THE EFFECT OF *ARTEMIA* ENRICHMENT ON THE EARLY REARING OF THE POT-BELLIED SEAHORSE *HIPPOCAMPUS ABDOMINALIS*

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INTRODUCTION

Artemia is not the most adequate starting prey in the rearing of some seahorse species such as *H. subelongatus* (Payne and Rippingale, 2000) or *H. guttulatus* (Planas et al. 2009) due to a limited digestibility. However, *Artemia* nauplii or metanauplii is suitable as a first feeding prey for *H. kuda* or *H. abdominalis* newborns (Job et al. 2002; Shapawi and Purser, 2003; Woods, 2003a,b).

The composition of enrichment diets is important in the assessment of *Artemia* metanauplii quality as first prey. Five enrichment diets for *Artemia* were tested in the early rearing of the pot-bellied seahorse *H. abdominalis*, a species distributed in SE Australia and New Zealand. The effect of enrichment diets on survival and growth of juveniles was studied.

MATERIALS AND METHODS

This study was conducted at the University of Tasmania (Launceston) (Fig. 1) on newborn seahorses *H. abdominalis* provided by Seahorse World Pty Ltd (Tasmania). Newborns were transferred to twenty 3-l hemispherical aquaria (19 seahorses/tank) and reared for 15 days at 16ºC, 34ppt salinity, a water flow of 0.2-0.3l min-1 and 12L:12D photoperiod. Food retention and removal was made by interchanging 100um and 400um outlet screens. Juveniles were fed on *Artemia* (EG; INVE) at a rate of 3 metanauplii ml-1 (15% WW), adjusted twice daily.

Five diets were used in the enrichment of *Artemia* metanauplii: 1) Control – unenriched metanauplii, 2) mixture of the microalgae *Isochrysis galbana*, *Pavlova lutheri* and *Tetraselmis suecia* (1:1:1), 3) Algamac 3050 (Aquafauna Biomarine, Inc), 4) Prolon (INVE) and Red pepper (Bernaqua), and 5) mixture of treatments 2 and 4. Four replicate aquaria were used per treatment. Final survival and weights (day 15) were determined and digital photographs of seahorses were taken for biometrics (Vincent, 1990) (Fig. 2). Statistical analyses were carried out using the software SPSS 15. Differences in final survival and growth among treatments were analyzed by ANOVA and nested ANOVA.

