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Health & Welfare

Bivalent vaccine protects yellowtails, amberjack against pasteurellosis

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U.S.-origin bacterial septicemia can result in significant mortality

Field trials confirmed the efficacy of the authors' bivalent vaccine.

Pseudotuberculosis, or pasteurellosis, caused by the halophilic bacterium (*Photobacterium damselae)* subspecies *piscicida (P. piscicida)* is a bacterial septicemia that can result in significant mortality and economic loss in a variety of cultured fish. First identified in wild fish populations in the United States in 1963, it has since been recognized as a major pathogen of farmed fish in various European countries and Japan. In addition, the authors' recent epidemiological investigations found *P. piscicida* in farmed cobia in Taiwan and in a variety of cultured species in China, including fingerling and larger seabream, snapper and pompano.

Although efficacious antibiotics to combat *P. piscicida* infection are available, alternative health management systems can help ensure the long-term sustainability of the affected species' industries.

Yellowtail, amberjack vaccine

Pasteurellosis occurs in yellowtail and amberjack in the Japanese fish culture industry. The disease, which occurs predominantly during the summer months, is most prevalent in fish of more than 10 grams. Mortality attributable to *P. piscicida* can range 5 to 50 percent. Despite the significant economic importance of this pathogen to the Japanese fish industry, there were no effective vaccines against it in Japan.

The authors therefore developed a safe and efficacious combination vaccine against P. piscicida infection and (*Lactococcus garvieae)* infection for use in yellowtail and amberjack culture. Field trials of the vaccine held between 2002 and 2005 were followed by further laboratory studies. Regulatory approval was obtained in Japan in December 2007, and the vaccine will be available this summer.

Challenges, results

The onset of immunity against *P. piscicida* infection in 31-gram yellowtails reared at 22 ± 2 degrees-C was investigated by weekly experimental challenge after the individual fish received a single intraperitoneal vaccination with the prototype oil-based bivalent vaccine.

Although minor effects were seen after the exposure at one week, maximum protection against pasteurellosis appeared three weeks after vaccination (Fig. 1), when vaccination reduced mortality from 100 percent in control fish to 30 percent in vaccinated fish.

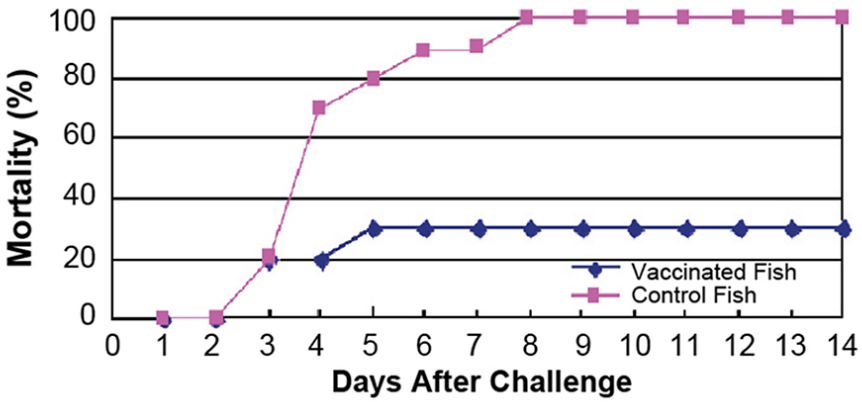

Fig. 1: Mortality of vaccinated yellowtails challenged after three weeks with *P. piscicida*.

Twelve weeks after vaccination, *P. piscicida* mortality in the control fish was 100 percent, while no mortality was observed in the vaccinated population. Protection against *L. garvieae* was also acquired one week after vaccination (Fig. 2).

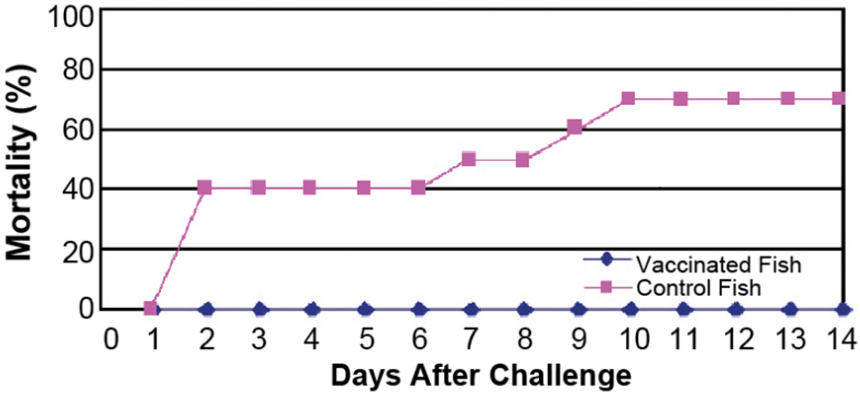

Fig. 2: Mortality of vaccinated yellowtails challenged after one week with *L. garvieae*.

Similar results were obtained in amberjack. Trials at three farms in Japan confirmed the safety and efficacy of the vaccine in yellowtails and amberjack in the field. Results from two farms are shown in Figs. 3 and 4.

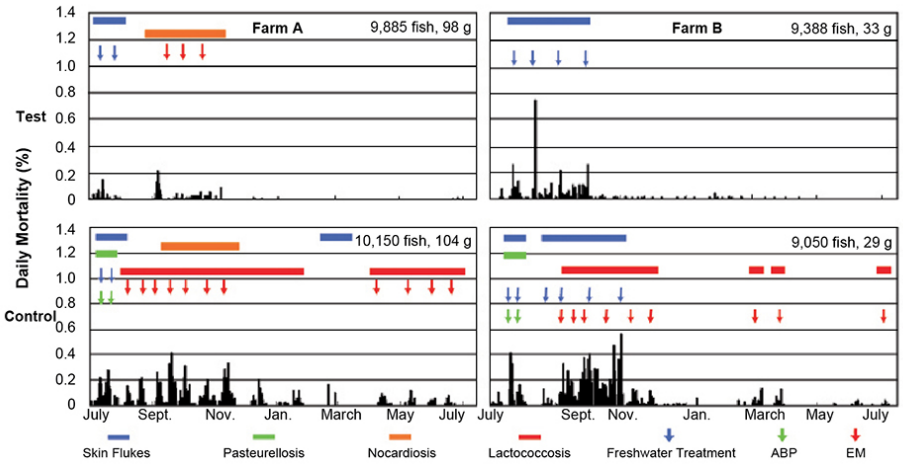

Fig. 3: Daily mortality in a field trial of bivalent vaccine in yellowtails.
Color bars indicate prevalent periods for disease conditions.

Fig. 4: Cumulative mortality in the field trial.

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