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On MBV and the shrimp postlarvae

Aquaculture Department, Southeast Asian Fisheries Development Center

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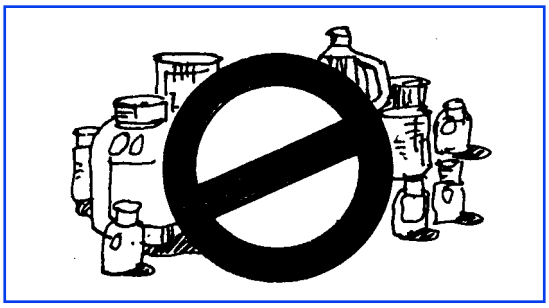


Drugs in Aquaculture

Using drugs in aquatic animals for both curative and preventive purposes may not only initiate environmental pollution but also affect human health due to drug residues. To protect human health, drug residues in marketed fish or shrimp are monitored in some major importing countries. Japan has begun such a monitoring program in seafood imports; the USA and European Economic Community may follow suit in the near future.

A withdrawal period is needed for complete removal of drug residues from the animal. This period can be determined according to the temperature of the water. Recommended withdrawal periods for various drugs are shown below.

Recommended withdrawal periods (number of days) for various drugs [*The Fish Inspector* (INFOFISH), Aug/Sep 1991, quoting *Asian Shrimp News,* ASCC, 1st Quarter '91, Issue 5.]

	Temperature (°C)		
	<12	12-22	>22
Oxytetracycline	60	40	15
Oxolinic acid	60	40	15
Furazolidone	40	20	10
Sulfamonomethoxine	60	30	15
Sulfadimethoxine	60	30	15
Neomycin	40	30	15
Nalidixic acid	40	20	10
Piromidic acid	40	20	10
Nifurpirinol	40	20	10

Source: **Naga, The ICLARM Quarterly**, October 1991.

On MBV and the Shrimp Postlarvae

Facts

1. Monodon baculovirus (MBV) is the most prevalent disease in hatchery-reared and pond-cultured shrimp (*Penaeus monodon*) in the Philippines which accounted for 67.1% of the 372 diagnostic cases examined from October 1989 to December 1990 at the DA-Bureau of Fisheries and Aquatic Resources. Of 9100 shrimp samples, 5085 (55.8%) were MBV-infected.

2. There is a high positive correlation between host age and incidence of MBV in hatchery-reared shrimp postlarvae (PL). This indicates that incidence of MBV increases with increasing age of host.

3. MBV is consistently diagnosed in all provinces every month. However, there is low correlation between occurrence of MBV and time (month). Therefore, MBV epizootics are basically hatchery and/or pond management related problems and do not specifically relate to certain geographical distribution or seasonal variations.

4. MBV is very resistant to chemical agents such as 150 ppm iodine, 10 ppm calcium hypochlorite at maximum exposure times of 6 and 8 h, respectively. Likewise, MBV is resistant to environmental parameters such as freshwater (0 ppt) and 37°C at maximum exposure time of 4 h. This resistance is probably due to the tough proteinaceous material (polyhedrin) of MBV occlusion bodies which act as a protective matrix.

Note: *Aqua Farm News,* Vol. VIII, No. 5, September-October 1990 featured *Disease Prevention in Shrimp Hatcheries.* Also, *Recommended Practices for Disease Prevention in Prawn and Shrimp Hatcheries,* an extension pamphlet, has been published by SEAFDEC/AQD. Write to: Sales/Circulation, SEAFDEC/AQD, P.O. Box 256, Iloilo City, Philippines 5000.

5. Direct sunlight exposure for 4 h completely inactivates MBV in infected hepatopancreatic tissues. MBV, being a virus of an aquatic species, might be far less resistant to drying and sunlight exposure when compared with other insect baculoviruses.

6. In pond culture, MBV infection results in low production. These observed differences in average body weight between MBV-negative and MBV-positive populations decreased as the stocking density decreased; hence, MBV infections may not be a problem in extensive culture where the stocking density ranges 1-2 shrimps/m^2.

7. Shrimp populations with MBV infections at stocking may harbor the virus throughout the whole culture period. However, the severity of infection (SOI) may decrease as the culture period increases. This decrease in SOI is probably due to the rapid regeneration of hepatopancreatic tissues in infected shrimps.

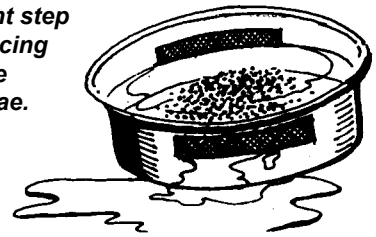
8. Transmission of MBV in hatchery reared shrimp larvae/PL can be by wild MBV-infected broodstock. During spawning, these infected broodstock may continuously shed tremendous quantities of MBV occlusion bodies and free virus via their feces before and during spawning. MBV-contaminated feces remained in the water until the eggs were hatched and may have infected the shrimps when they began feeding.

