

Health Management Concepts in Lobster Mariculture

K.K. Vijayan, N.K. Sanil and Krupesh Sharma

*Fish Health Section, Marine Biotechnology Division
Central Marine Fisheries Research Institute, Cochin-682018*

Lobsters are considered as highly priced delicacies and command high prices in the domestic and export markets. Lobster fishery which remained as subsistence fishery till the sixties has now flourished into a commercial activity earning valuable foreign exchange for the country. Of the 25 species reported from the Indian coasts, 6 are known to have commercial importance and include *Panulirus homarus*, *P. polyphagus*, *P. ornatus*, *Puerulus sewelli* and *Thenus orientalis*.

Though shrimps followed by crabs have been dominating the marine crustacean farming during the past decade, recent trends indicate that lobsters hold the potential to be a successful candidate for mariculture. Our country has earned Rs. 71.56 crores through export of lobster alone, mostly to Southeast Asian countries during 2005-06. CMFRI has successfully demonstrated the breeding of spiny lobsters and sand lobsters, and further R&D may eventually lead to the hatchery production of baby lobsters and mariculture of lobsters. As in the case of crab farming, lobsters can either be "farmed" or "fattened". Farming is essentially a grow-out operation in which the juveniles are grown for several months until they attain marketable size. Fattening, on the other hand, refers to short duration culture of undersized lobsters to a specific acceptable size and hence command better price. In India, lobster farming is in its beginning stage and states like Kerala, Tamil Nadu, Maharashtra and Gujarat have immense potential for lobster farming. Presently though not in a large scale, lobster fattening is slowly picking up in the country. Asian countries like Vietnam and Philippines are the forerunners in lobster farming. But controlled, closed-cycle farming systems have their own advantages and disadvantages (especially related to technology and production methods). Cage farming is another option to be explored but this also have several problems especially related to economic profitability such as cannibalism, lack of high quality dry feed, high labour and investment costs.

The term 'health' in an animal describes the state in which all the physiological processes are functioning normally. Any impairment that interferes with the performance of normal functions including responses to environmental factors, toxicants, climate, nutrition, infectious agents etc. can be termed a disease. Diseases can be caused by a variety of factors, the most important being pathogens, while the others include stress, environmental/water quality, physical agents, nutritional imbalance, toxins etc. or a combination of these. Pathogens are always present in the environment and a delicate balance exists between the host, pathogen and environment and any change in this equilibrium may lead to increasing or decreasing levels of disease. The effect of disease on animals is variable and range from morbidity/reduced production in some cases to heavy mortalities.

Lobster rearing systems, viz., breeding, larval rearing and fattening are always prone to disease occurrence due to various biotic and abiotic factors. Since disease in aquaculture conditions is largely a management problem, the saying 'prevention is better than cure' is very important. Thus for tackling any disease condition, the first step is the correct diagnosis of the problem at the right time followed by suitable treatment and management schedules.

When we talk about diseases, there are two broad categories - infectious and non-infectious diseases. Infectious diseases are those caused by pathogenic organisms. Commonly encountered diseases affecting lobsters are infections caused by opportunist viruses, bacteria, and parasites. They multiply in vast numbers, causing massive damage to the organism by depriving it of life-essential substances and/or by producing toxic substances and most of them can be cured by medications. In contrast, non-infectious diseases are caused by environmental problems, nutritional deficiencies, or genetic anomalies; they are not contagious and usually cannot be cured by medications.

Based on their nature, diseases can be classified into acute and chronic. In acute diseases, the process of disease development starts with the contact with the pathogen, which infiltrates into the body, proliferates, becomes systemic, starts exhibiting symptoms and finally if the host is not able to fight the disease, leads to the death of the animal. Chronic infections develop slowly, may or may not show symptoms, may remain in the body for a prolonged period serving as a reservoir/carrier and are difficult to cure. Normally healthy animals have the natural ability to defend themselves against infections and a strong immunity/host resistance prevents the pathogen from establishing. Stress, which is a major factor in culture conditions, slows down the immune system making the fish weak and unable to defend itself, leading to diseases. In order to avoid disease outbreaks it is essential that stock health is optimised within the economic constraints of the production or holding system. Under most rearing

and holding conditions lobsters are exposed to various forms of environmental stressors, e.g. crowding and confinement, adverse water quality, handling and grading procedures, which have the potential to affect health and well designed and maintained rearing systems hold the key for successful culture and production. As in any other aquaculture venture, in lobster farming also health management should be holistic in nature.

