

# EFFECTS OF FRESH OR FROZEN GRASS SHRIMP (*Palaemonetes varians*) ON CUTTLEFISH (*Sepia officinalis*) HATCHLINGS DIGESTIVE ENZYME ACTIVITY

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## Introduction:

Previous results show that the use of frozen grass shrimp (*P. varians*) as food from first feeding for *S. officinalis*, resulted in moderate success; although ~15% mortality was obtained, growth was 67% lower when compared with cuttlefish fed fresh grass shrimp (Sykes et al. 2010). Despite the management benefits, the effects of this shift in the rearing methodology on cuttlefish digestive activity and during the maturation of the digestive system is still to be determined.

## Research Questions:

- 1) How does the introduction of frozen grass shrimp affects cuttlefish digestive activity?
- 2) Will this introduction affect the maturation of digestive system?

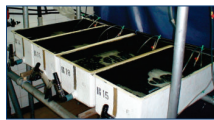


## Conclusions:

- 1) Cuttlefish hatchlings digestive capacity increase with development.
- 2) Cuttlefish hatchlings exhibits similar specific digestive activities when fed fresh or frozen grass shrimp.
- 3) Frozen grass shrimp impairs cuttlefish growth. Digestive capacity by itself does not justify differences in growth. However, these might be justified by a lower feed intake by cuttlefish fed frozen grass shrimp or an imbalanced nutritional composition of this food.

## Material & Methods:

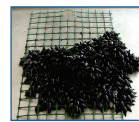
### Experimental Conditions:



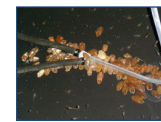
Experimental tanks

### Rearing conditions:

- 6 black tanks (10 L; bottom area 0.25 m<sup>2</sup>)
- 70 cuttlefish/tank
- Light intensity 100 lux
- 14h:10h light dark cycle
- Temperature - 17.36±0.94°C
- Salinity - 33.14±0.85‰
- O<sub>2</sub> - 97.98±1.81%



Eggs

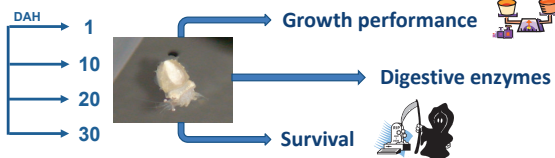


1 day hatchlings

### Feeding protocol:



### Sampling:



Trypsin (BAPNA) - Holm et al., 1988

Amylase (Starch) – Métais and Bieth, 1968

Acid protease (Hemoglobin) – Anson, 1938

Protein content – Bradford, 1976

expressed  
specific activity (U.mg protein<sup>-1</sup>)  
total activity (U.hatchling<sup>-1</sup>)

## Results & Discussion:

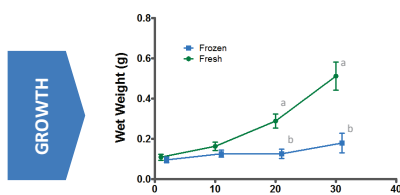


Figure 1 - Growth of cuttlefish fed fresh and frozen grass shrimp (mean ± sd, n=21). Data presented in offset.

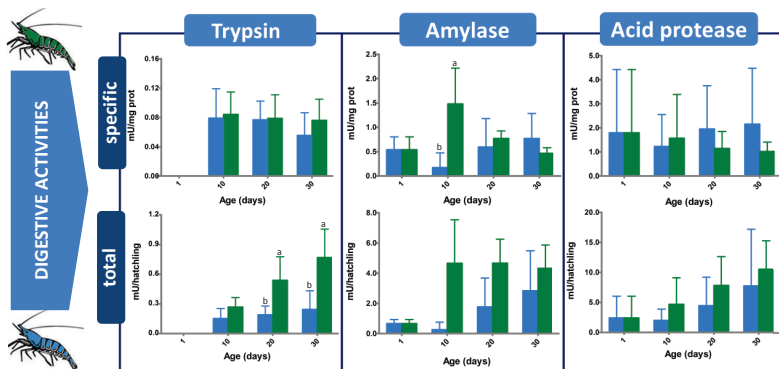


Figure 2 - Enzyme activity of cuttlefish fed fresh and frozen grass shrimp (mean ± sd, n= 7 animals per food and age).

- No mortality recorded for both feeding protocols;
- Cuttlefish fed fresh grass shrimp exhibited higher weight (P<0.05) than those fed frozen grass shrimp (Fig.1);
- Trypsin activity was only verified from 10 DAH onwards, increasing significantly during development;
- Differences observed on trypsin total activities of cuttlefish fed on different diets are a consequence of cuttlefish growth differences;
- Cuttlefish fed either prey exhibited similar values of trypsin specific activities, thus suggesting that hatchlings were eating more fresh than frozen diet and/or that the nutritional value of frozen shrimp was lower than in fresh and, therefore, being insufficient to cope with hatchling growth potential;
- After 20 DAH, hatchlings fed live shrimp exhibited almost two times more trypsin and amylase total activities than those fed frozen shrimp;
- At 10 DAH, only hatchlings fed fresh grass shrimp exhibited a peak of amylase activity. Amylase peak of activity has been observed at the early stages life stages of some fish species and suggested as a predisposition of these stages to use carbohydrates (Zambonino-Infante et al., 2008);
- Strong variability was observed for acid protease of cuttlefish fed both diets. Still, acid protease total activity increased significantly with age.