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SEAFDEC "Better life through aquaculture"

MICROBIAL DISEASES OF PRAWNS

Microbial diseases are caused by viruses, bacteria, fungi, and protozoans. The viruses that have been recognized in **Penaeus monodon** so far are the monodon baculovirus (MBV), the infectious hypodermal and hematopoietech necrosis virus (INHHNV), and the hepatopancreatic parvo-like virus (HPV). IHHNV is believed to have come to the Philippines through the introduction of contaminated live **P. stylirostris** or **P. vannamei** from South or Central American countries. They have caused 70-90% cumulative mortalities in prawns (post-larvae to adults). Viral diseases may be controlled through avoidance, sanitation, proper nutrition, absolute quarantine, and when already present, through eradication.

Pathogenic bacteria may also attack prawns. The most serious disease at present is the luminous bacterial disease caused by **Vibrio harveyi** and **V. splendidus.** Affected prawns (larvae to post-larvae) and luminescent in the dark and often suffer heavy mortalities. The disease may be prevented by disinfection of rearing water with chlorine, elimination of sediments and waste materials on tank bottom, and more frequent water change. Screeing of drugs for treatment of the disease is being undertaken at SEAFDEC AQD. So far some nitrofurans have proven to be quite effective under laboratory conditions. Other bacterial diseases of prawn are the filamentous bacterial disease and the shell disease. The filamentous bacteria **(Leucothrix)** may be found on the external surfaces of the prawn and thrive in waters rich in organic and in-organic substances. The **Vibrio** and **Aeromonas** species found on the eroded areas of the shell of juveniles and adults are also present in sea water and could be secondary invaders after physical trauma of the shell and underlying membranes.

The most important fungal disease of prawn is larval mycosis caused by **Lagenidium** spp., **Haliphthoros philippinensis,** and **Sirolpidium** sp. These fungi may replace the internal tissues of the prawn and may cause 100% mortalities within 2 days. Chemical prophylaxis includes disinfection of spawners with Treflan R (5 ppm for 1 h) or eggs with Tide (20 ppm for 2 h) while chemo-therapy consists of Treflan R or Trifluralin baths at 0.2 ppm for 24 h.

Protozoans that invade prawns include the ciliates **Zoothamnium, Vorticella, Epistylis, Ephelota,** and **Acineta** which, when present in large numbers on the prawn shell and gills, may cause respiratory and locomotory difficulties and may form a fuzzy mat on the shell. Ciliate infestation may be controlled by avoiding heavy sutation, high nutrient load, turbidity, and low oxygen tension. Endoparasites include gregarines which may interfere with particle filtration in the digestive tract of larvae and microsporidia which may cause ovaries and, consequently, parasitic castration among female prawns.

Source: Lecture Notes of Ma. Cecilia L. Baticados, Head, Fish Health Section, SEAFDEC AQD, 1988.

NUTRITIONAL, TOXIC, AND ENVIRONMENTAL DISEASES OF PRAWNS

Pond-grown prawns are more often subject to nutritional, toxic, and environmental diseases than are the younger stages in hatchery-nursery systems.

The chronic soft-shell syndrome may be due to nutritional deficiency (inadequate amounts of food or nutrient, e.g., Ca and P), pesticide contamination (e.g., with Aquatin and Gusathion A), and poor pond water soil conditions (e.g., when soil ph >6, water phosphate <1 ppm and organic matter content of the soil $<$ 7% occur **together**). The disease could be controlled through environmental and dietary manipulation.

The red disease (prawns become reddish) affects juveniles to adults and is believed to be due to microbial toxins (mycotoxins) in rancid or spoiled diets or in detritus of ponds rich in organic matter.

The blue disease (prawns become bluish) is possibly due to nutritional deficiency (e.g., low levels of the carotenoid astaxanthin in the diet) or an environmental factor (poor soil-water quality). It may be controlled by reducing the stocking density, giving high quality food, and changing pond water more frequently.

