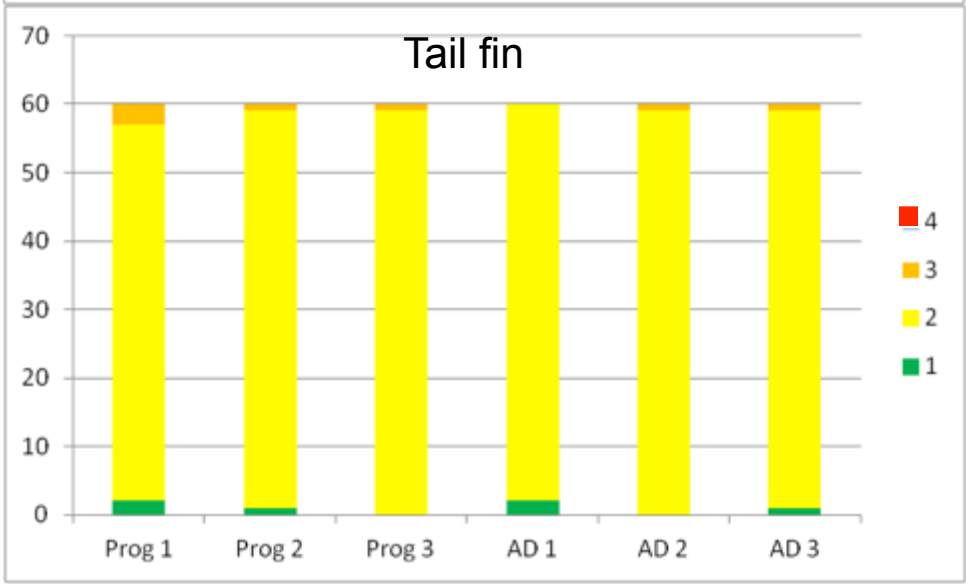
3 - heavy fin damage

4 – no fin

n=60







Meagre

Results

Fin condition – 10 January 2017

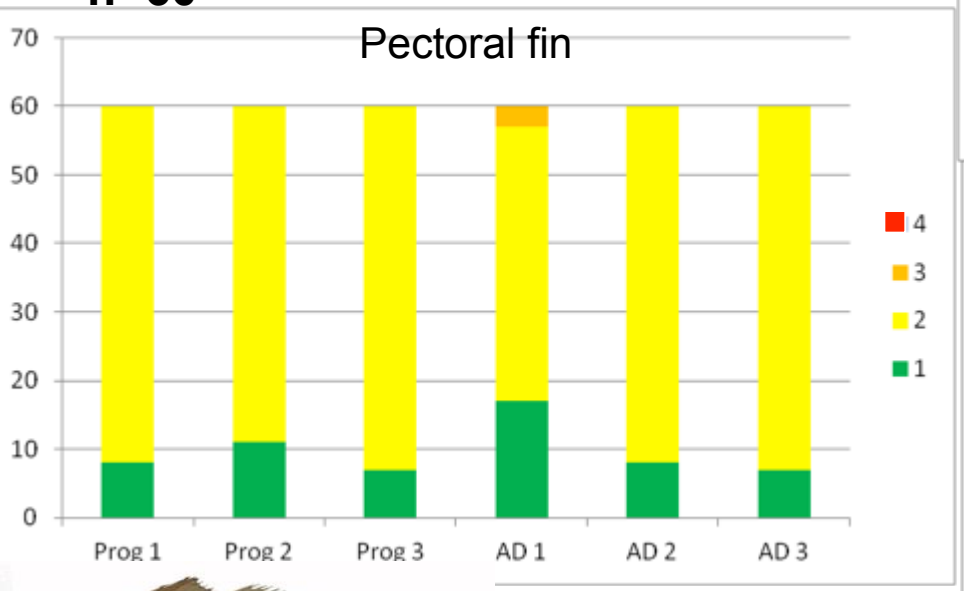
