CULTURE OF TWO CONSECUTIVE GENERATIONS OF CUTTLEFISH, *Sepia officinalis* (Linnaeus, 1758), USING LIVE GRASS SHRIMP (*Palaemonetes varians*) AS THE ONLY PREY

Center of Marine Sciences

Cephalopod Culture & Research

António V. Sykes, Pedro M. Domingues & José P. Andrade

CCMAR - Universidade do Algarve
Campus de Gambelas - 8000–810 Faro – PORTUGAL
email: asykes@ualg.pt

INTRODUCTION

Cephalopods have a great potential for aquaculture because of their short life cycles, fast growth rates, high food conversion efficiencies and high market value (Lee, 1994; Lee *et al.*, 1998). The cuttlefish, *Sepia officinalis*, is one of the species of cephalopods most commonly cultured, both in Europe and United States, because it has several characteristics that make it one of the most promising cephalopod species to be cultured in large scale (Forsythe *et al.*, 1994).

Until now, acceptable growth rates and low mortality have been obtained feeding live mysid shrimp during the first few weeks of their life. Nevertheless, costs associated with mysid production and their low fecundity (Domingues *et al.*, 1998; 2000) makes them a bottleneck in the first stage culture of the cuttlefish.

Live grass shrimp (*Palaemonetes varians*) might be used as an alternative first diet, since it has been used in post-hatchling culture of the cuttlefish with good results (Domingues *et al.*, 2001).

The objective of this research was to determine if *S. officinalis* could be cultured through the life cycle exclusively on a diet of live grass shrimp, and the consequences on growth, mortality, age at the time of spawning, fecundity and fertility, among other aspects of the life cycle.

MATERIAL & METHODS

Winter Cycle:

►27 hatchlings;

►Temperature - 15±3 ºC;

►Salinity - 35±2 PSU.

Summer Cycle:

►30 hatchlings;

►Temperature - 23±2 ºC;

►Salinity - 37±2 PSU.

Both populations were fed *ad libitum* with live grass shrimp (*P. varians*). Cuttlefish were weighed every 10 days. Data collected was used to calculate: 1) Mean Weight; 2)Mean Instantaneous Growth Rate (IGR) (%Body Weight d-1)=(LnW2-LnW1)/t*100, where W2 and W1 are the final and initial weight, respectively, Ln the natural logarithm and t the number of days of the time period and 3) Survival rates.

Eggs were collected and 50% were weighed on a daily basis, and total egg numbers and weight were determined. Egg laying periods were determined for both experiments. From all the newly born hatchlings, about 30% were individually weighed to determine mean hatchling weight. Fertility (number of hatchlings born from the total of eggs laid) was also determined.

All adult cuttlefish were weighed after death and examined for sex determination, to determine differences in weight between males and females, as well as sex ratio within each group.

RESULTS

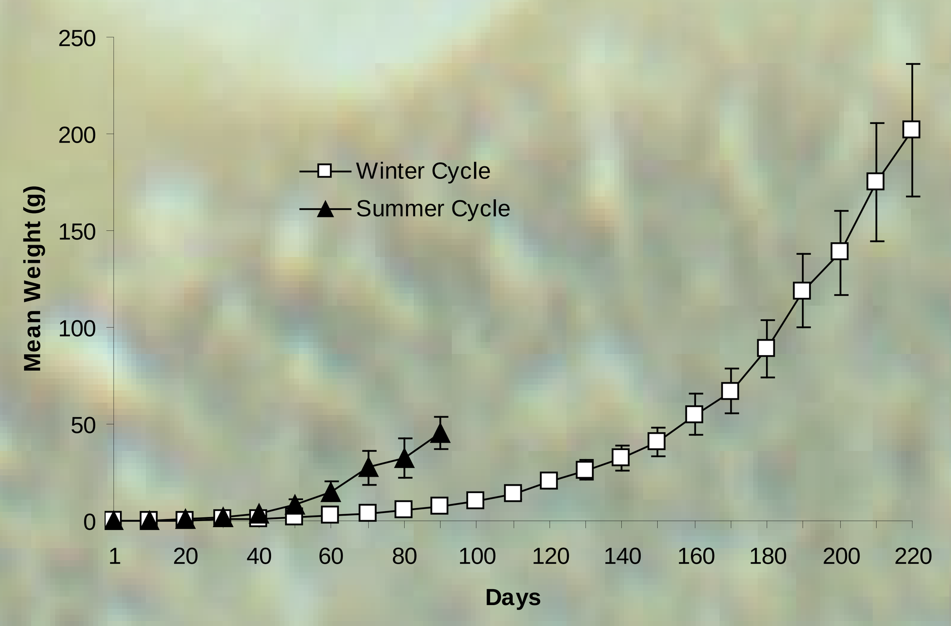

Fig. 1 – Growth of cuttlefish fed live grass shrimp during both winter and summer cycles, from hatching until start of spawning.