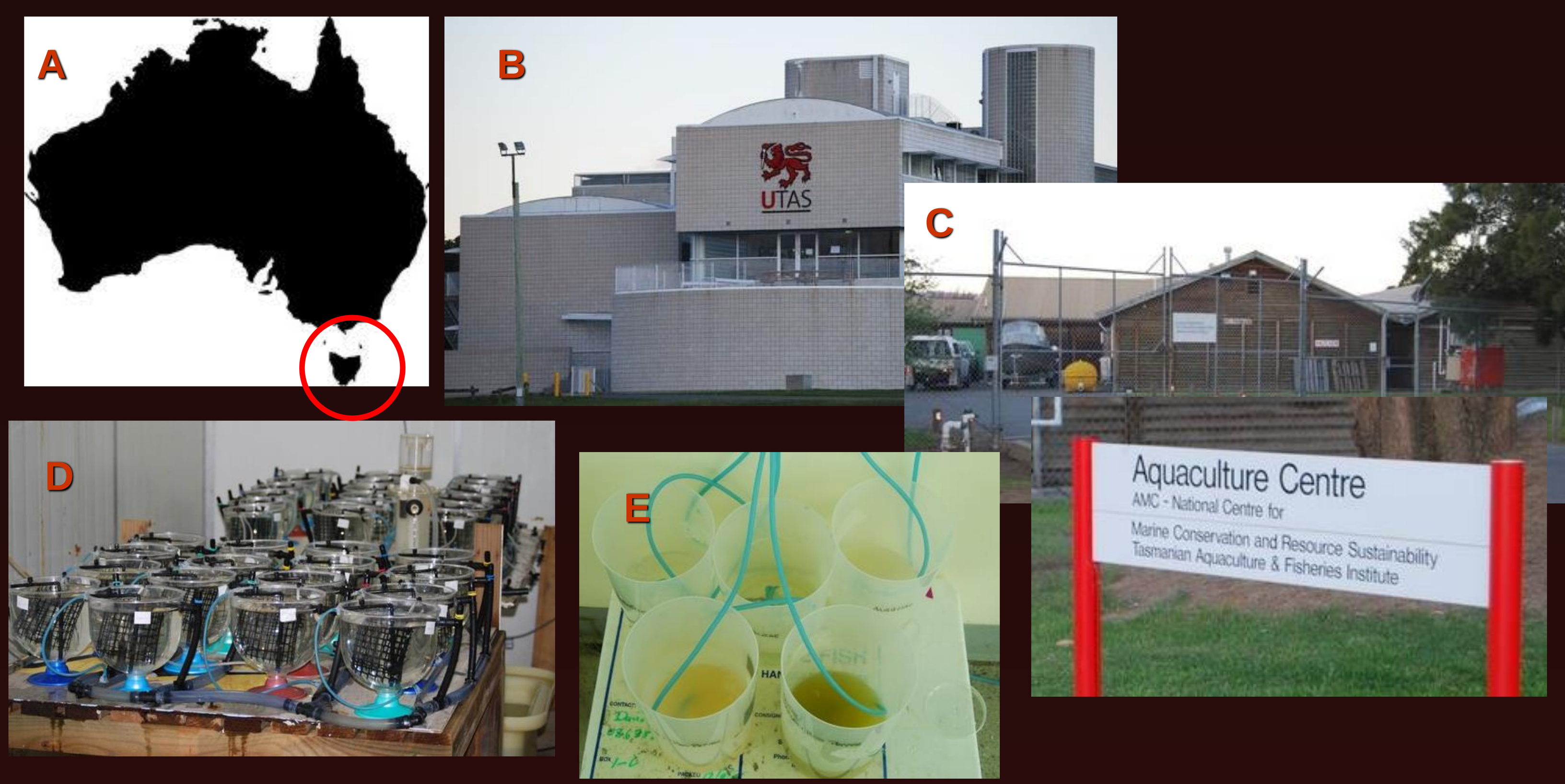

Fig. 1. A: Location, B, C: Institution, D. seahorses tanks and E: *Artemia* enrichments.

RESULTS AND DISCUSSION

Average survival in 15-d old juveniles was 85.26±4.40% (Table I). The highest and lowest survivals were recorded in treatments 3 (Algamac; 92.2%) and 1 (control; 80.3%), respectively though differences among treatments were not significant (ANOVA, $F_{4,15}$: 1.40; p=0.2813).

Significant differences (nested ANOVA, $F_{4,15}$: 6.25, p= 0.0036) were found in final weights between treatments 3, 4 and 5 (highest weight) and treatments 1 and 2. Similarly, final lengths were significantly different among treatments (nested ANOVA, $F_{4,15}$: 11.042, p= 0.0002), Treatment 3 provided the highest lengths.

Dietary Treatments	Survival (%)	Length (mm) Initial	Length (mm) Final	Wet weigth (mg) Initial	Wet weigth (mg) Final
UNENRICHED	80,26 ± 7,89	17,95 ± 0,90	24,45 ± 0,61	5,67 ± 2,27	23,28 ± 3,43
MIXTURE ALGAE	82,89 ± 11,67	17,95 ± 0,90	24,37 ± 0,64	5,67 ± 2,27	23,89 ± 1,69
ALGAMAC 3050	92,11 ± 6,79	17,95 ± 0,90	27,59 ± 0,32	5,67 ± 2,27	30,79 ± 2,31
PROLON+RED PEPPER	85,53 ± 5,04	17,95 ± 0,90	25,99 ± 0,96	5,67 ± 2,27	28,92 ± 3,08
PROLON+RED PEPPER+MIXTURE ALGAE	85,53 ± 2,63	17,95 ± 0,90	25,70 ± 1,17	5,67 ± 2,27	29,92 ± 5,98

Table I. Total length (mm), wet weight (mg) and survival (%) of juveniles *H. abdominalis* fed on different *Artemia* enrichments for 15 days.

