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Education Series

Laem-Singh Necrosis Virus (LSNV)

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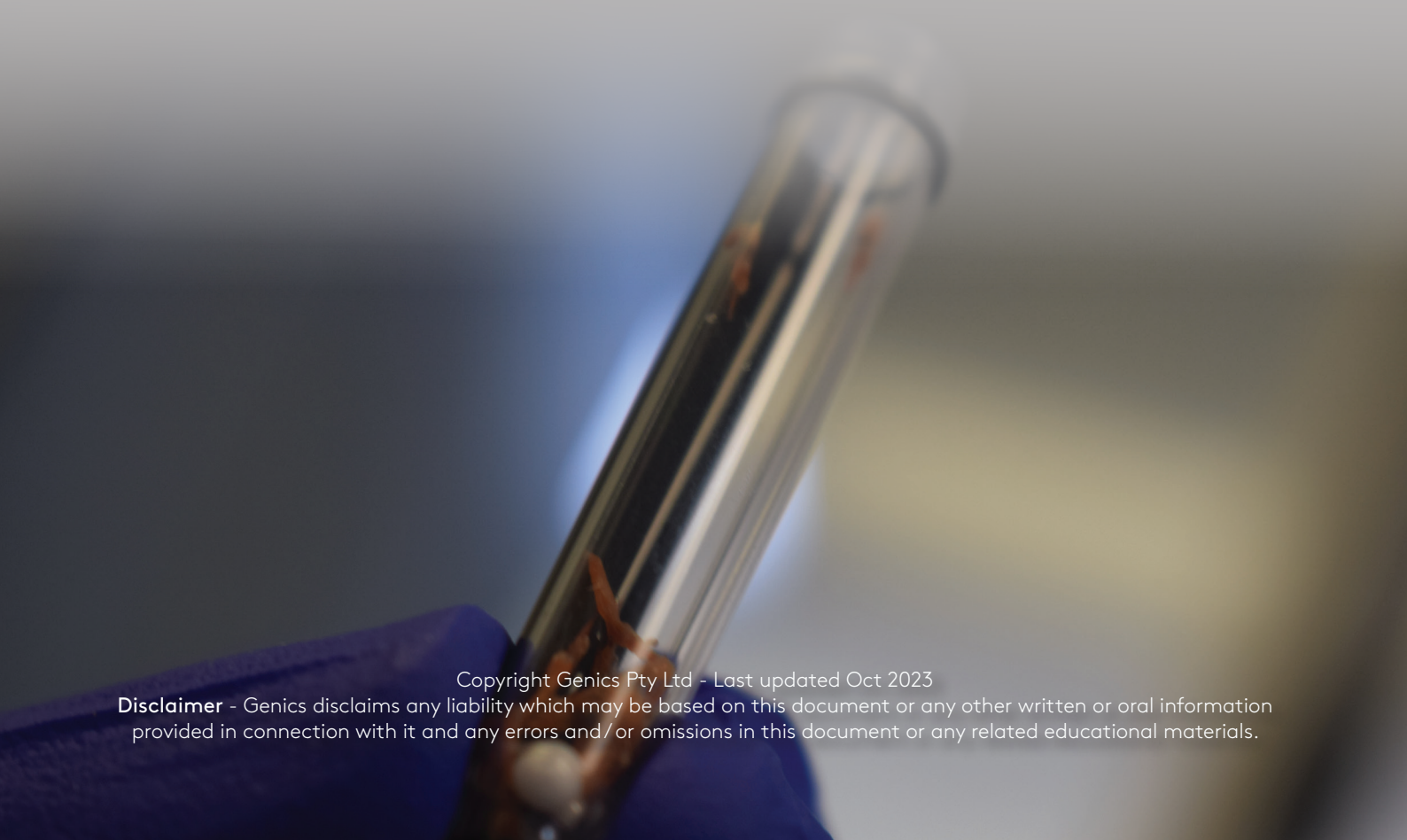

Shrimp get sick too. Laem-Singh Necrosis virus (LSNV) is an infectious agent first identified in 2006 in Laem-Singh province in Thailand, where its name comes from. It is a component of the Monodon Slow Growth Syndrome (MSGS), which causes stunted growth and significant size variation. Within this syndrome, LSNV is thought to be associated with retinopathy present in these slow growing animals, but it does not cause death on its own. It has been concluded that LSNV is a necessary but insufficient cause of MSGS, where the other agent or agents involved remain unknown. For this reason, it is recommended that farmers avoid stocking ponds with LSNV-infected postlarvae, to prevent MSGS in their farms.

