

field oysters with a mean dry weight condition index greater than 120 were again consistently higher than would be predicted from Equation (1) (see Walne, 1970).

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The effect of continuous versus discontinuous feeding on the growth of hatchery reared spat of *Crassostrea gigas* Thunberg

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Various authors have suggested that feeding and digestion in bivalves may be rhythmic rather than continuous processes (Nelson, 1918; J. E. Morton, 1956; B. S. Morton, 1970, 1971). Recently it has been shown that the tidal rhythm for extracellular digestion in *Ostrea edulis* is not maintained under non-tidal laboratory conditions, but that similar changes to those found in the field can be induced by a discontinuous, on-off feeding regime (Langton and Gabbott, in press). Likewise, Owen (1972) has suggested that the tidal rhythm for intracellular digestion in *Cardium edule* may be dependent on the food supply. It occurred to us that, if under natural conditions the available food supply co-ordinates the digestive activity of bivalves, then a discontinuous feeding regime might be more beneficial for growth than continuous or *ad hoc* feeding. We have compared the growth rate of *Crassostrea gigas* spat under different feeding regimes and the results are presented here.

Oyster spat were supplied by Seed Oysters (U.K.) Ltd., and the experiments carried out at the White

Fish Authority Shellfish Cultivation Unit, Brynsiencyn, Anglesey. In the first experiment, 100 000 spat were held in 350 and 450 litre tanks at a density of 60 spat per litre. In experiment 2, the density was reduced to 50 spat per litre and the tanks were changed around to eliminate differences in tank volume and design as experimental variables. At the start of the experiments the spat ranged in size from 1.5 to 1.8 mm and were approximately 40 days old. Filtered sea water was constantly recirculated through the tanks and changed every second day when the tanks were cleaned. The sea water temperature was kept at ambient room temperature and varied between 19° and 22°C.

The four feeding regimes were as follows:

Tank A, Fed once a day to give an algal cell count of 120 cells/μl.

Tank B, Fed continuously (drip feed) to give the same total quantity of algal cells per day as Tank A.

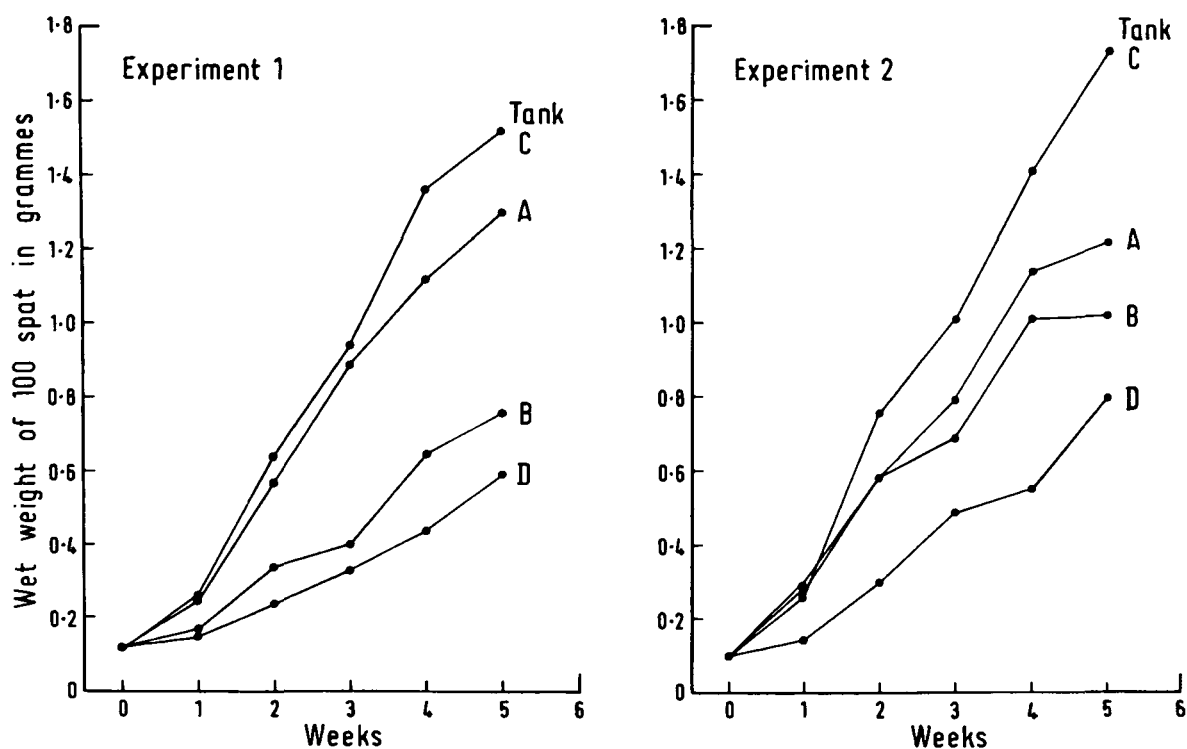


Figure 1. Wet weight increase of *Crassostrea gigas* spat under different feeding regimes. For details see text.