1 – Perfect fin

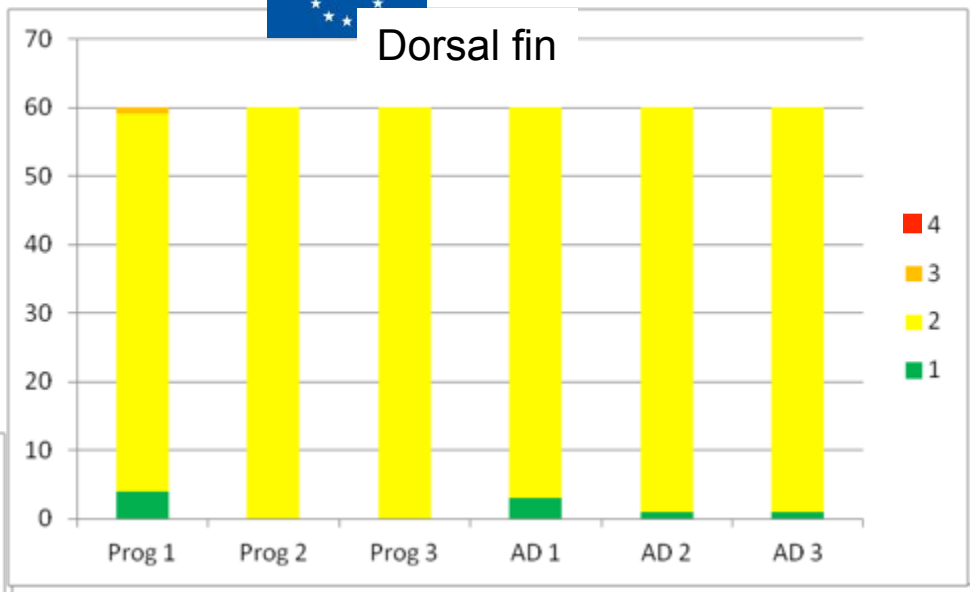
2 – light of fin damage

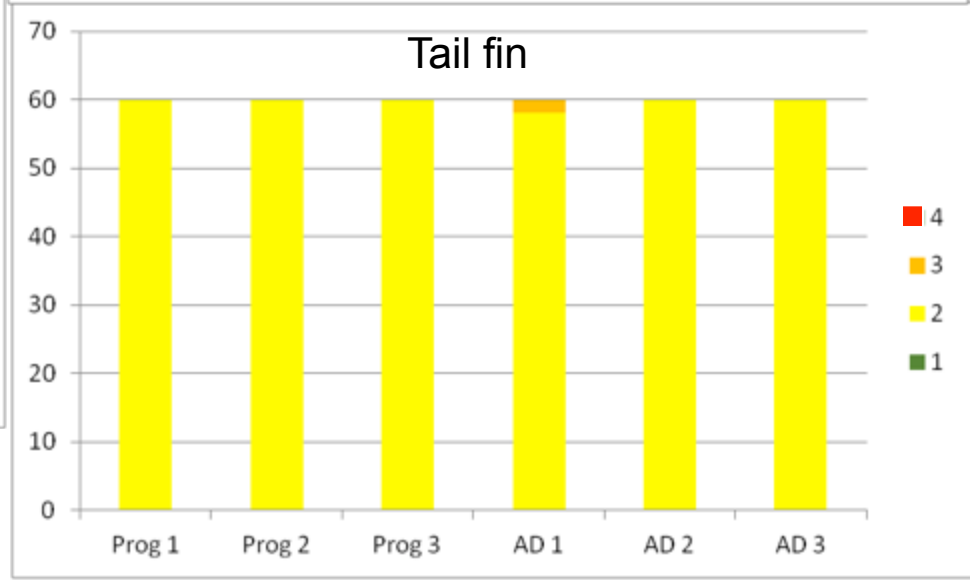
3 - heavy fin damage