LSNV has been detected primarily in *Penaeus monodon,* but other hosts include *Penaeus merguiensis*, *Metapenaeus dobsoni* and *Penaeus vannamei*. *P. vannamei* might act as an asymptomatic carrier according to transmission studies.

LSNV is a positive-sense single-stranded RNA (ssRNA) of 25nm diameter. It was reported in association with MSGS in both healthy and infected *P. monodon,* first from Thailand and later in Malaysia, Indonesia, India and Vietnam, which suggested a geographical distribution restricted to South and Southeast Asia.

MSGS from which LSNV is a contributing factor, is characterized by enormous impact in tiger shrimp production due to significant production losses and poor productivity. A study showed that affected shrimp only reached an average size of 5–10 g instead of the regular size of 24–40 g after 4 months of culture, and they also presented overly high (30–80 %) coefficient of variation (CV) in weight. A consequence is the uncertainty of final harvest yield and value. For example, in ponds with MSGS the average growth rate is around half of what is usually expected, and in Thailand this uncertainly was one of the drivers that caused the shift to the use of *P. vannamei* over *P. monodon*.

Causative agents of MSGS are not yet determined, but it is concluded that LSNV must be present for the syndrome to occur. Because of this, LSNV has been listed among the specific pathogens that should be eliminated from Specific Pathogen Free (SPF) stocks of domesticated *P. monodon*. It has been demonstrated through experimentation that LSNV can be transmitted horizontally and vertically, and it should be taken into consideration that *L. vannamei* could be a carrier without showing any clinical signs.

Clinical signs of LSNV are mainly retinopathy, however, the pathogeny is not yet fully understood. On the other hand, shrimp affected by MSGS are reported to present unusually dark colour, unusually bright yellow markings, ''bamboo-shaped'' abdominal segments, brittle antennae and a low average daily weight gain leading to a wide variety of sizes.

Early detection using Shrimp MultiPath™ can mean the difference between a full harvest or a 50% reduction in harvest output. With early detection of LSNV the farmer can anticipate the MSGS occurrence and thus take action before the yield is affected. At present, the control strategy for LSNV is mainly routine detection and subsequent removal of LSNV-positive batches of postlarvae. There have been promising results with the use of double stranded RNA (dsRNA) for RNA interference (RNAi) to control LSNV, which reduces the occurrence of MSGS, however it is not a regular practice.

Target life-history stages for accurate early detection include postlarval, juvenile and broodstock life stages. LSNV can be transmitted both horizontally and vertically.

Target organs for sensitive Shrimp **Multi**Path™ detection are the lymphoid organ and gills.

Sampling and preservation of tissues for PCR tests should be done in labelled vials and/or tubes that seal and the fixative should be 70% laboratory grade ethanol. Tissue size can be 2-5 mm^2 in size. Sample equipment must be sterilized between sample tubes.

Sampling numbers and health management plans should be established with your health expert who will take into account factors such as nauplii/postlarvae source, climate, farm size and location, company structure, market channels for sale of product, etc. There is also the option to pool samples for Shrimp **Multi**Path™ testing to maximize value for money with PCR testing.

Longer term solutions to disease caused by LSNV through the MSGS, include implementing improved management practices during culture and reduced stress on the shrimp. In places where *P. vannamei* has already been introduced, they should be reared separately from *P. monodon*, especially at the maturation and hatchery phases. The use of RNAi to reduce the presence of LSNV in infected broodstock can be employed as a tool for cleaning high value animals of the virus to a point where vertical transmission risk is reduced. On a wider scope, in order to restrict the spread of MSGS, quarantine safeguards should be implemented to the movement of living shrimp stock for aquaculture. A significant scientific knowledge gap remains for MSGS, with more research required to determine the primary agent or factor responsible for the disease, as well as studies on other crustacean species that might be carriers and act as sources of infection.

Contact Genics at info@genics.com if you would like to discuss shrimp health management options for your operation or visit www.genics.com for further details.

Learn how to dissect your shrimp for testing

Visit our new Educational page here to learn how to:

- Sterilize your equipment before sampling
- Selecting the correct ethanol for tissue preservation
- Identify and sample shrimp target organs for Shrimp **Multi**Path™ testing

Questions?

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LSNV

Did you know?

Shrimp rarely harbour only one pathogen and farmers often don't know which ones they are. This is a significant economic risk for farmers. **Genics has solved this problem** with Shrimp **Multi**Path™. It's the ultimate early warning system for farmers, **detecting 16 pathogens in a single test** that is unparalleled in today's industry for its sensitivity and accuracy.