High performance diets for meagre larvae and early juveniles

sparos I&D nutrition in aquaculture
Olhão, Portugal

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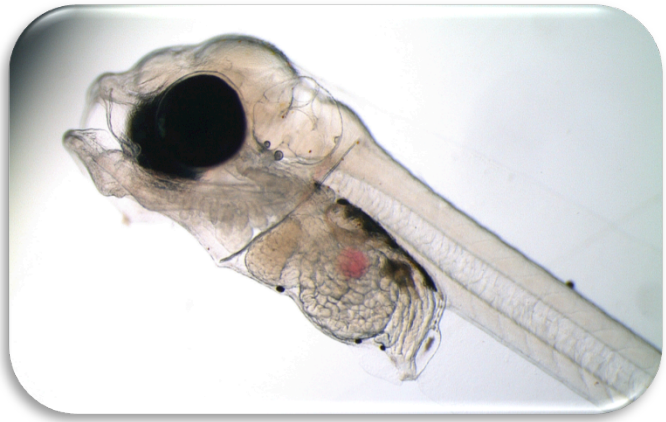
HIGH PERFORMANCE LARVAL DIETS

Tailoring
your feeds

INTRODUCTION

Commercial diets



Seabream

- Widely farmed species
- **Low growth rates**

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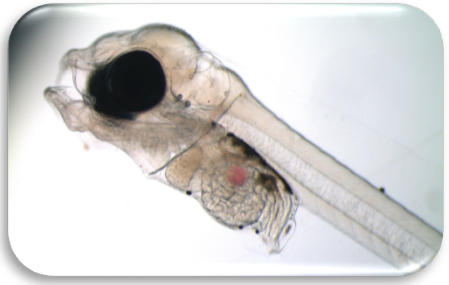
INTRODUCTION

Seabream



- Widely farmed species
- **Lower growth rates**

VS

Meagre

- Aquaculture diversification
- **High growth rates**

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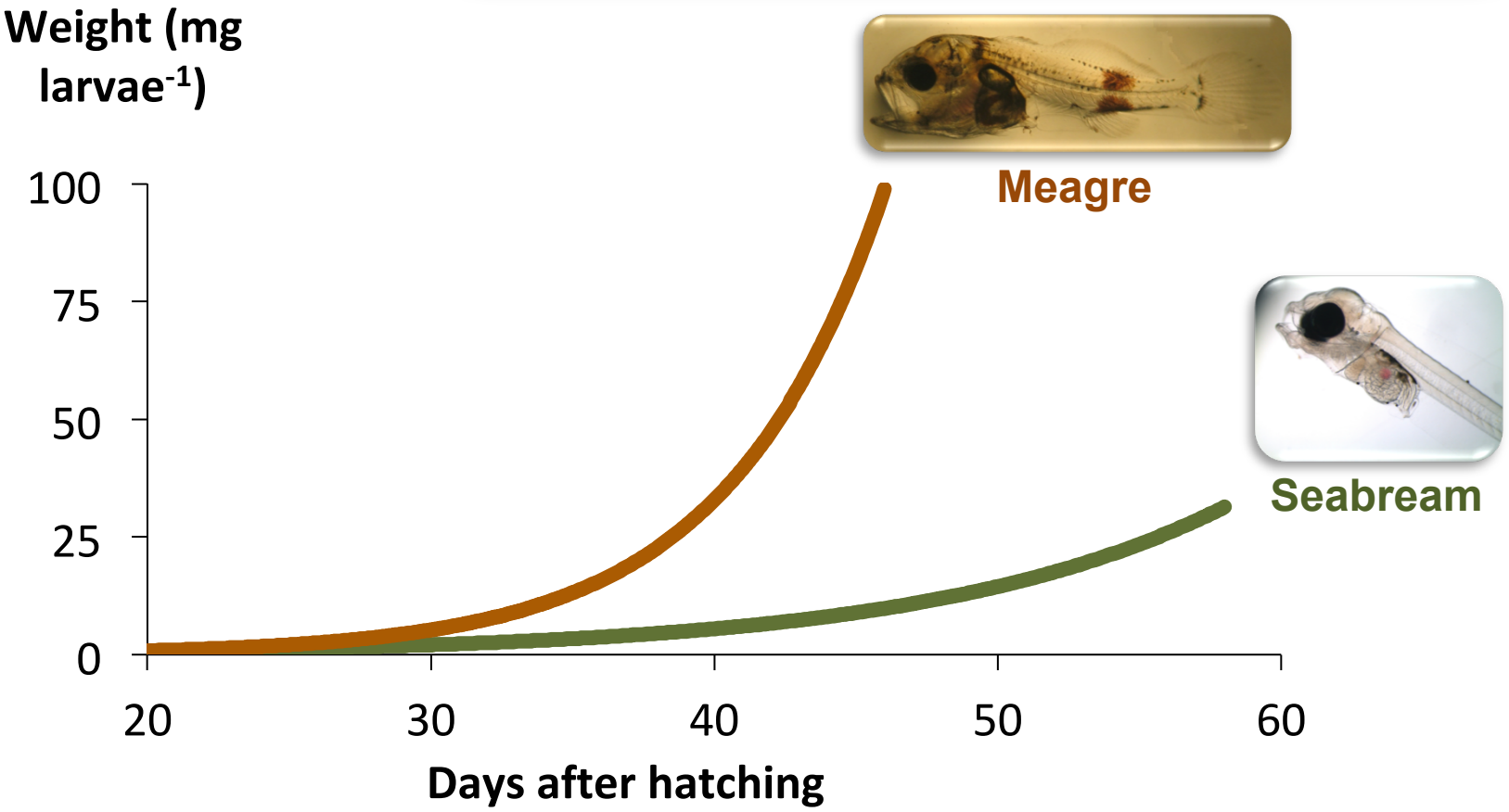

