EDIBLE OYSTERS - BASICS OF FARMING AND ITS WEALTH IN HEALTH BENEFITS

B. Jenni, K. S. Muhamed, V. Kripa, P.S.
Alloycious and K. M. Justin Joy
ICAR-Central Marine Fisheries Research Institute
Post Box No. 1603, Ernakulam North P.O.,Kochi-682 018.

Overview

Oysters, "Janitors" in the aquatic ecosystem is also a palatine food. This bivalve mollusc is protected by two calcareous shells,rich in calcium carbonate and strontium. The animal is attached to the hard substratum with the cementing material produced by the animal itself.

Globally, China the lead producer of oysters (Crassostrea spp. 3948817 metric tonnes, FAO 2014).In India its popularity is so limited but in the beginning of 20thcentury the scenario has changed due to the implementation and commercialization of oyster farming in the country by Central Marine Fisheries Research Institute (CMFRI) through a World Bank aided NAIP project. Its collateral efforts with State Fisheries make this farming a popular and profitable aquaculture practice along the coastal States of India especially in Kerala and Maharashtra.

In India Crassostreamadrasensis, the major species contributing to the fisheries and its commercial production was started in Ashtamudi Lake in Kerala (1995). The initial production was 2 tonnes but now the production has reached 4045 tonnes (2016).

Farming methods

They are broadly grouped as bottom (on bottom) culture and

off-bottom culture. Raft, rack, long-line and stake are used in the various off-bottom culture practices. In India, rack and ren method is the popularized technology in estuaries. The off-bottom culture methods are advantageous over the bottom culture in the following respects.

1. Relatively rapid growth and good meat yield
2. Facilitate three-dimensional utilization of the culture area
3. The biological functions of the oyster such as filtration feeding etc. are carried out independent of the tidal flow
4. Silting and predatory problems are negligible
5. Metal and bacterial accumulation is less

Culture technology and economics

Edible oyster culture is a very simple technology, which can be easily practiced. There are a few critical factors (such as seed collection and harvesting period) which are governed by the biology of the species which affect the profit of the farming operations. The farmer can easily understand these aspects by observation and practice. In India the proved oyster farming is rack and ren method in estuaries and backwaters. The investment details are given in Table 1.

Table 1: Economics for a model oyster farm

Economics for a model oyster farm for 3 years

Farming method - Rack
Water body - Estuary
Oyster farm - 5 m X 5 m
No. of ren - 300
Duration - 7 months

I. Fixed cost (Material cost)				
Sl.no	Item	Qty	Rate	Total
		Kg / nos	(Rs)	(Rs)
1	Bamboo poles	19	350	6650
2	Rope (for farm construction) 3mm	2	280	560
3	Rope (for ren making) 3mm	6	280	1680
	Total			8890
	Depreciation 33%			2934
II. Recurring cost				
1	Cost of shells for ren making	1500	1	1500
2	Ren making charges	300	5	1500
3	Farm construction charges	3	1250	3750
4	Installation of spat settler	300	5	1500
5	Labour charges for harvest	6	1000	6000
6	Cannoe hire charge	5	300	1500
7	Depuration charge	1440	10	14400
8	Shell on (Single oyster de-clumping)	1500	1	1500
	Total			31650
III. Marketing expense (shucked meat)				
1	Shucking charge	67	75	5025
2	Marketing charges for shucked meat	67	25	1675
3	Fuel charge (LPG)	1	2700	2700
	Total			9400
	Total input cost =I + II + III =2934 + 33150 + 9540 = 45624			
IV. Total yield				
	Shell on	4.8 kg / ren	300 ren	1440kg
	Single oyster	5nos/ ren	300 ren	1500 nos
	Meat * 5.2% of 1290 kg**(67kg)			
V. Gross revenue				
	Single oyster	1500	30	45000
	Heat shucked meat	67	500	33500
	Total			78500

NET PROFIT 78,500 - 45,624 = 32,876

* Meat percentage may vary according to the waterbody and climatic variations

* *After deducting single oyster weight

Seed Collection

Oyster seed are collected from estuaries by placing suitable collectors called cultch in the water column at appropriate period. During spawning seasons the spat collectors are suspended from racks.

How to prepare a cultch?

Cultch is the term used for spat / seed collector. For suspended method of oyster culture cutch made of oyster shells have been found to be ideal. Empty oyster shells are cleaned manually to remove the foulers and then washed to remove silt. A small hole is made on the shell and these are strung on 3mm dia nylon rope with a spacing of 15 to 20 cm between each shell (5 shells per meter rope). Such strings are called ren. The spaced rens can be used as such for grow out system. For seed collection purposes the shells are strung continuously without spacers (10 to 15 shells per meter) and after the attachment of seed they shells can be removed and restrung at the rate of 5 shells per meter which is the ideal density for grow out.

If the oysters are to be grown by the tray method then empty shells or lime coated tiles can be placed in the trays for seed collection. Lime coated tiles gave encouraging results and on a single tile, as many as 120 larvae are known to settle.