4 – no fin

n=60







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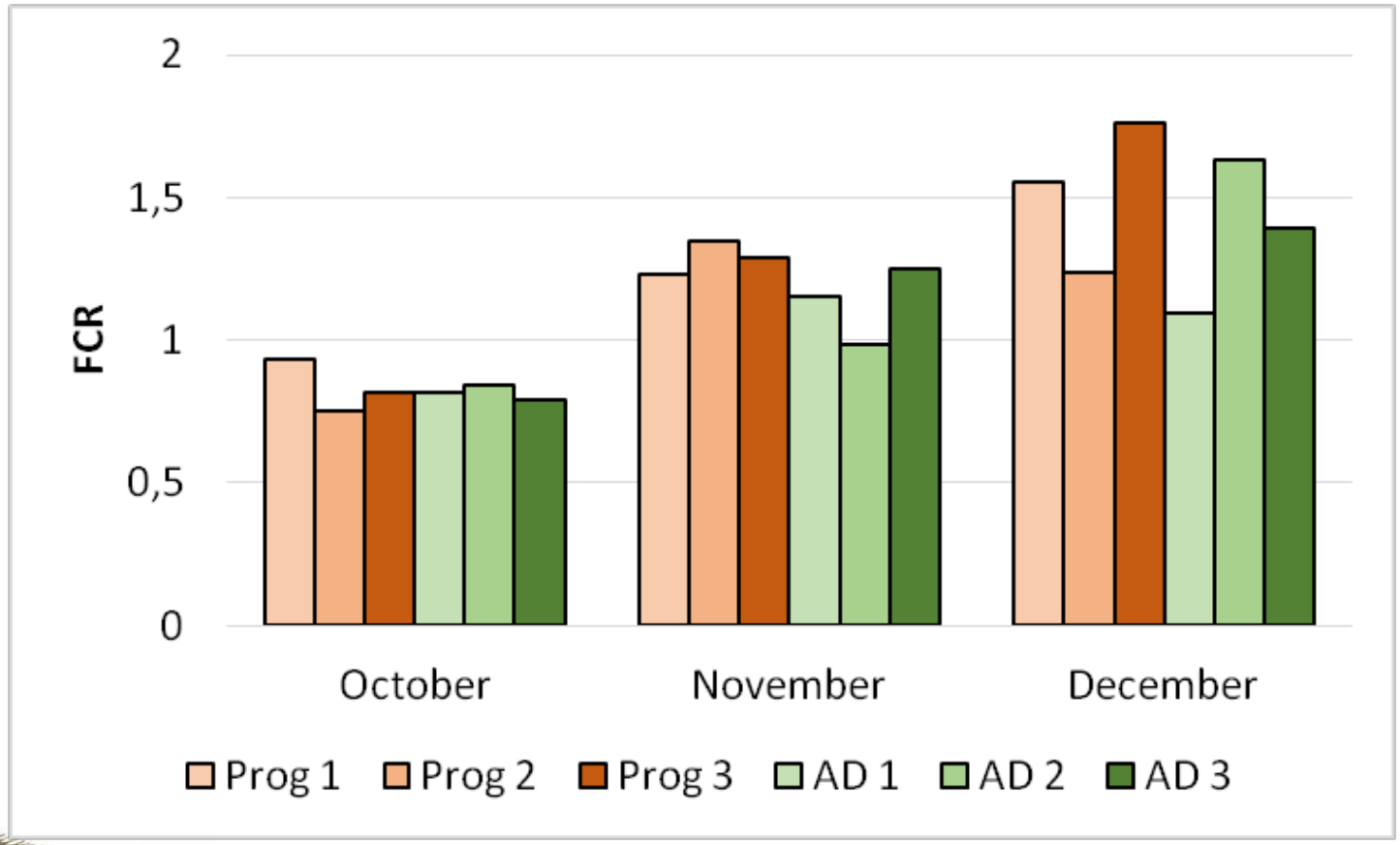
Results

Feed Conversion Ratio (FCR)