INTRODUCTION

Commercial diets

Meagre

- Aquaculture diversification
- High growth rates
- **High nutrient requirements**

INTRODUCTION

Special microdiets

- Optimised nutrient levels
- Premium ingredients
- Novel technologies

Meagre

- Aquaculture diversification
- High growth rates
- **High nutrient requirements**

OBJECTIVES

Project CORWIN: determine if meagre needs specifically designed diets during the early developmental stages - larvae and juveniles

FASTCOR: Test two different lipid levels in high performance diets and evaluate larval growth, survival and quality in comparison to a commercial diet

REARING CONDITIONS

Initial rearing

Tank: **1500 L tank**
Density: **90 larvae L^{-1}**
Rearing: **until 20 DAH**

Trial conditions

9 Tanks: 300 L
Density: **15 larvae L^{-1}**
Rearing: **From 20 to 46 DAH**
Feeding: **Continuous (*ad libitum*)**

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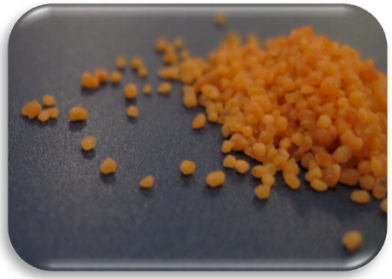
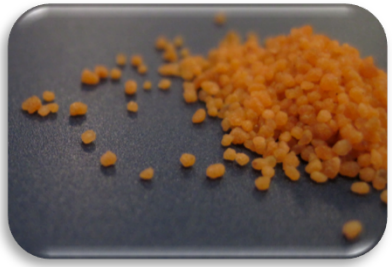
EXPERIMENTAL DIETS

Commercial
Protein: **62 %**
Lipids: **17 %**

Fish, krill, fish roe, soybean lecithin, brewer's yeast autolysate, microalgae, fish gelatine, squid meal, vegetable fat



FAST
Protein: **64 %**
Lipids: **16 %**



FAST
Protein: **61 %**
Lipids: **22 %**

Both diets: Fishmeal, squid meal, shrimp meal, wheat gluten, fish solubles, fish oil and soy lecithin

