

Fish food for marine farms harbor antibiotic resistance genes

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From isolated caves to ancient permafrost, antibiotic-resistant bacteria and genes for resistance have been showing up in unexpected places. As scientists puzzle over how genes for antibiotic resistance arise in various environments and what risks to human health they might pose, one team has identified a surprising way some of these genes are getting into ocean sediments: through food for marine fisheries. Their report appears in *ACS' Environmental Science & Technology*.

Many disease-causing bacteria, such as those that cause tuberculosis, have developed resistance to common antibiotics and drugs of last resort. To fight this major public health threat, scientists are working to figure out how resistance spreads among bacteria. One reservoir for resistance genes where they can be exchanged among bacteria—and possibly end up in the food chain—is the sediment in marine fish farms even when no antibiotics have been applied. One suspected source is fishmeal, which is made of low-value fish and seafood byproducts. Previous research has found that fish food, which generally incorporates fishmeal, can contain antibiotics. But no study had yet measured the abundance of antibiotic resistance genes in the fishmeal. As millions of tons of fishmeal are used every year with much of it sinking uneaten to the ocean floor, Jing Wang and colleagues wanted to see what its impact could be on the mariculture "resistome," or collection of resistance genes.

The researchers analyzed commercially available fish meal and found 132 antibiotic resistance genes, some of which could potentially confer resistance to common antibiotics and those of last resort, such as

vancomycin. Lab testing showed that the application of fishmeal to marine farm sediment samples changed the make-up of [bacteria species](#), boosting potential human pathogenic bacteria (*Vibrio* species), which contribute to foodborne illnesses worldwide. It also increased the abundance and diversity of [antibiotic resistance genes](#) in the test sediments. The results suggest that [fishmeal](#) product could itself be a reservoir of these bits of DNA and could promote their distribution globally.

More information: Fishmeal Application Induces Antibiotic Resistance Gene Propagation in Mariculture Sediment, *Environ. Sci. Technol.*, Article ASAP. [DOI: 10.1021/acs.est.7b02875](https://doi.org/10.1021/acs.est.7b02875)

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