Tank C, Fed discontinuously with a 6 hour ON and 6 hour OFF regime to give the same total quantity of algal cells per day as Tank A.

Tank D, Fed discontinuously with the same feeding regime as Tank C but with half the quantity of algal cells per day compared with Tanks A, B and C.

All the tanks received the same algal culture consisting of a mixture of 5 flagellate and three diatom species.

At weekly intervals 100 spat were taken at random from each of the experimental tanks, dried on filter paper, and the wet weight determined (Fig. 1). In both experiments, the spat that were fed discontinuously at the high food level showed the greatest increase in wet weight. Addition of food once a day gave an increase in wet weight intermediate between that of the discontinuous and continuous feeding regimes. The spat which were fed discontinuously but with only half the food provided for the other groups grew least well.

The importance of an adequate food supply for spat growth has long been recognised, but actual feeding methods have generally been chosen for convenience rather than for any other reason (Loosanoff and Davis, 1963; Walne, 1966). The possibility that

programmed feeding regimes could be advantageous has been overlooked since adult bivalves are generally considered to be continuous feeders (Purchon, 1971). Why discontinuous feeding gives better growth is not fully understood but it may be a result of metabolic adaptation to the feeding regime.

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A multichannel approach to monitor sea surface temperature from space along the NW Coast of Africa

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Shenk and Salomonson (1972) used data from the Medium Resolution Infrared Radiometer (MRIR) to establish a multispectral method for sea surface temperature measurements. This method allows one to consider and correct for attenuation of electromagnetic radiation by clouds, aerosols and extreme conditions in the distribution of water vapour in the atmosphere. In the following analysis the technique was used to test the application over the Northwest Coast of Africa.

To test for cloud-free conditions, the solar reflected energy between 0.2 and 4.0 μm was used from one channel of the MRIR. The normalized reflectance $F = \pi \bar{N} / (\bar{H}^* \cos \sigma^*)$, where \bar{H}^* is the effective solar constant, \bar{N} is the effective radiance, and σ^* is the solar zenith angle) was used to establish a threshold level of $F = 8$ for a cloudfree ocean surface. This allows one to sample the radiation over cloud-free areas in the lower and middle troposphere.

Measurements in the spectral region between 6.4 and 6.9 μm indicated upper troposphere high radiation was recorded. By accepting only the window measurements between 6 and 11 μm which passed the threshold sets of the two channels, a mercator grid print map was generated.

Table 1. Comparisons between blackbody temperature and actual sea surface temperature, Nimbus 3, 1969

Area	Date	No. of Measurements	Means, °C		
			T_{BB}	T_{SS}	ΔT
Gulf Stream	6 May	22	18.9°	22.9°	4.0°
Gulf stream	14 August	12	21.3°	25.6°	4.3°
Mediterranean Sea	2 July through 27 August	6	22.3°	26.1°	3.8°

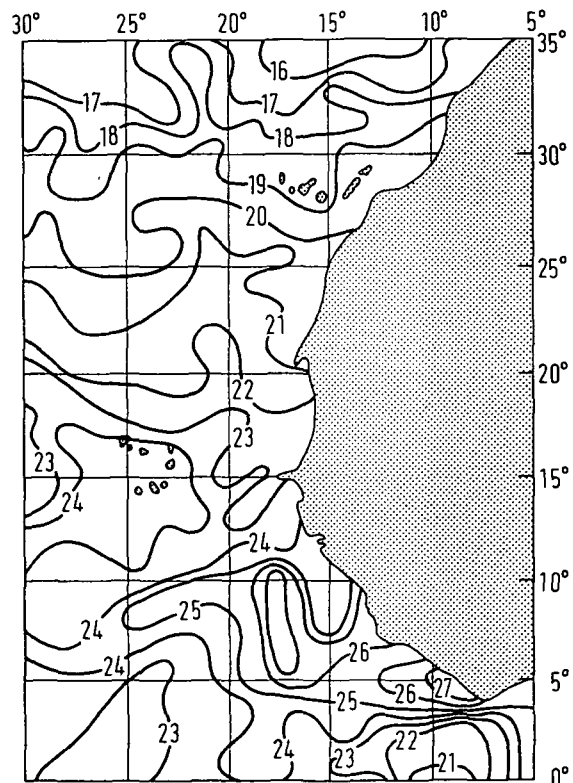


Figure 1. Temperature distribution (°C) in July 1969.

A correction for the absorption of energy by gases has still to be considered. This correction can be done empirically with ship measurements. Comparisons between blackbody temperature over cloud-free areas and actual ship measurements in the Gulf Stream and in the Mediterranean Sea are shown in Table 1.