High survival and growth (final wet weight and length) were achieved in the early rearing of *H. abdominalis* with all *Artemia* enrichment diets tested. Acceptable results were also obtained in the control treatment (unenriched *Artemia*). These results agree with previous studies on *H. abdominalis* (Woods, 2003ab; Shapawi and Purser, 2003). However, the highest performances in terms of final weight and length were achieved in treatments 3, 4 and 5, where *Artemia* was enriched with commercial products. The results indicate that all the enrichments tested appear suitable for the culture of this species. The use of enrichment diets for improving the growth and survival of seahorses has been studied previously (Chang and Southgate, 2001, Wong and Benzie, 2003; Woods, 2003a).

The high survival and growth recorded in *H. abdominalis* is not common in the culture of juveniles of other seahorse species such as *H. subelongatus* (Payne and Rippingale, 2000), *H. guttulatus* (Planas et al. 2009) and *H. kuda* (Chang and Southgate, 2001), suggesting differences between seahorse species (fatty acid requirements, digestive capabilities). In fact, the digestive enzymatic profile in seahorses differs between species (Alvarez et al. 2009; Quintas et al. 2010), observing a qualitatively and quantitative high enzymatic activity on juveniles of *H. abdominalis*. The high quitinolytic activity (N-acetyl-β-glucosaminidase) observed in juveniles of *H. abdominalis* (Quintas et al. 2010) could be the key to explain their capability to digest *Artemia* nauplii and metanauplii in contrast to newborns of other seahorses species (Planas et al. 2009).

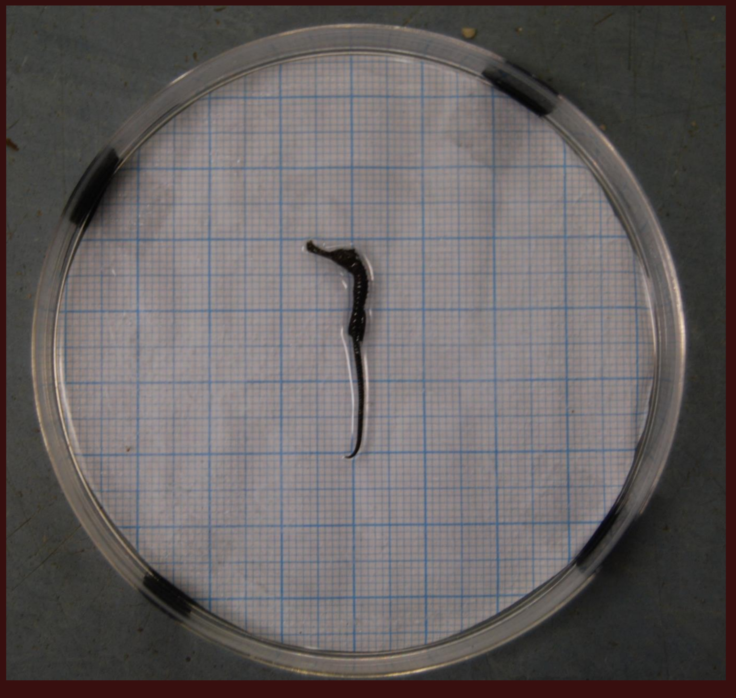

Fig. 2. Juvenile *H. abdominalis* for biometrics.

ACKNOWLEDGEMENTS: The study was financed by the Spanish Ministry of Science and Technology (CGL2005-05927-C03-01/03) and Xunta de Galicia (PGIDIT06PXIC402106PN). P. Quintas was supported by a postdoctoral contract and a grant (JAE Doc-CSIC).

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