9. Production of MBV-free PL can be achieved by means of strategic egg prophylaxis as described below. The principle involved in this method is to eliminate all possible egg contaminants, including free MBV virus and occlusion bodies, by means of egg prophylaxis using iodine, benzalkonium chloride, calcium hypochlorite, or ozone-treated seawater.

Producing MBV-free postlarvae

Egg prophylaxis by washing and rinsing spawned eggs is the most important step towards the production of MBV-free shrimp PL. Regardless of the type of disinfected seawater used to wash the eggs, MBV-free postlarvae are produced up to PL-15. However, there exist significant differences among the types of disinfected seawater used in comparison to the hatching rate of the eggs and the survival rate in their larval and postlarval life stages.

Egg prophylaxis - washing spawned eggs - is the most important step in producing MBV-free postlarvae.



Overall, the eggs washed with ozone-disinfected seawater gave the highest survival rate of 67.6% in PL-7 animals. This high postlarval survival can be attributed to the substance itself, having a rapid rate of decay in the water with low level ozone residuals. Ozone residuals are believed to cause genetic damage to developing embryos and larval forms of marine species; hence, activated carbon filtration is recommended to eliminate ozone residue in ozonized seawater. On the contrary, the unwashed eggs exhibited the highest hatching rate, but gave the lowest survival rate of only 30.6% when the animals reached PL-7. This low survival rate can be attributed to microorganisms, such as bacteria and fungi, that may have attached to the eggs and may have infected the larvae after hatching. It can also be noted in the unwashed eggs that the average survival rate at Zoea-2 stage was 86% but abruptly dropped to 54% at Mysis-2. In contrast, eggs washed with ozone-treated seawater gave a relatively higher survival rate (89.3%) at Z-2 and gradually dropped to 78.5% at M-2 and 67.6% PL-7. Survival of the postlarvae (PL-7) hatched from eggs washed with ozonized seawater was more than twice the survival of PL-7 hatched from the unwashed eggs which was 30.6%.

Although ozonized seawater appeared to be the best disinfectant based on high egg hatching rate and larval/postlarval survival, its use in small and medium scale hatcheries would be a critical factor in terms of its capital and operational costs. Benzalkonium chloride-treated seawater gave the second highest hatching rate of 60.3% making it an alternative choice, especially in small scale hatch-

eries. Benzalkonium chloride is a quarternary ammonium compound used as a surface disinfectant, as a detergent, or as a topical antiseptic.

The iodine-disinfected and chlorinated seawater showed low hatching rates - 37.8% and 48.3%, respectively. One of the drawbacks of using chlorinated seawater was the neutralization process with sodium thiosulfate. In freshwater environments, sodium thiosulfate is non-toxic, but in seawater, 1 mg/l sodium thiosulfate has been shown to be toxic to larval penaeid shrimps.

Summary. Although the use of ozone-treated seawater gave the highest hatching and survival rates, the use of benzalkonium chloride-tested seawater appeared to be a better choice for medium and small-scale hatcheries due to high capital and operational costs of ozone generators.

Source: *The Epizootiology of Penaeus Monodon Baculovirus (MBV) in the Philippines* by Dr. Jose M. Natividad of DA-Bureau of Fisheries and Aquatic Resources. Paper presented at the **2nd Prawn Congress;** 23 Nov. 1991; Bacolod City.

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Alternative Farming Systems

"AQD's general objective is generation of technologies that (1) have no ecological effects, (2) give equitable benefits to end-users, and (3) are sustainable," SEAFDEC Aquaculture Department Chief Dr. Flor Lacanilao stressed in his opening remarks during the *Roundtable Discussion on 1992 Research Activities* held 23-24 January at Tigbauan, Iloilo.

As the three criteria characterize real development, the Chief noted, AQD will not support these two farming systems: intensive shrimp culture and milkfish pen and tilapia cage cultures in Laguna Lake. These two systems he termed "wrong development [concepts] for the country" and which he criticized as:

	Intensive shrimp culture	Milkfish pen culture and tilapia cage culture in Laguna Lake
1. Ecological effects	Antibiotics pollution; development of drug-resistant pathogens	Reduction of natural food in surrounding waters; pollution
2. Social consequences (unequal benefits)	Endangers public health	Reduced catch of small fishermen
3. Sustainability	Stopped by low prices	Stopped by pollution, social unrest

AQD will hence gear its R & D towards these alternative farming systems: semi-intensive/extensive systems (low stocking density to prevent disease) and the use of the more extensive coastal waters (seafarming and searanching).