When to place the cultch for seed collection?

One of the main factors that determine the success of the farming operation is the period when the clutches are placed for seed collection. If they are laid in advance of spatfall, they may be covered with silt or settlement of foulers , making them unsuitable for the oyster larvae to settle. The larval period in C. madrasensis is 15-20 days. The ideal time for laying the spat collectors in the

water is about 7 -10 days after peak spawning (as determined by gonad examination and abundance of early larval stages in the plankton). Strong currents interfere with larval settlement and may result in poor spat collection. The water quality parameters for oyster farming are given in the following table (Table 2).

Live consumption

As an excellent appetizer and to know the salty taste of oysters—you'll need to open them up by shucking the "depurated" oysters (use a thick towel and oyster shucking knife).

Depuration

The process of expelling contaminants from gills and guts

Water quality indices	Desired level
Physical	
Temperature	25-34˚C
Transparency	50 -150 cm
Chemical	
Salinity	15 -38 psu
pH	6.5 - 8.5
DO	5-10 mgL-1
Total ammonia	0.01 – 0.1 mgL-1
Nitrite	<0.5 mgL-1
Nitrate	0.1 – 3 mgL-1
Phosphate	0.05 – 0.5 mgL-1
Biological	
GPP	0.5 - 3mgCL-1
NPP	1 – 2.5 mgL-1
BOD	2 -5 mgL-1
Chlorophyll	10 – 15 mgL-1
Seston / TPM	25- 30 mgL-1

Table 2: Criteria for site selection

of oysters by providing them with good purified seawater before they are used for consumption is called depuration.

Why oysters are so good for US ?

"Milk of the Ocean"

Oystersare rich in protein, lipids, carbohydrates, minerals (calcium, **iron**,copper,zinc, phosphorus) and vitamins (A,D,C,D&K) (Table 3). Oyster diet will increase your intelligence and learning abilities if introduced in childhood.

Brain food and Happy mood

They are good sources of Vitamin B 12, Omega 3 fats, iron and zinc, which boost memory and brain functioning. Proteins in oysters are high in tyrosine, an amino acid that is used by the brain to help in regulating mood and adapting to stress.

Dementia or alzheimers

Zn reduce age related mascular degeneration, and increase immunity (more in oysters)

Bone Health

The high level of calcium, phosphorus, **zinc**, iron, copper and **selenium** all contribute in their own way to increasing bone mineral density and durability, thereby protecting from developing conditions like osteoporosis.

Wound Healing and Immunity

High levels of zinc in oysters can give us quick **wound healing** and a **strong immune system**

Heart Health

Omega-3 fatty acids reduce the chances of plaque accumulation thereby reducing the risk of arteriosclerosis. The **potassium and magnesium** content of oysters help in **lowering blood pressure** by relaxing the blood vessels. A rich natural source of zinc, maintaining sense of taste and smell and inhibiting the abnormal clotting that contributes to cardiovascular disease.

Blood Circulation

Rich in **iron,** which is a key component of haemoglobin that carries oxygen to the cells. A steady supply of oxygen makes the various organ systems function efficiently and **boosts the overall metabolic rate** of the body.

Do you want to become a Casanova / Cleopatra

Oysters are rich in amino acid and zinc they are known as aphrodisiacs for triggering increased level of sex hormones, testosterone and estrogen.

Glowing skin

Including oysters in your diet helps maintaining collagen levels in the skin. This enables the skin to retain its elasticity and firmness and delay the onset of wrinkles.

Food for all

Oysters are low in fat, cholesterol and calories and can thus be enjoyed by everyone, if consumed in moderation.

Table 3.Nutritional facts(Source:http;//nutritiondata.self.com)

Serving size 25g	
Calories	40.8
Nutrition facts	
Carbohydrates	
Total Carbohydrates	2.5 g
Fats and fatty acids	
Total Fat	1.1 g
Saturated fat	0.3 g
Monounsaturated fat	0.2 g
Polyunsaturated fat	0.4 g
Omega -3- fatty acids	370mg
Omega -6- fatty acids	16.0 mg
Protein and aminoacids	

Protein	4.7
Vitamins	
Vitamin A	122 IU
Vitamin C	3.2 mg
Vitamin E	0.2 mg
Riboflavin	0.1 mg
Niacin	0.9 mg
Folate	3.7 mcg
Vitamin B12	7.2 mcg
Pantothenic acid	0.2 mg
Minerals	
Calcium	4.0 mg
Iron	2.3 mg
Magnesium	11.0 mg
Manganese	0.3 mg
Phosphorus	60.8 mg
Potassium	75.5 mg
Sodium	53.0 mg
Zinc	8.3 mg
Selenium	38.5 mcg
Sterols	
Cholesterol	25 mg
Others	
Water	16.0 g
Ash	0.6 g

"Let your food be your medicine" — Hippocrates