

**ABSTRACTS OF PAPERS**

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**FIRST CULTURE EXPERIENCES OF *HALIOTIS COCCINEA CANARIENSIS* IN A BIOFILTER SYSTEM.** P. H. Toledo, R. Haroun, H. Fernández Palacios, M. Izquierdo, and J. Peña, Instituto Canario de Ciencias Marinas (ICCM), Ap. 56 35200, Teide, Las Palmas, Islas Canarias, Spain.

*Haliotis coccinea canariensis* is an endemic subspecies from the Canary Islands. Its highly appreciated flavour has led to it being overfished along the Canarian coasts. The present experiments were aimed to produce cultures of *H. coccinea canariensis* in an integrated biofilter system. Sixty abalone specimens of average shell length 4.2 cm were carefully collected from rocky shores by hand and scuba diving. After being sexed and marked, they were kept under natural light conditions in three indoor circular tanks of 2000 l and provided with constant seawater flux and aeration. They were fed with four species of algae: *Ulva rigida*, *Grateloupia dichotoma*, *Codium taylorii*, and *Cystoseira humilis*, produced in the biofilter system of the aquaculture experimental plant in the ICCM. Individual size (shell length and width) and weight were recorded on a monthly basis and spawning was induced in the late spring with U.V. light, seawater, hydrogen peroxide and TRIS solution. Abalone grew well with two of the selected algal species, namely *Ulva rigida* and *Grateloupia dichotoma*, although the former was better accepted and more efficient in promoting growth. Induced spawning was successful, and after two months of feeding with benthic diatoms, settled juveniles started feeding on macroalgae.

**THE DIGESTIBILITY OF RAW, AUTOCLAVED AND PHYTASE TREATED LEGUMES IN GREENLIP ABALONE, *HALIOTIS LAEVIGATA*.** M. E. Vandeppeer, P. W. Hone, R. J. van Barneveld, and J. N. Havenhand, SA Research and Development Institute Aquatic Sciences Centre, PO Box 120, Henley Beach, South Australia, 5022.

In this study we determined the apparent digestibility of nutrients in field peas, faba beans, yellow lupins and vetch in the greenlip abalone, *Haliotis laevigata*, and assessed whether autoclaving or the addition of phytase improved the digestibility of nutrients in these legumes. Fifteen isonitrogenous diets, consisting of one of three different treatments of the following legumes: field peas (*Pisum sativum*), yellow lupins (*Lupinus luteus*), faba beans (*Vicia faba*) and vetch (*Vicia sativa*), were formulated. The three treatments of each legume were raw, raw plus the enzyme phytase, and autoclaved. De-fatted soyflour served as a control. All legumes (whole seed) were ground in a hammer mill and included as the sole protein source of each diet. Each diet was fed to four different replicate tanks of 80–100 juvenile greenlip abalone, *Haliotis laevigata* (shell length 40–60 mm, 70 g wet weight). Faeces were collected each day by settlement and the apparent digestibil-

ity of gross energy, protein, amino acids and phosphorous in each diet was calculated using chromic oxide as the inert indicator (0.5%). With respect to N digestibility for the untreated legumes, lupin > soyflour = beans > peas = vetch. Gross energy and dry matter digestibility had similar patterns, with lupin = soyflour > beans > peas = vetch. In general, autoclaving had a negative effect on digestibility, significantly decreasing the digestibility of all amino acids and protein from all legumes. Gross energy digestibility decreased for both soyflour and lupins, but increased for peas and vetch after autoclaving. The gross energy digestibility of beans was unchanged. The addition of phytase significantly increased the digestibility of phosphorous from the lupin diet only (84–91%). Strangely, the digestibility of phosphorous from pea diet actually decreased with the addition of phytase (94–87%). In addition to its effect on phosphorous digestibility, increases in dry matter, nitrogen and the digestibility of some amino acids were observed with the addition of phytase.

**THE EFFECT OF STARVATION ON GRAZING RATES OF *HALIOTIS FULGENS* POSTLARVAE.** L. A. Vélez Espino, R. Searcy Bernal, and C. Anguiano Beltrán, Instituto de Investigaciones Oceanológicas, Apartado Postal 453, Ensenada 22860, Baja California, México.

Grazing rates of *Haliotis fulgens* postlarvae (30, 45, and 60 days old) after different periods of starvation (0, 1, 2, 3, and 4 days) were estimated by the digital analysis of video-recorded images of grazed areas. Trials were conducted in 10ml plastic dishes colonized by the cultured diatom *Navicula incerta* at standard densities (ca. 250–500 cells/mm<sup>2</sup>). A significant increase in grazing rates at longer starvation periods was detected. However, for 45 and 60 day old postlarvae, this increase occurred mostly during the first two days of starvation. The maximum grazing rates for 30, 45, and 60 day old starved abalones were 3.861, 6.986, and 10.643 cells/postlarva/hour, respectively, which are similar to rates observed in parallel trials at much higher biofilm densities (ca. 4,000 cells/mm<sup>2</sup>).

**TETRAPLOID INDUCTION IN THE PACIFIC ABALONE *HALIOTIS DISCUS HANNAI* INO WITH 6-DMAP AND CB.** G. Zhang, Z. Wang, Y. Chang, J. Song, J. Ding, Dalian Fisheries University, Key Laboratory of Mariculture Ecology, Ministry of Agriculture, Dalian, LN, 116023, PRC, S. Zhao and X. Guo, Haskin Shellfish Research Laboratory, Rutgers University, 6959 Miller Avenue, Port Norris, NJ, 08349, USA.

Triploid shellfish are useful in aquaculture because of their sterility, superior growth, improvement meat quality and sometimes increased disease resistance. The best way to produce trip-