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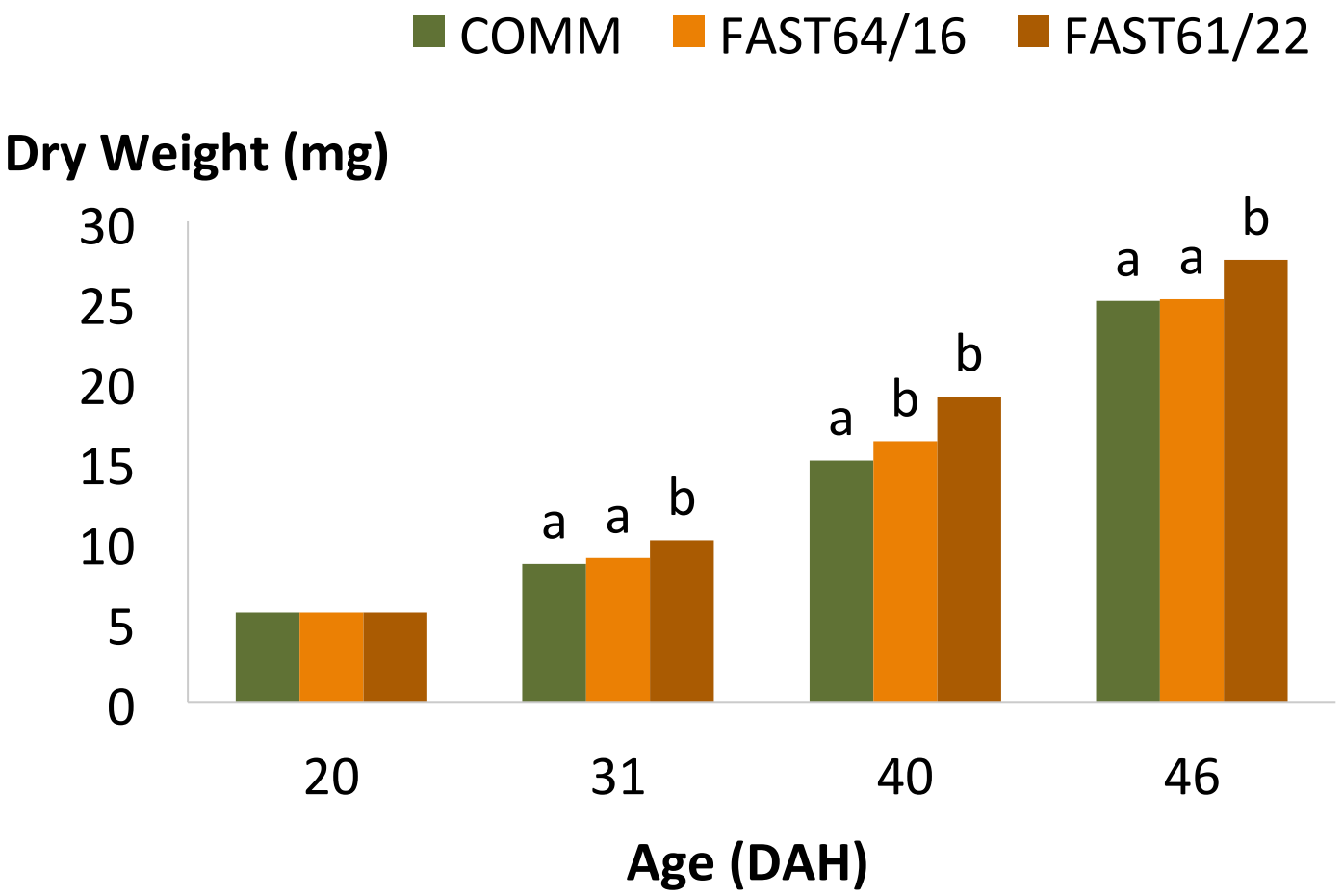
RESULTS



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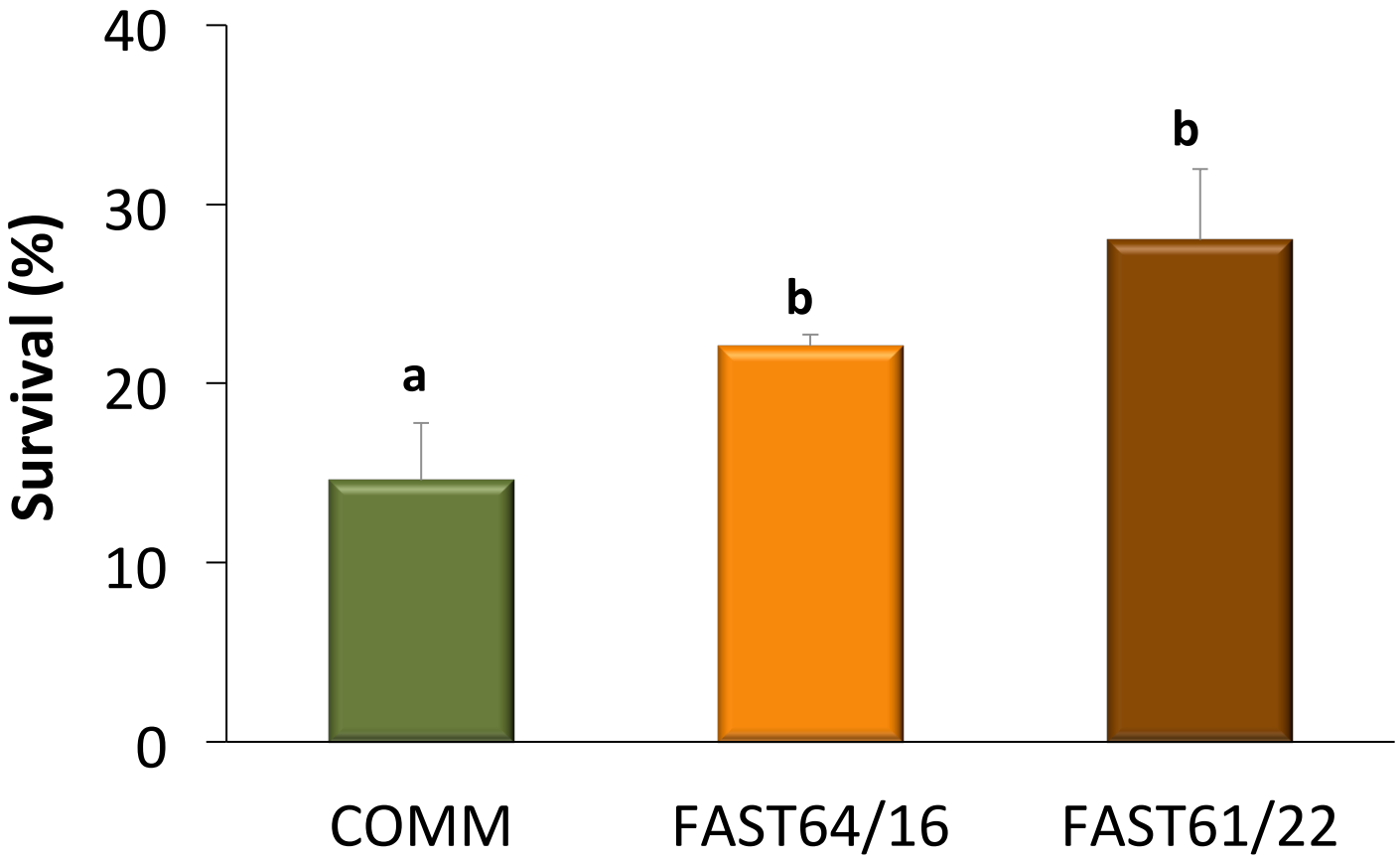
RESULTS



