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From bees to shrimp: How buzz around innate immunity could reshape production and disease prevention in shrimp aquaculture

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Dalan Animal Health adapts bee-proven vaccine tech to shrimp, harnessing innate immunity to fight major aquaculture diseases.

In a potential breakthrough for the aquaculture industry, U.S. biotech company **Dalan Animal Health** (<http://www.dalan.com>) has developed a way to train the immune systems of fish and other animals to fight off deadly diseases. This new technology taps into innate immunity – the body's non-specific defense system – and teaches it to provide long-term protection against a wide range of deadly pathogens. This discovery reportedly has the potential to transform animal health, food security and future human health applications.

The company says that its platform activates a shrimp's innate immune system prenatally, enabling species-wide disease resistance. This approach was first validated with the **world's first honeybee**



Dalan Animal Health's innate immunity platform is an innovation in food production and disease prevention, demonstrating the ability to train farmed shrimp's innate immune systems prenatally, offering protection against major diseases. Photo of mature Pacific white shrimp broodstock by Darryl Jory.

vaccine (<https://www.prnewswire.com/news-releases/dalan-animal-health-unlocks-the-power-of-innate-immunity-for-a-new-era-in-disease-prevention-302372696.html?prn>), which Dalan reports has already protected over 20,000 colonies. Now, the company is applying this same technology to aquaculture, introducing what it calls the first-ever viable shrimp vaccine – a potentially critical step in safeguarding the \$45 billion global shrimp industry.

“We are not just offering a vaccine – we are providing an innovative tool for the shrimp industry that benefits economic and ecological sustainability,” Dr. Annette Kleiser, CEO of Dalan Animal Health, told the *Advocate*.

The adaptive immune system – also known as the acquired or specific immune system – is a specialized branch of the immune system that uses targeted cells, organs and physiological processes to identify and eliminate specific pathogens. It's one of two primary immunity strategies in vertebrate animals. The other is the innate immune system (or nonspecific immune system), an alternate defense strategy that not only supports vertebrates but also serves as the dominant immune system response in plants, fungi and invertebrates like bees and shrimp.



(<https://link.chtbl.com/aquapod>).

Dalan reports that its new vaccine will offer a non-chemical alternative to manage major shrimp diseases like White Spot Syndrome Virus (WSSV) and Acute Hepatopancreatic Necrosis Disease (AHPND)/Early Mortality Syndrome (EMS). In testing its shrimp vaccine, 62 percent survival rates against WSSV and 61 percent survival rates against EMS were noted.

For shrimp farming, artificial intelligence offers long-term value



Artificial intelligence will increasingly integrate into standard shrimp farming practices, with widespread benefits pointing toward sustainability.



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Dalan says its technique can train the innate immune system prenatally – by immunizing broodstock shrimp – offering offspring protection against multiple disease threats. Its vaccine platform, it adds, will provide lifetime protection.

A key breakthrough of this approach is the discovery that innate immunity – once thought to lack memory – can be trained, unlocking new disease prevention strategies in aquaculture.

“Our aim is to provide a sustainable, non-chemical solution to combat devastating diseases affecting the shrimp industry, like White Spot Syndrome Virus and Early Mortality Syndrome,” Fernando Rianza Carcamo, Dalan’s Head of Business Development, told the *Advocate*. “We believe we are not just protecting animals – we’re moving entire ecosystems and food production systems forward.”

The novel vaccine has reportedly been administered to shrimp broodstock in several ways, with oral delivery emerging as the preferred method. So far, its efficacy has been tested in lab models, with protection observed in the next generation of shrimp and lasting for several months. Field trials will be needed to confirm its effectiveness under real-world aquaculture conditions.

In honeybees, queen vaccination has shown protection that lasts several months, protecting the entire colony. Dalan hopes that prenatal immune training in shrimp broodstock will deliver similar long-lasting protection in the next generation that is observed in the lab.

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