

Detecting Bacterial Pathogens in Oysters

Program targets *Campylobacter* and *Salmonella*

by Susan McGinley

Oysters on the half shell lose their glamour if they've got *Campylobacter* or *Salmonella* lurking in their tissues. These bacterial pathogens are leading causes of food-borne illness around the world and are a particular concern in raw or lightly cooked shellfish (see sidebar).

"Both of these bacteria are normal flora in chickens, but when they get into humans, they cause disease," says Lynn Joens, a UA veterinary microbiologist who is testing clams and oysters from both U.S. coasts for the presence of *Campylobacter* and *Salmonella*. Unlike poultry and other hosts, shellfish do not usually harbor these organisms, but they acquire them by filtering water through their systems and concentrating them in their meat.

Some shellfish species reside in estuaries where fecal runoff from sewage may pollute the water and penetrate their tissues. Because shellfish feed by filtering water to gather nutrients, they also pick up fecal pathogens which can thrive in their tissues without killing them.

Joens and his colleagues, including veterinary scientist John Maré, want to determine the extent of shellfish contamination for *Salmonella* and *Campylobacter* across the U.S. With help from the USDA and the North Carolina Department of Fisheries, they have begun collecting clams and oysters from several bays and rivers in Oregon and North Carolina.

"We've found *Salmonella* in fifty to seventy percent of the clams and oysters we've tested," Joens says. The incidence of *Campylobacter* has been much lower—about ten to fifteen percent. "We're checking various types of seafood, but we're concentrating on oysters since they are most often eaten raw."

Each state regulates its own oyster farms. "Most states test the water, but only for *E. coli*, as defined by FDA regulations," Joens notes. Commercial shellfish farms use a method called

depuration to reduce the concentration of *E. coli* in oysters, but it doesn't work on either of the other two bacteria, according to his findings.

The technique involves putting the oysters in a tank of water and changing the water periodically, while testing it at intervals to make sure the bacteria are gone. This gets rid of the *E. coli*, but unfortunately the oyster itself concentrates more and more *Salmonella* and *Campylobacter* in its tissues as the water is filtered. "You actually have to test the meat to determine the amount of contamination," Joens says.

His strategy is to bring attention to contaminated rivers and bays by testing oyster meat from different locations for the presence of the two pathogens, then tracing back up those rivers to find the sources of the pollution. "We'll report our findings to the FDA so that they can clean up the contamination sources," Joens says. He plans to expand the testing program to include samples from locations up and down both coasts and the Gulf of Mexico. "We want to find the contamination so growers and restaurants across the country can sell their oysters to the public without making them sick." ❖



L. Joens

About *Campylobacter* and *Salmonella*

Although most people have never heard of *Campylobacter*, this hardy bacterial pathogen causes plenty of trouble worldwide. Both *Campylobacter* and *Salmonella* species can survive in meat products, and in fresh and salt water for days.

In Arizona, *Salmonella* is the number one cause of food-borne illness; *Campylobacter* is third, according to Lynn Joens, UA veterinary microbiologist. More *Campylobacter* food poisonings have been reported since 1998. He says most people pick both of these up by eating uncooked poultry left behind on improperly washed cutting boards and counter tops. The usual scenario is the barbecue.

"People will trim the raw chicken on the cutting board, transfer it to a plate, take it to the barbecue, cook it, and then put it back on the same unwashed plate and cutting board the raw chicken was on," Joens says. "*Salmonella* in particular is on both the skin of the poultry and in the meat, and doesn't just wash off. Only cooking to the proper temperature of 160 degrees gets rid of it."

Shellfish don't normally harbor *Campylobacter* or *Salmonella*, but they do collect these bacteria by filtering contaminants from water as they feed. Cooked shellfish poses no threat, but oysters, which are most often consumed raw, may hold these contaminants for months before harvest.

Joens says the prevalence of *Campylobacter* and *Salmonella* food poisoning may be higher than current figures show because a lot of cases probably go unreported.

Lynn Joens
(520) 621-4687
joens@ag.arizona.edu