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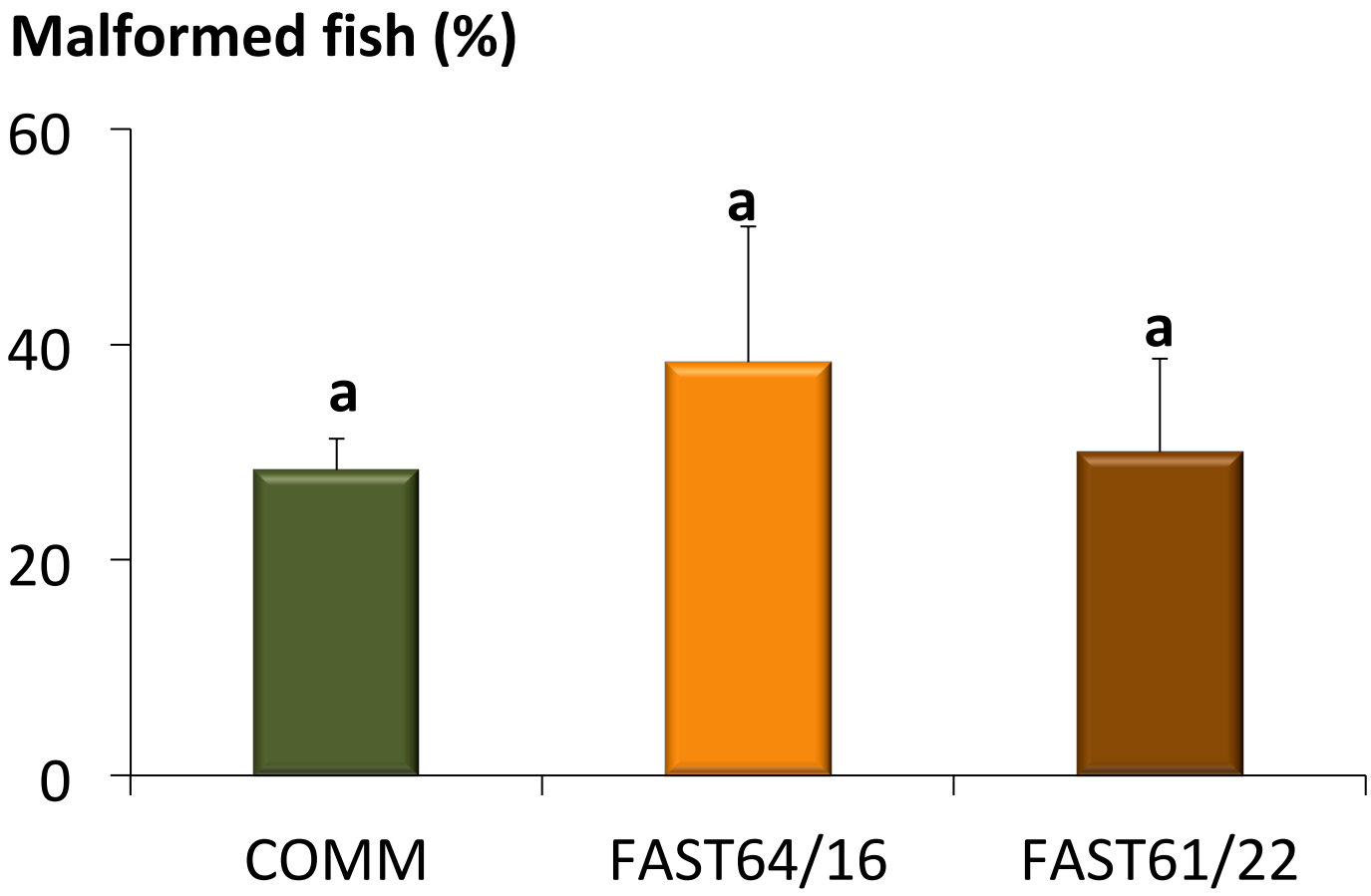
RESULTS



