

Meat from Animals Vaccinated with mRNA Vaccines May Soon Make Its Way Into the US Food Supply

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Shrimp have become the latest addition to **a growing list of food sources targeted by mRNA gene therapy technology**. An Israeli company seeking to bring mRNA vaccines to shrimp farming has <u>raised \$8.25 million</u> from a group of venture capitalists to promote and improve animal health in marine species through its orally administered RNA-particle platform.

ViAqua, a biotechnology company, created an RNA-based vaccine product that uses <u>ribonucleic acid interference</u> (RNAi) to manipulate gene expression in shrimp. RNAi is a biological process where RNA molecules are used to inhibit gene expression or translation by neutralizing targeted mRNA molecules.

The vaccine comes in the form of a coated feed supplement designed to enhance resistance to white spot syndrome virus (WSSV)—a viral infection that causes an annual loss of about <u>\$3 billion and a 15 percent reduction</u> in global shrimp production. ViAqua suggests RNA molecules can inhibit the expression of genes that cause disease with every meal containing its coated product.

According to a 2022 <u>proof-of-concept study</u>, the nanovaccine was roughly 80 percent effective in a lethal WSSV challenge model and exhibited excellent in vivo safety profiles. Yet the risks of altering gene expression in shrimp and the effects of consuming vaccinated shrimp are unknown.

"Oral delivery is the holy grail of aquaculture health development due to both the impossibility of vaccinating individual shrimp and its ability to substantially bring down the operational costs of disease management while improving outcomes," said Shai Ufaz, CEO of ViAqua in a press release. "We are excited to bring this technology to market to address the need for affordable disease solutions in aquaculture."

ViAqua plans to begin production in India in 2024 and believes its technology has numerous applications in aquaculture and beyond, according to their press release.

mRNA Vaccines Are Already Used in Pigs

The aquaculture industry is not the only market being targeted with mRNA vaccines. Genvax Technologies, a startup creating mRNA vaccines for animals, in 2022 secured \$6.5 million in funding to develop a self-amplifying mRNA (saRNA) platform that allows for rapid development of a herd or flock-specific vaccine matched 100 percent to the circulating variant at the root of a disease outbreak.

Genvax's technology involves inserting a specific transgene or "gene of interest" matched to the variant strain into the platform. The saRNA then generates an antibody response without requiring the whole pathogen to be matched to the circulating strain.

In April 2022, Genvax <u>was awarded a \$145,000 grant</u> by the Foundation for Food and Agriculture Research to develop an saRNA vaccine for African swine flu (ASF) in collaboration with the U.S. Department of Agriculture. ASF is a highly contagious virus with a 100 percent swine mortality rate but has never occurred in the United States.

According to a 2022 paper published in eClinicalMedicine, saRNA technology uses lipid nanoparticles (LNPs) to encapsulate saRNA. When injected as a vaccine, the LNP encapsulation facilitates "endosomal uptake and release into the cytoplasm of target cells in vivo." This novel technology has "significant and previously untested potential" to be used in drugs and vaccines.

Genvax isn't the first company to harness mRNA technology in pigs. Merck, in 2018, introduced SEQUIVITY, a "revolutionary swine vaccine platform" that uses RNA particle technology to create "customized prescription vaccines against strains of influenza A virus in swine, porcine circovirus (PCV), rotavirus and beyond."

SEQUIVITY uses electronic gene sequencing to generate RNA particles that, when injected into an animal, provide instructions to immune cells to translate the sequence into proteins that act as antigens, similar to how the COVID-19 vaccine causes the body to generate spike proteins. The idea is that the animal's immune system, when challenged with the actual live pathogen, will recognize the antigen and elicit an immune response.

According to Merck, their RNA participle technology allows for the development of a "safe and flexible" custom swine flu vaccine in only eight to 12 weeks compared to traditional vaccines that take years to develop.

Although it is claimed vaccines <u>utilizing RNA technology</u> are safe and effective, studies appear to be scarce with little to no research to determine what effects consuming pork from vaccinated pigs may have on the human body.

mRNA Vaccines in Cattle Raise Concerns Among Producers

According to the National Cattlemen's Beef Association, mRNA vaccines are currently not <u>licensed for use</u> in U.S. beef cattle. The vaccines <u>are being developed</u> to treat and prevent diseases in cattle, whose meat could make its way to the dinner table.

Ranchers-Cattlemen Action Legal Fund United Stockgrowers of America (R-CALF USA), a

national, non-profit organization with more than 5,000 members dedicated to ensuring the continued profitability and viability of the U.S. cattle industry, has <u>raised concerns</u> over using mRNA vaccines in cattle.

In April 2023, R-CALF USA met with medical doctors and a molecular biologist regarding the status of mRNA injections in the global protein supply chain. Veterinarian Max Thornsberry reported that some researchers have found that mRNA and its coded virus could pass to humans who have consumed dairy or meat products from an mRNA-injected animal.

Mr. Thornsberry raised concerns about the full impact and unknown long-term effects of consuming meat from animals injected with mRNA vaccines and called for more extensive research. Although the United States has not yet approved an mRNA vaccine for use in cattle, the country is increasing imports of beef from other countries that either vaccinate cattle with mRNA vaccines or plan to.

"This points to the urgent need for MCOOL (mandatory country of origin labeling)," Mr. Thonsberry said. "Consumers deserve the right to choose whether to consume beef from a country where mRNA injections are being given to cattle, and the only way they can have that choice is if Congress passes MCOOL for beef."

R-CALF USA plans to develop a policy direction for the organization at an upcoming meeting, but "strongly reinforces the need for mandatory country of origin labeling" of beef immediately so that American consumers will know if the beef they are buying comes from a country that is using the controversial mRNA technology in their cattle.

In an op-ed posted on its website, R-CALF USA CEO Bill Bullard said the organization has been <u>attacked for its position</u> and accused by pharmaceutical-backed publications of "fearmongering and misinformation."

"Iowa State University researchers submitted a multi-year <u>research project</u> to the U.S. Department of Agriculture to test a cattle mRNA vaccine system for bovine respiratory syncytial virus (RSV) infection," Mr. Bullard said.

"According to the submission, researchers planned to test the mRNA on cattle during the second year of the project with a completion date of 2026. It would be naïve not to assume that such a research project signals an effort to obtain approval for mRNA injections in U.S. cattle," he added.

Mr. Bullard encouraged others not to "simply trust the pharmaceutical companies and the government" and says his organization "intends to learn the truth by continuing to disclose differing scientific findings, seeking more research into the long-term effects of mRNA injections for cattle, and demanding more transparency from pharmaceutical companies and the government."

Meanwhile, the organization has stated it believes people have a right to know whether the meat they consume has come from animals injected with mRNA technology.

Several states have already drafted or proposed legislation seeking to require the labeling of products derived from animals administered mRNA vaccines, including <u>Tennessee</u>, <u>Idaho</u>, <u>Arizona</u>, <u>Texas</u>, and Missouri.

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