Cramped tails or body cramp, the rigid flexure of the abdomen, is due to temperature shock, e.g., handling of prawns in air warmer than the culture water. Muscle necrosis is also closely associated with poor environmental conditions like overcrowding, low oxygen levels, severe gill fouling, and salinity or temperature shock. It is characterized by white opaque areas in the abdomen. The distal portion of the abdomen may become infected and turn into the more commonly observed "tail rot."

Heavy metal poisoning, e.g., by cadmium and copper, could result in morphological deformities, damage in gill tissues, and mortalities. The adverse effects of the poisoning may be minimized by immediate water change.

The black gill disease is actually a condition that accompanies many disease syndromes in pond-grown prawns, e.g., microbial infections nutritional deficiency, exposure to toxic substances, and heavy siltation. The gills become reddish, brownish to black, and mortalities may occur due to respiratory difficulties.

Source: Lecture Notes of Ma. Cecilia L. Baticados, Head, Fish Health Section, SEAFDEC AQD, 1988.

PRAWN DISEASE CONTROL PROGRAM

The most critical step in disease control is correct diagnosis. Once the diseases are known, control programs must emphasize: (1) Stress management, (2) Control of transfers and introductions, and (3) Chemotherapy.

Stress management is geared towards cutting the pathway of the disease agent to the prawn and increasing the resistance of the prawn to diseases. These may be attained through (1) Nutrition research and feed development, (2) Proper design and construction of culture systems, (3) Stocking density standardization, and (4) Determination of water quality standards for culture systems.

Transfers and introductions of different stages and species of prawn must be controlled by a set of rules and regulations to reduce the risk of transferring pathogens from one place to another or from an imported species to a native species. The most dramatic of these is the world wide transfer of a viral pathogen of penaeid shrimps.

Chemotherapy must be the last resort in disease control, primarily because of the danger of developing strains of bacteria resistant to the drugs being used. Most of the drugs available in the market are also used in human diseases and have not been actually tested on prawns under local conditions. Other considerations include the tolerance of the prawn to the chemical, efficiency of the chemical, economics, and limitations on the use of drugs to treat animals cultured for food.

Source: Lecture Notes of Ma. Cecilia L. Baticados, Head, Fish Health Section, SEAFDEC AQD, 1988.

TIPS ON PRAWN DIET PREPARATION

1. Before you prepare prawn diets, it is wise to seek the advice of an expert or someone who has already prepared diets successfully. Researchers at the SEAFDEC Aquaculture Department, especially those directly involved in feed development and pond culture, are ready to assist you.

2. Most of the ingredients for prawn diets are available from any poultry store. Be sure, however, that they are fresh, dry, and of good quality when you buy them.

3. Do not use moist or rancid ingredients, especially rice bran, cod liver oil and flour. Molds easily develop and produce aflatoxin, a substance causing cancer, which can cause mass mortality of prawns in your pond.

4. For vitamin and mineral mixes, you can use the commercial poultry mixes from any poultry store but add around 0.5% to 1% Vitamin C if it is not included in the vitamin mix.

5. Feed millers can also be requested to help you. You can ask them to prepare your vitamin and mineral mixes. This is more practical than mixing these yourself. However, feed millers may not accept orders of less than 10 kg of vitamin-mineral mix. You may pool together some prawn producers in your area and make a joint order so all of you will have these important ingredients anytime you need them. The vitamin mix can be stored for up to one month if kept in a cool, dry place. Mineral mixes can be kept for several months. Store vitamin and mineral mixes in tightly covered containers.

6. Shrimp meal and other crustacean meals contain astaxanthin that gives the bright reddish orange color to cooked prawns.

7. If you use full fat soybean meal, do not give it raw. It should be heat-treated at 170^{o}C for 10 minutes before mixing it with other ingredients.

8. Store extra ingredients in a cool, clean, and dry place. Seal and label each container properly.

9. It is practical to produce not less than 10 kilograms of pellets to save on time and effort in preparation.

10. Attend aquaculture seminars or workshops conducted by SEAFDEC AQD to keep abreast of the latest findings in prawn production and feed development.

Source: Lecture Notes of Dr. Felicitas P. Pascual, Head, Farming Systems Section, SEAFDEC AQD, 1987.