In India lobster farming is in its infancy and hence limited information is available on the diseases and pathogens encountered in lobsters in our country. Other than bacterial shell diseases, the only major disease reported in lobster from India is a case of 'suspected gaffekemia'. The major diseases encountered in lobsters are:

Gaffkemia

Gaffkemia or Red tail disease is caused by the bacterial pathogen *Aerococcus viridans* var *homari* (= *Gaffkya homari*). It is one of the most economically important infectious diseases of impounded American lobsters leading to significant harvest losses. In some species of lobsters, a high natural prevalence of infection could lead to an epizootic during live-storage of captive lobsters. The pathogen usually enter into the lobster body through puncture wounds or lesions and the infection results in a decrease in haemocyte counts and increase in haemolymph clotting time leading to fatal septicemic condition. Temporary reduction in mortality rate may be obtained by lowering temperature, which reduces the proliferation rate of the bacterium. Wounding and crowded conditions should be avoided and proper husbandry and system hygiene should be maintained.

Ciliate disease of lobsters

Caused by a holotrich ciliate, *Anophryoides*, an opportunistic parasite, which attaches to and destroys haemocytes, sometimes causing mortality.

Paramoebiasis

Caused by parasites of the genus *Paramoeba*; under stressful environmental conditions can lead to high mortalities.

Microsporidiosis

Caused by various microsporidian parasites. Spores occur in the muscle fibres causing the muscle to appear "milky" or "cooked" in living specimens.

Dinoflagellate blood disease

Caused by *Hematodinium*-like parasitic dinoflagellates in the haemolymph. Most major organs and tissues appear to be invaded before the parasite enters the haemolymph in high numbers leading to death.

Juvenile lobster vibriosis

Caused by *Vibrio anguillarum* and other *Vibrio* sp. which are ubiquitous in stressful culture conditions and are often lethal.

Shell disease, Chitinolytic bacterial disease, Epizootic shell disease

Caused by various bacteria including species from the genera *Pseudomonas*, *Vibrio*, *Beneckea* and *Flavobacteriaceae*. Infection results in pitted, eroded, and melanised exoskeleton at the site of infection. Although mild and medium levels of the disease are not lethal, severe cases result in mortality. Disfiguration of the cuticle reduces market value.

Gregarine parasites

Caused by the gregarines of the genus *Porospora* and infects the wall of the intestine but does not cause any serious pathology.

Lagenidium disease

Caused by the fungus *Lagenidium* sp.; penetrates and fills larvae with mycelia giving a white, opaque appearance and is usually lethal. Usually considered related to poor husbandry and can be prevented by better sanitation.

Burn spot disease of juvenile lobsters

Caused by *Fusarium* sp. resulting in black spots on exoskeleton and brownish discoloration of the gills in larvae/juveniles and is due to poor husbandry practices.

Haliphthoros fungus disease

Infiltration of the exoskeleton of post larvae by mycelia causing extensive damage and melanisation, causing mortality.

Epibiont fouling

Persistent low level mortalities of juvenile lobsters have been reported in rearing systems associated with moderate to heavy growth of epibionts and *Leucothrix*-like bacteria.

Parasitic copepods

Attaches to gill filaments and feed on the haemolymph.

Infections with the larval forms of nematodes, trematodes and acanthocephalans and Nemertean worms feeding on lobster eggs are also reported.

The lessons learnt from the collapse of the prawn culture in India points to the need for a pro-active approach for the successful management of diseases in lobsters. This has to be a holistic approach, aimed at the prevention of the diseases rather than control and treatment.