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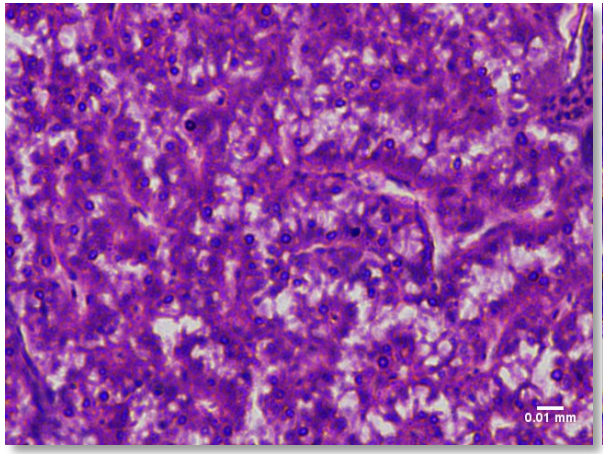

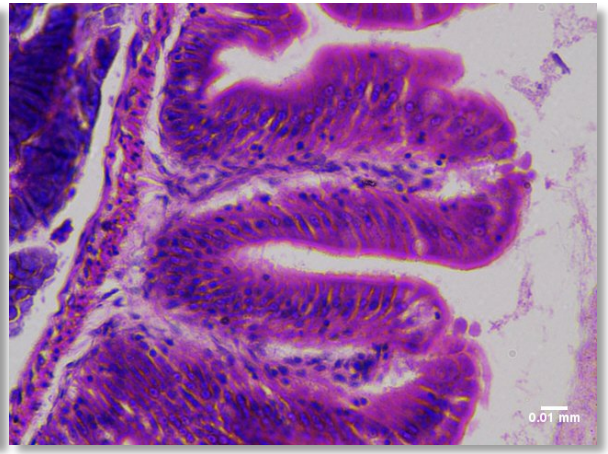

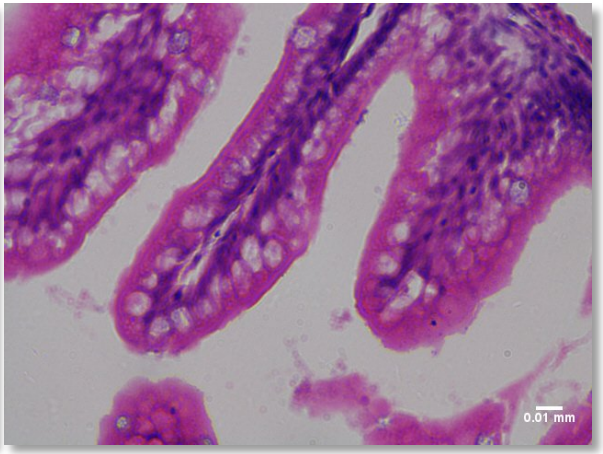

Hepatic tissues with normal lipid and glycogen reserves

Proximal and distal intestine without alterations

No significant differences observed between treatments

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DISCUSSION

Meagre larvae seem to have higher nutritional requirements than slower growing species and may require microdiets rich in both protein and lipids (Saavedra et al., 2016).

High lipid requirements may be associated to higher requirement of DHA and/or energy production (Vallés and Estévez 2015).

This study corroborates results for greater amberjack that proposed larvae of fast growing marine fish species require specific diets (Conceição et al. 2016).

SUSTAINABLE DIETS FOR MEAGRE JUVENILES

INTRODUCTION

Protein reduction in aquafeeds

- Lower dependency of fishmeal
- Lower nitrogen emissions
- Reduction of feeding costs

- Inclusion of carbohydrate sources

Energy source?
Protein sparing?

OBJECTIVES

Project CORWIN: determine if meagre needs a specifically designed microdiet formulation during the early developmental stages - larvae and juveniles

SPROTCOR:

- Assess the effect of fishmeal replacement by alternative proteins in diets for meagre early-juveniles
- Assess protein sparing by dietary starch supplementation in fish using meagre as model species

REARING CONDITIONS

Location: **IPMA (Portugal)**

Tanks: **1500 L (triplicates)**

Density: **200 fish per tank**

Weight: **2.1 ± 0.5 g**

Duration: **58 DAH**

Feeding: **6 daily meals**

Analysis:
Growth performance; FCR; body composition; liver and gut histology; nutrient retention

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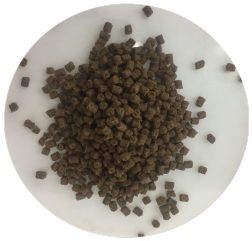
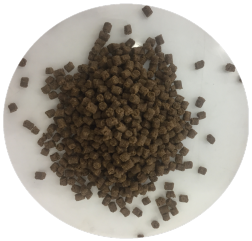
EXPERIMENTAL DIETS