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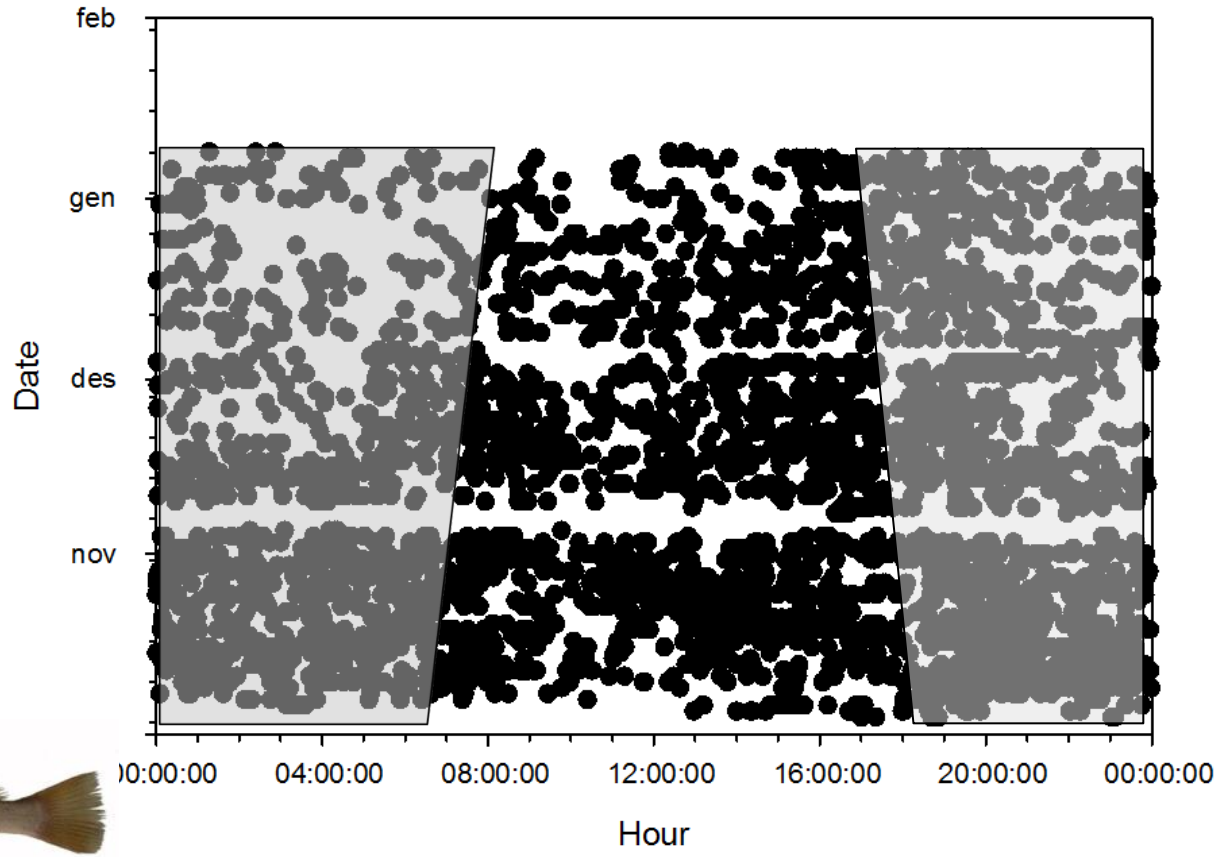
Results

Timing of demand feeding – feeding pattern

AD 1



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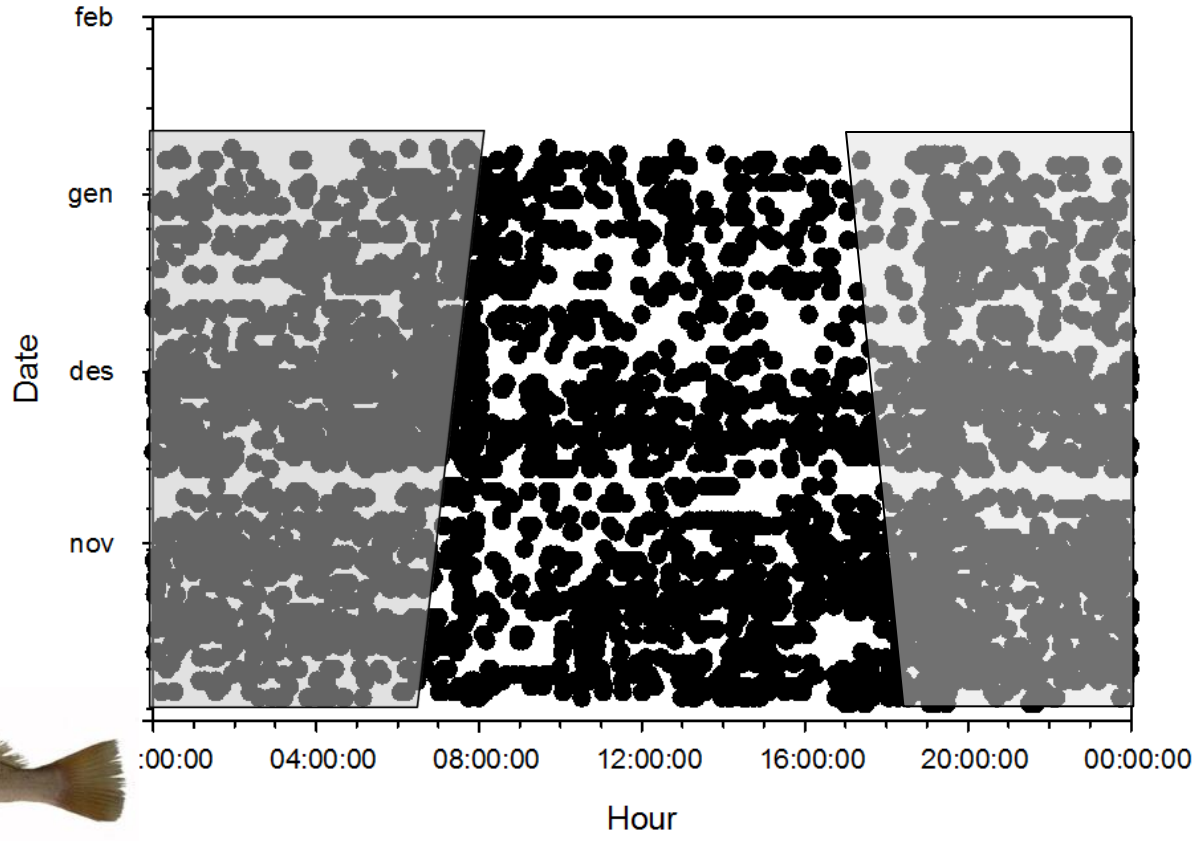
Results