RINSING OF PENAEID EGGS

A number of techniques are routinely used to improve the hatchability of spawned penaeid eggs. These include such pre-spawning measures as improving water quality by filtration, using antibiotics, adjusting temperature and salinity in spawning tanks to the same level as maturation tanks, disinfecting pre-spawning females (e.g. with 400 ppm formalin for 10 minutes), maintaining low lighting, and proper aeration (low before spawning, moderate after).

After spawning, problems may arise (depending on the volume of the spawning tank and the use of water exchange) with deteriorating water quality and bacterial growth on eggs.

Although some groups have suggested dipping eggs in disinfectant solutions such as iodine or treating them with antibiotics, a simple rinse in clean sea water is effective enough in reducing surface bacteria.

Penaeid eggs are protected by a tough hatching membrane and can be safely rinsed on a submerged filter screen. If the same procedure were used on nauplii, it might break setae and invite infection.

Source: COASTAL AQUACULTURE, Texas Agricultural Extension Service, Texas A&M Sea Grant College Program, January 1988.

GUIDELINES FOR THE CONVERSION OF MANGROVES TO PONDS

The following general guidelines could be followed in converting mangroves to fishponds:

1. Wherever possible, first consideration should be given to areas which had been reclaimed for some other purpose (e.g., agriculture), but now abandoned or underutilized. It is rational to use such reclaimed areas for pond culture before embarking on further conversion of existing mangrove forest.

2. Should the use of existing mangroves be inevitable, the ponds should be sited on the landward side of the mangroves, and filled by pumping. The seaward portion of the retained mangrove forest will serve as a shelter, nursery, and reproductive site for coastal capture fisheries while also acting as a natural buffer against coastal erosion. This part of the mangrove can also be managed for forestry on sustained yield basis.

3. Where pond installations have to be constructed in the mangrove forest proper, the least productive areas with trees of poor growth or of uneconomical species should be utilized. In this way, the more productive areas are retained for forestry management use.

4. To maintain the ecological balance, large-scale clearing of mangroves adjoining the mouths of river systems is discouraged. Similarly, mangrove islands should not be converted as they are needed for conserving coastal wildlife and fishery resources.

In pond construction, additional care should be taken to reduce further damage or detrimental effects on the adjacent mangrove area. Adequate buffer zones should be retained between the pond edge and the coast or river's edge to prevent erosion and also to act as a windbreaker. There should be little disruption as possible to stream-flow and freshwater runoff so as to retain the integrity and function of the adjacent mangrove system as much as possible. The conversion of large tracts of a highly localized area should be discouraged so as to guard excessive changes in environmental conditions like temperatures and evaporation rates.

Postlarval shrimp fry used for stocking the ponds should be obtained from hatcheries and not from natural environmental. In this way, the overall output of the mangrove system will be maximized. In the meantime it is important that research be stepped up to look into the various aspects of shrimp aquaculture to increase its viability. An emphasis on research into mangrove-aquaculture interaction is also desirable.

Source: "Mangroves & Aquaculture - Striking a Balance" by Tarlochan Singh. Infofish International, September-October 1987.

THE LOWLY SEAWEED: AN ATTRACTIVE PROPOSITION

Restaurateurs specializing in haute seafood swear that many wealthy matrons and socialites today go for raw seaweed, especially the type the Samals and the Cebuanos call "latu," both for aesthetic and gastronomic reasons.

Semi-processed seaweeds, chips, and powder are fast emerging as major export items because of their tested industrial uses. Most beauty aids, costly fabrics, and preserved food items procured from posh shopping centers' are processed with applications of seaweed colloids, a by-product of Eucheuma, a high grade seaweed. Ironically, the Philippines, ideally suited for seaweeds culture because of its vast shoreline has yet to fully appreciate the seaweed's great potentials as an export commodity. In fact, it is the country's seemingly endless shoreline that should make it a major supplier of semi-processed seaweeds. At this stage, the seaweed products that have made it to the export market are washed and dried seaweeds, and alkali-treated chips or powder.