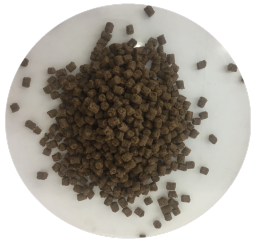
FM 42

Fishmeal
Protein: **42 %**
Lipids: **15 %**
Carbs: **24 %**



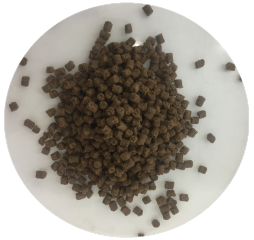
AP 42

Alternative
Protein: **42 %**
Lipids: **15 %**
Carbs: **24 %**



FM 52

Fishmeal
Protein: **52 %**
Lipids: **15 %**
Carbs: **7 %**



AP 52

Alternative protein
Protein: **52 %**
Lipids: **15 %**
Carbs: **7 %**

FM diets: Fishmeal, squid meal, fish solubles, fish oil, potato starch

AP diets: poultry meal, soy protein concentrate, wheat gluten, corn gluten, soybean meal, porcine blood meal, fish oil and potato starch

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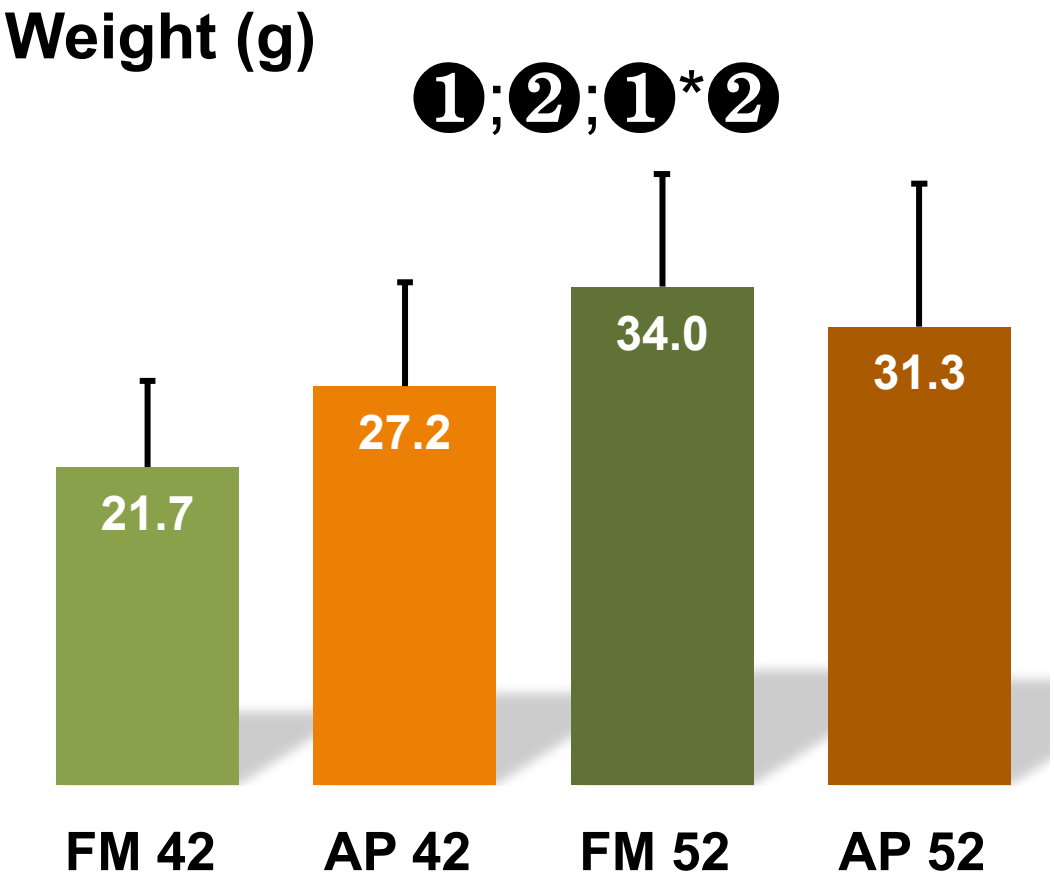
RESULTS