Timing of demand feeding – feeding pattern

AD 2



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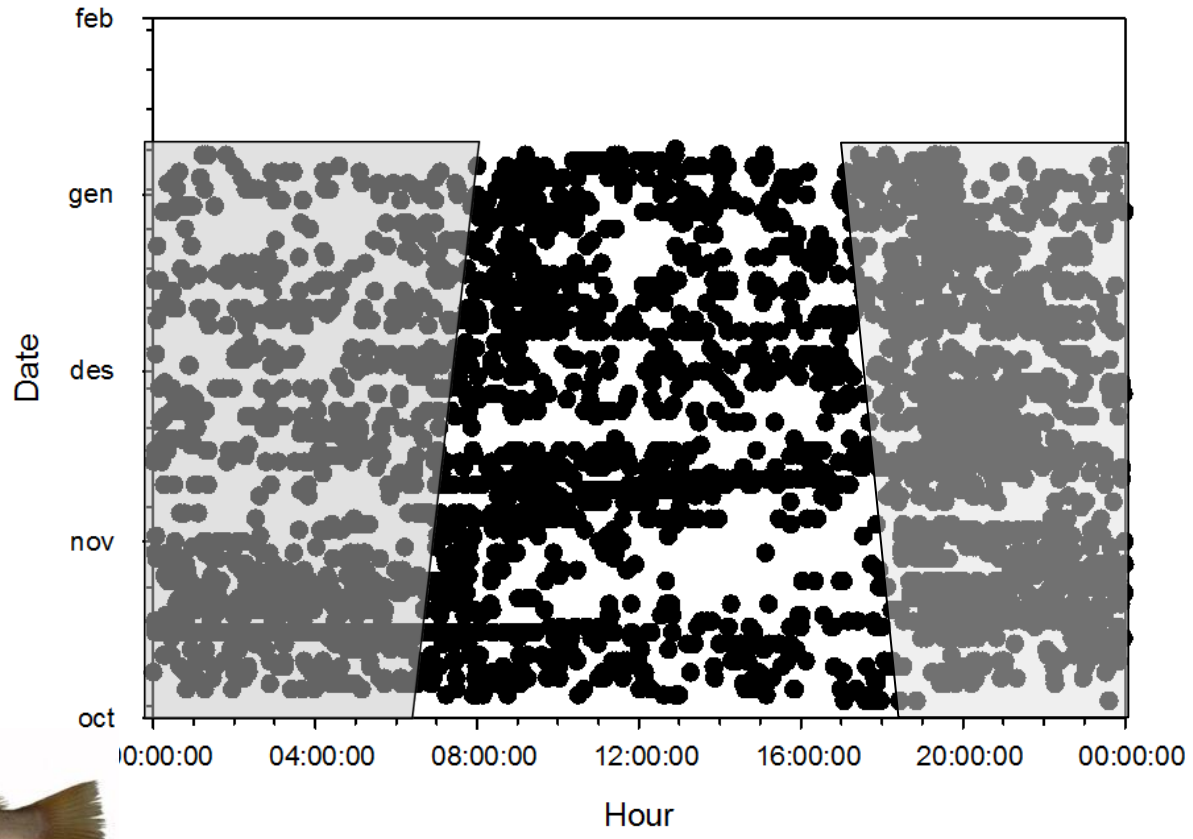
Results

Timing of demand feeding – feeding pattern

AD 3



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Preliminary observations

- Meagre rise to fill all the water column during the night and stay deeper in the tank during the day
- 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
- Feeing during the entire 24 hours cycle including during the night
- No obvious feeding pattern / rhythm

Gracias por su atención
El fin.