

## A Cycle of Life—Wastewater Used to Make Fish Food



In an effort to turn an unused byproduct of the beverage industry into a sustainable, protein-rich feed ingredient for the aquaculture industry, two Mines environmental science and engineering alums, an assistant professor and a graduate student have formed an interesting collaboration.

After both graduating with doctorates in environmental science and engineering from Mines in 2002, Seth Terry and Andy Logan founded Oberon FMR, a

company that focuses on turning food industry byproducts into protein for use in animal feed.

"We seek to develop and commercialize a sustainable high-protein feed ingredient for animals made from unutilized byproducts of food processing operations," Terry summed up. "Because the byproduct is often viewed as an environmental liability to food manufacturers, our process can provide significant benefits."

Wastewater from food processing operations is frequently too nutrient-rich to discharge into municipal water treatment plants, where it would overwhelm the delicate balance of microbial life. Instead, industries must treat it themselves, employing the same principles, but engineering the environment to better handle the nutrient-rich wastewater. The real work of purifying the water is done by microbes, which metabolize the nutrients in which they are bathed. In the process, they multiply, creating a supply stream of biomass rich in protein. Currently, this biomass is composted or buried in landfills. The goal of Oberon is to cultivate the right combination of microbes in these specialized treatment plants so that, once the biomass is dried, they have useable fish food.

To this end, Terry, Logan and environmental science and engineering assistant professor, John Spear, teamed up with collaborators from the University of Colorado at Boulder to land a \$1.1 million grant from the National Science Foundation to get the project rolling.

"[Terry and Logan's] side of the grant work is to scale up the technology," Spear explained. "Our side of the grant work is to have a doctoral student further the science

aspects." Jackson Lee, a graduate student in environmental science and engineering, will be researching the microbial composition of the biomass.

"Having actually lived off farm-raised tilapia as a Peace Corps volunteer in the Philippines, I definitely see the possibility of food-waste-derived fish food serving a sustainable purpose in numerous countries, not just our own—particularly in societies where protein primarily comes from fish," Lee said.

Spear noted that common fish farming practices, including fish feeding on other fish, are environmentally problematic. "Fish farming is not sustainable. That is the main problem," said Spear. "If you feed fish dried microbial biomass, which most eat anyway as a significant source of their natural diet, they get protein to build their own biomass. It is way more sustainable, perfectly healthy and takes an existing waste stream and puts it to beneficial use. It is a great environmental engineering project."

The team is currently operating pilot facilities at New Belgium Brewery in Fort Collins, where it is using the beer manufacturer's wastewater to produce hundreds of pounds of protein-rich biomass material for feeding trials that will be conducted by feed manufacturers in the near future.

[http://www.mines.edu/magazine/2008/Spring/Departments/new\\_frontiers.html](http://www.mines.edu/magazine/2008/Spring/Departments/new_frontiers.html)