- 2-way ANOVA:
  - ❶ Protein level
  - ❷ Protein source
  - ❶*❷ Interaction

- Survival: > 97 %
- 10x weight increase

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RESULTS

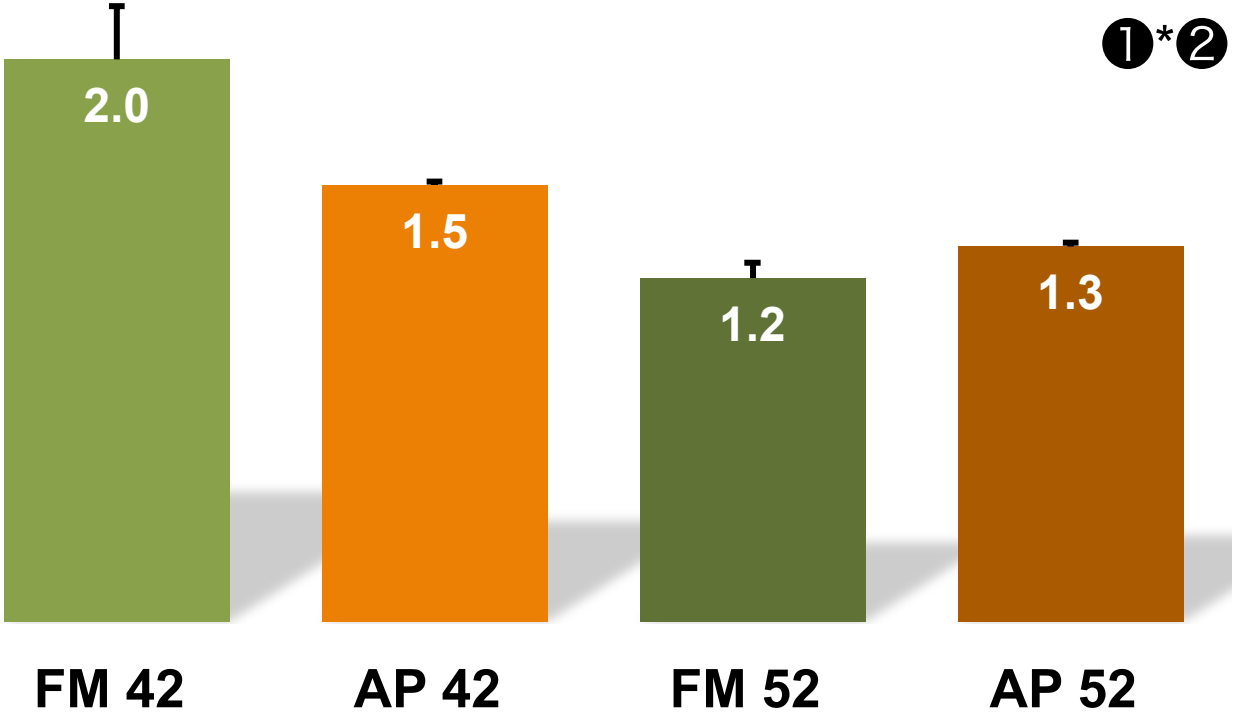
FCR

❶;❷;❶*❷

❶ Protein level

❷ Protein source

❶*❷ Interaction



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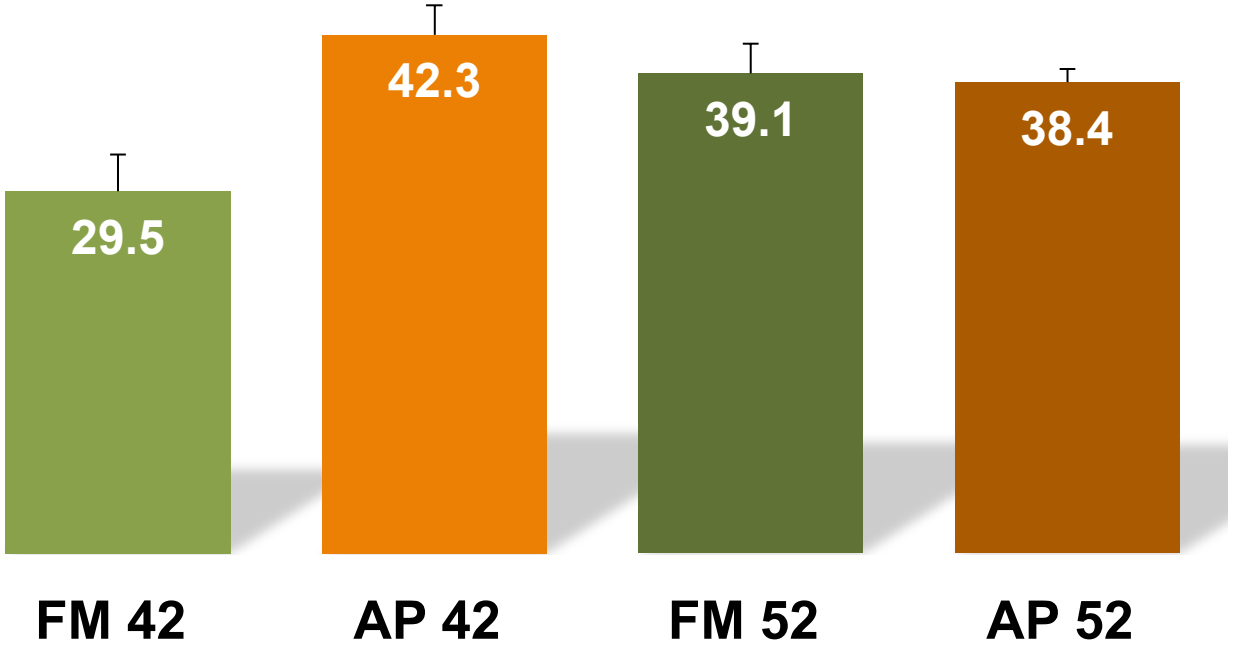
RESULTS