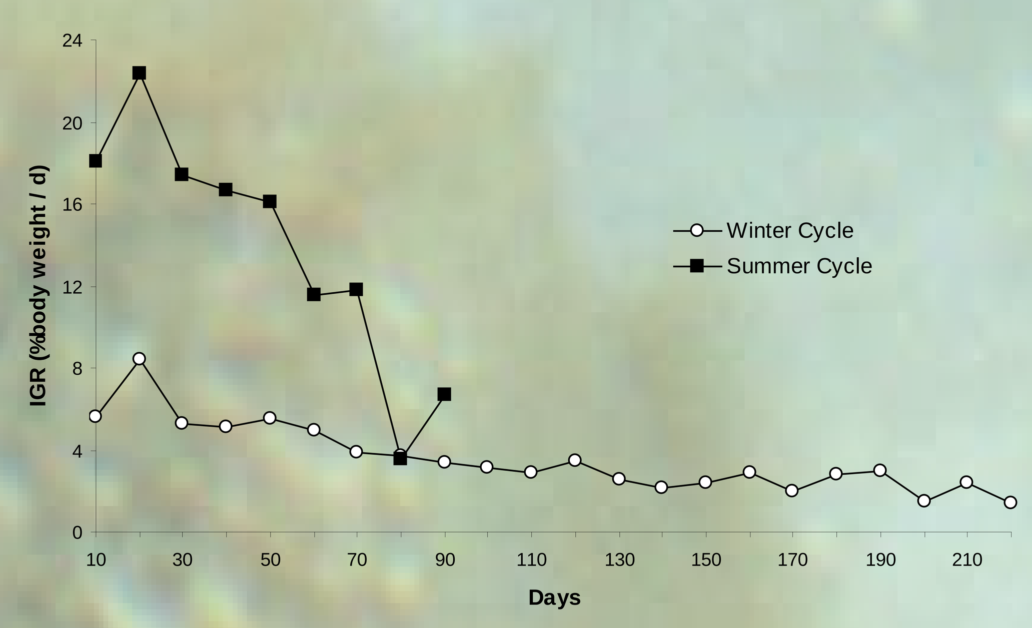

Fig. 2 – Instantaneous growth rate (% body weight/day) of cuttlefish fed live grass shrimp during both winter and summer cycles, from hatching until start of spawning.

Table I - Results from the winter and summer life cycles for *S. officinalis* cultured in the laboratory with live grass shrimp (*Palaemonetes varians*) as the only prey. Results from these two cycles were compared with those obtained by Domingues *et al*. (submited) for *S. officinalis* fed live mysids during the first 20 days and live grass shrimp afterwards, at the same temperature range of our winter cycle (Mysids Winter Cycle).

	Mysid Winter Cycle	Grass Shrimp Winter Cycle	Grass Shrimp Summer Cycle
Duration of life cycle (days)	260	262	126
Duration of spawning period (days)	30	42	36
Eggs laid (n)	4048	5916	1808
Total egg weight (g)	3087,3	3448,5	236,8
Eggs (n) / Female	225	370	301
Eggs sampled (n)	1200	2939	848
Mean egg weight (g)	0,74 ± 0,18	0,56 ± 0,17	0,25 ± 0,08
Largest egg weighed (g)	-	2,464	0,622
Smallest egg weighed (g)	-	0,114	0,142
Hatchlings sampled (n)	300	93	204
Mean weight hatchlings (g)	0,10 ± 0,02	0,076 ± 0,013	0,081 ± 0,016
Mean weight females (g); (n)	248,0 ± 33,1 (18)	193,3 ± 30,8 (16)	64,7 ± 12,7 (6)
Mean weight males (g); (n)	343,3 ± 80,5 (6)	310 ± 89,6 (7)	77,6 ± 22,3 (18)
Mean temperature; Time to hatch	23 ºC ; 30 days	25ºC ; 25 days	20ºC ; 28days
Hatching percentage	41%	-	16%

CONCLUSIONS

►We succeeded in culturing the cuttlefish during two consecutive generations using live grass shrimp as the only prey;

►Hatchlings easily preyed upon grass shrimp with sizes that could be twice as big as their mantle length, in both cycles;

►Temperature was the most important factor to explain the great differences between the winter and summer cycles;

►Growth was considerably faster during the summer and life span was shorter, due to the much higher temperatures (23±2 ºC compared to 15±3 ºC);

►Grass shrimp seems to be a good food for the culture of the life cycle of the cuttlefish. It replaced mysids as first food with similar results in body weight at the time of spawning.

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