Large manufacturers of pharmaceuticals which use up large quantities of seaweed colloids are almost oblivious of its only source -- the raw seaweeds which can be conveniently cultured here. These manufacturers of pharmaceuticals should take the lead in establishing seaweed processing plants, only to produce their own raw material requirements but more importantly, to enhance its production for export.

The raw Eucheuma seaweed is categorized in trading channels according to its gel strength and quality unadulterated by foreign materials such as straw nylon and other marine growth.

To cut down on freight costs for semi- processed seaweed colloids, the moisture content should be fixed at a low 30 percent. To enhance the quality of the product, particularly for export, attempts had been made to pre-treat seaweeds right at the farm level. But these attempts have yet to progress beyond laboratory experiments.

Unbelievably, the exact technical requirements and technology inputs for the manufacture of seaweed colloids remain a closely guarded secret of the world's leading manufacturers. Prospective developers agree that the lack of expertise and production cost estimates continue to stand in the way of its effective marketing by local producers.

Those in the know contend that government should pave the way for possible joint ventures with foreign manufacturers for the development of natural colloids or finished seaweed products.

Meanwhile, the seaweed industry awaits a more vigorous promotional effort to draw investors' interest. The industry has plenty of room for foreign investors to sink sizable capital inputs into the various stages of development, from the culture stage to the exportable finished product. The dollar-earning potentials of the industry should make it a highly attractive proposition.

Source: Philippines Dispatch News Service, Fourth Week January 1988.

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CROCODILE CULTURE

Crocodile culture seems to be getting popular. It would not be far-off when crocodile meat dishes would be available in gourmet restaurants, and we are even threatened with croco-burger in the near future.

Crocodile farms fit in well with many types of fish culture as well as poultry or pig-farming since the waste produced, be it small fish or cast piglets, can be readily recycled as feed to the crocs. They are a lot easier to manage than fish, provided one keeps clear of the teeth, since apart from being on dry land, they only require feeding twice or thrice a week once they reach reasonable size.

Skins of full grown crocodiles sell for up to $300 each from the farm, and the meat may be worth up to $20 a kilo.

Source: FISH VET'S DIARY by Dr. Robert J. Roberts, Director, Institute of Aquaculture, University of Stirling, Scotland. Fish Farming International, Vol. XV, No. 2, February 1988.

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REMOVING OFF-FLAVOR OF TILAPIA

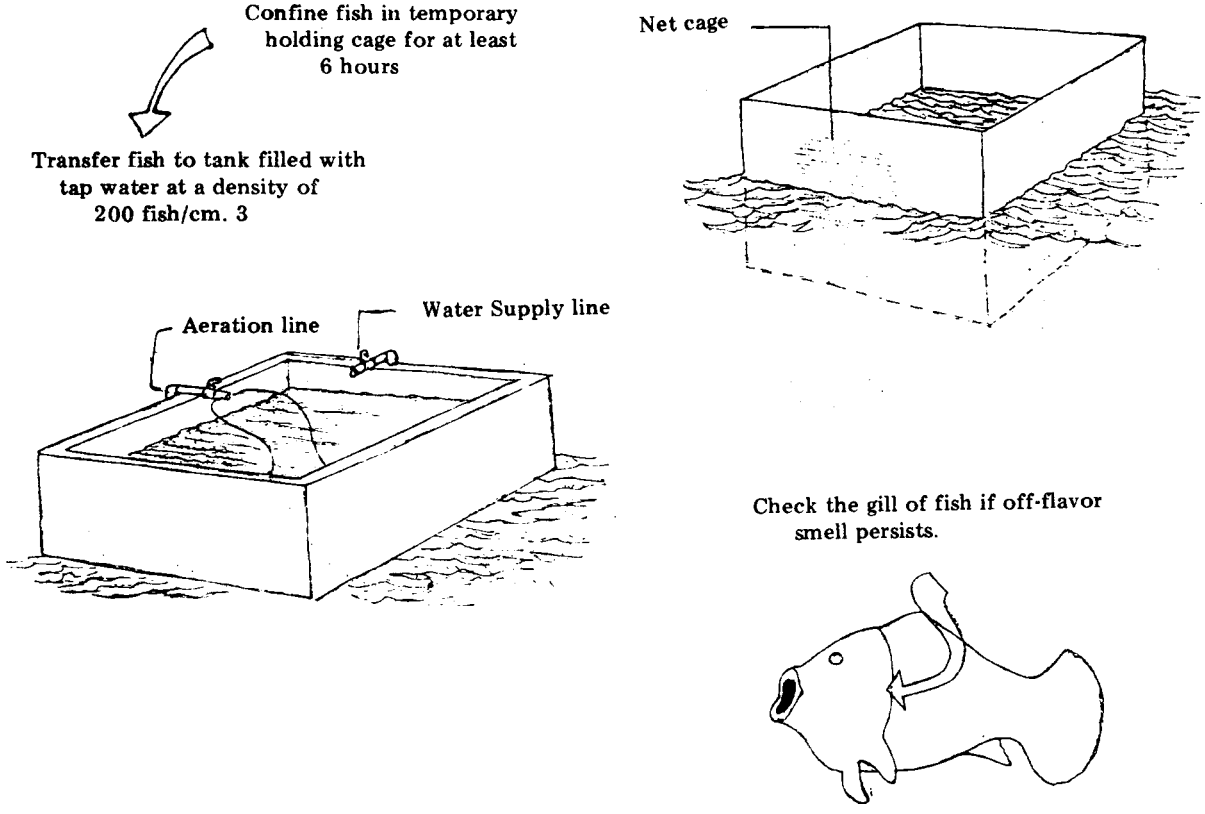
There are times when the fish flesh has a strong off-flavor - a taste and smell of algae or mud. This occurs when there is a bloom of "liya" or Microcystis aeruginosa, a phytoplankton in the lake. What exactly triggers this bloom is not yet known. To get rid of the off-flavor do the following:

1. Confine harvested fish in a temporary holding cage for at least 6 hours to induce fish to empty their stomach.

2. Transfer fish to a tank filled with clean tap or well water at a density of about 200 fish per cubic meter. Provide aeration (See Figure below.)

3. After 3 days, check the gills of a few fish if the off-flavor smell still persists. You may cook a few fish to sample the taste. Change water completely if off-flavor persists.

4. Repeat Step 3 until trace of off-flavor is completely removed. This process could take from 7 to 14 days.



Source: Tilapia Cage Farming in Lakes by A.M. Bautista SEAFDEC Aquaculture Tech. Module No. 1, 1985.

FREEZING OYSTERS

Occasionally you may find it necessary to freeze a surplus of oysters or mussels which have been purchased fresh. As the shape of the shells makes air exclusion difficult, "Glazing" is recommended. The task is simple: They should be placed on trays, frozen, then finely sprayed with cold, clean water and placed in the freezer.

To retain their flavor, thaw naturally - DO NOT wash or soak to "hurry" the process. Frozen shellfish will keep up to 3 months in the freezer. But remember the golden rule of freezer management - rotate the stock - first in, first out. And as with all seafoods, once defrosted DO NOT REFREEZE.

If mussels are purchased live, the following procedure is necessary to open them:

1. Refrigerate the mussels until ready for use.
2. Wash shells under cold running water by scrubbing with a stiff brush.
3. Place into a bowl of clean cold water.
4. Discard any that float; live mussels sink in the water.
5. If shells are slightly open, tap the outside; a live mussel will contract and close.
6. Pull out the "Beard" or byssus thread by which the mussel has been attached to a rope.

As most recipes using mussels call for them to be opened, they require precooking. They should be cooked in small batches in a large saucepan containing only 2.5 centimeter liquid. The liquid can be either water, white wine, or cider. The cleaned mussels should be placed on the boiling liquid and cooked rapidly for about 30 seconds - until the shells open. Remove them and drain while cooking the next batch. Repeat the process until required number are opened. Strain the cooking liquid and reserve for use in recipes if necessary.

Source: The Tasmanian Seafood Scene. Published by Tasmanian Fisheries Development Authority. No. 4, July-September 1982.

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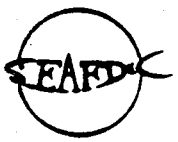

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