Protein retention (% intake)

❷; ❶*❷

❷ Protein source

❶*❷ Interaction



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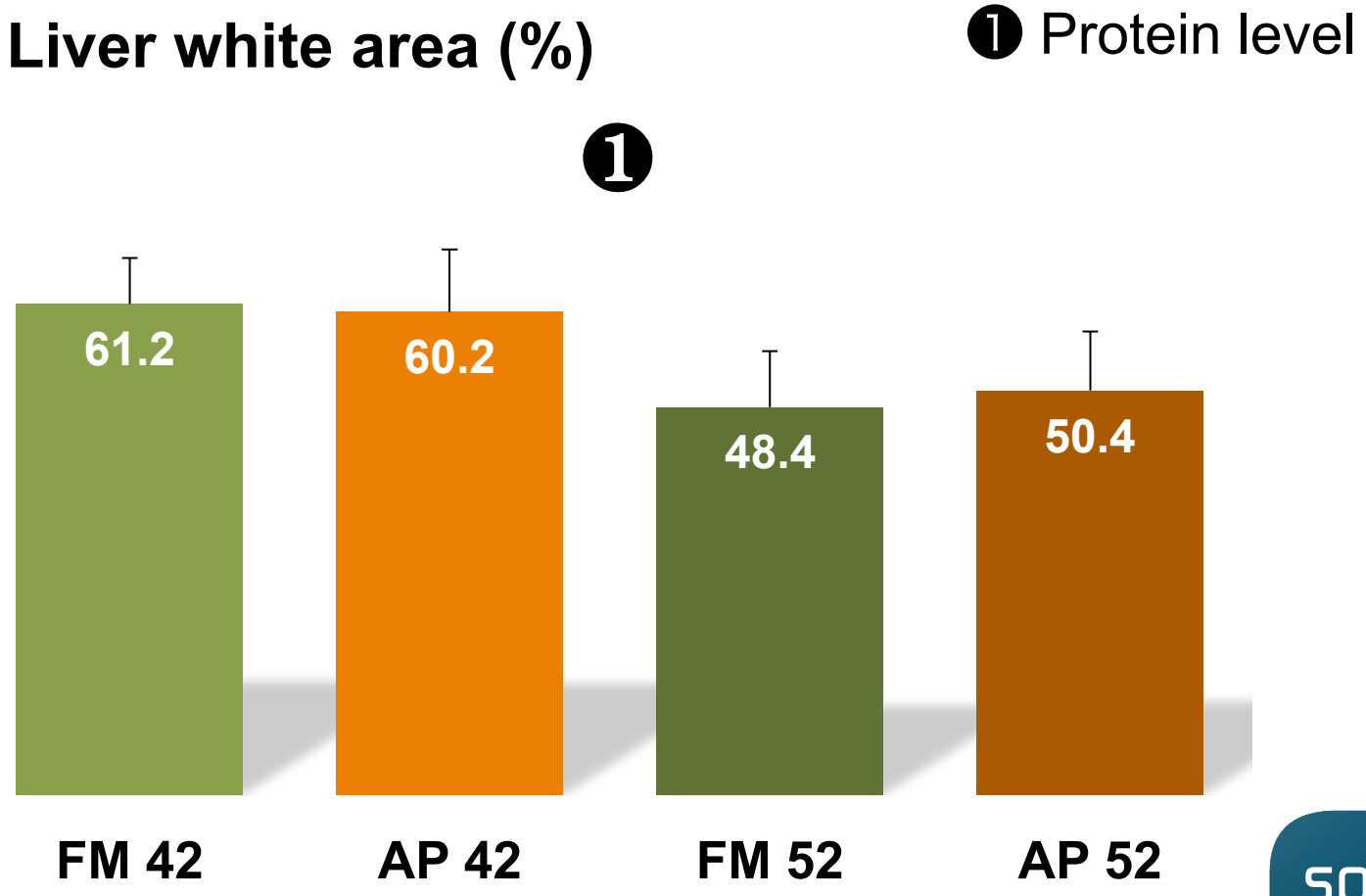
RESULTS



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DISCUSSION

Fish were more efficient in utilizing diets with a higher protein level than diets where protein was partially replaced by carbohydrates

A clear protein-sparing effect was not observed in meagre juveniles

DISCUSSION

AP sources led to better growth and feed conversion at the lower protein level (AP42), compared to fish meal (FM42), likely due to differences in the amino acid profile of diets.

Suggests some degree of protein sparing may be reached by manipulating dietary amino acid profile

TAKE HOME MESSAGES

High protein/ lipid diets to cope with high nutrient requirements

AP are promising nutrient sources for early juveniles

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THANK YOU!

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