

(FFA) in 1993. Participating in the Marin Coastal Watershed Enhancement Project workshops, Martin learned how to control erosion and provide wildlife habitat along Stemple Creek, which cuts through the dairy, without losing grazing land. Her water quality project earned Martin a statewide Agriscience Student of the Year award and national FFA awards.

"I was trying to control erosion and, in the process, I was hoping to provide quail habitat," Martin says. "Planting trees to control erosion also gives the quail cover and a place to roost away from predators."

During this time, The Department of Fish and Game cited the dairy for dairy waste pollution, which was later traced to an area where manure had been stockpiled. Alerted to the problem, Martin expanded her project. She and her father Paul fenced off the creek and built a bridge and gates to control the animals' movement in and out of the water, then began monitoring the water quality where the creek entered the property and where it left.

By moving cows away from streambanks and allowing vegetation to grow, Martin was able to stabilize the banks. She also teamed up with the Shrimp Club from Brookside Elementary School in San Anselmo, which was trying to save the endangered freshwater shrimp in Stemple Creek. The urban schoolchildren planted native grasses, trees and shrubs to restore the streambank.

"I tested total ammonia, dissolved oxygen, sediment, temperature and pH," she says, "and the water was better leaving [than when entering the property]."

"I think we're moving in the right direction by temporarily excluding animals from the creek," Martin says.

"And, we have an intensely managed grazing system; they're not just running out to eat whatever they want. Now we turn them out until the grass is grazed down to a level where the plants can come back at a reasonable rate."

Larson and Rilla produced a video, a ranch plan workbook and a creek care guide to monitor water quality. Martin can be seen demonstrating water testing in the watershed planning video, "Downstream." The video, ranch plan workbook and creek care guide are available from Stephanie Larson at the Cooperative Extension office, 2604 Ventura Ave., Rm. 100, Santa Rosa, CA 95403.

—Editor



Jack Kelly Clark

UC Davis student Betsy Martin leans against a fence she built to keep grazing cows away from Stemple Creek. Behind her are willows she and the Shrimp Club planted along the creek to control erosion and to restore the habitat of freshwater shrimp.

Research update

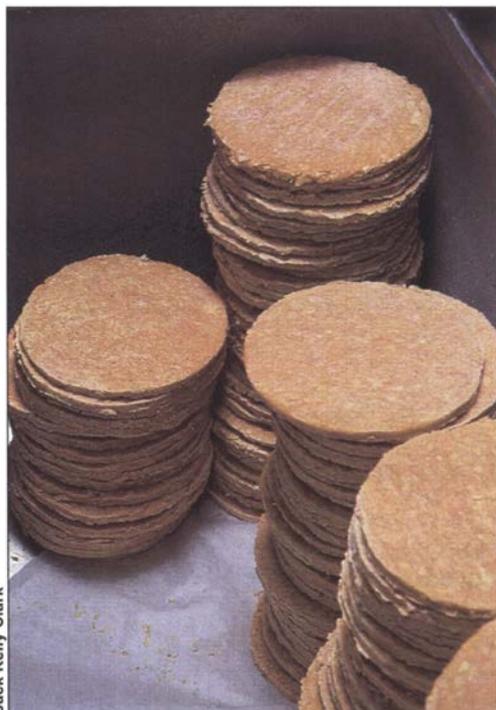
UC scientists seek to ensure safe meat

Several well-publicized outbreaks of food-poisoning have many Americans wondering about the safety of their food supply. The most recent incident involved Odwalla brand unpasteurized apple juice, which was linked to 66 cases of intestinal illness and the death of a 16-month-old Colorado girl. In Japan, a food-poisoning outbreak beginning in July 1996 killed 11 people and sickened more than 9,000 others.

The cause of both outbreaks was *Escherichia coli* O157:H7, a toxin-producing strain of a common intestinal bacterium. It causes bloody diarrhea and, in severe cases, kidney failure. First identified in 1982, *E. coli* O157:H7 was also the

culprit in a 1993 food-poisoning outbreak, when four children died and hundreds of people became ill in the Pacific Northwest after eating contaminated fast-food hamburgers. That incident spurred a major reform of federal food safety regulations. The new food safety rules, issued in July 1996, were designed to reduce the risk of illness caused by bacterial contamination of meat and poultry products.

The Centers for Disease Control and Prevention estimate that as many as 5 million people become ill and 4,000 die annually from consuming meat and poultry products contaminated with four major bacterial pathogens: *Salmonella*,



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The FDA says ground meat must be cooked to an internal temperature of 155°F for 15 seconds to be safe. The safe cold holding temperature is 41°F or lower.

Campylobacter, *E. coli* O157:H7 and *Listeria monocytogenes*. In an attempt to cut the number of these preventable deaths and illnesses, the new food safety system incorporates scientific testing and other modern tools to detect and prevent microbial contamination.

The new system is three-pronged, according to Bennie Osburn, dean of the UC Davis School of Veterinary Medicine. First, every meat and poultry processing plant has to have written standard operating procedures for sanitation and adopt its own hazard analysis and critical control points (HACCP) plan identifying points where contamination can occur and monitoring them closely. The effectiveness of HACCP plans must be verified by USDA Food Safety and Inspection Service (FSIS)

personnel. Second, carcasses must be routinely tested for *E. coli* contamination at all slaughter plants. Third, every slaughter and meat processing facility that produces raw ground meat must ensure its *Salmonella* contamination rate is below the current national baseline. FSIS estimates the new system will save \$1 billion per year in medical expenses, lost work and other costs related to foodborne illness.

Under the old system, more than 7,400 FSIS inspectors monitored 6,200 slaughter and processing plants in the United States, where they looked for diseased animals or contaminated carcasses using organoleptic methods, that is, by visually inspecting and smelling the meat.

The new system requires plants to use modern techniques for microbial testing to verify fecal contamination control. FSIS will conduct tests to verify that pathogen reduction standards are being met.

About a dozen UC Davis scientists have been involved in developing strategies to prevent animals from becoming infected, to intercept infected animals before they enter the processing plant, and to prevent contamination from being spread around the plant (see *California Agriculture* Jan-Feb 1994). Recent efforts have been directed toward improving diagnostic tests for live animals and carcasses. "We have one of the largest groups of researchers in the world focusing on these problems," says Osburn.

A new test for *E. coli* O157:H7, developed by Prabhakara Choudary, director of the UC Davis antibody engineering laboratory, and post-doctoral researcher Christopher Gooding, could greatly improve the ability of food inspectors and meat and dairy producers to detect bacterial contamination. The rapid and sensitive 8-hour test offers a faster alternative to current techniques, which require at least 2 days to yield conclusive results.

UC researchers are also conducting studies to better understand where and how *Salmonella* and other pathogens are infecting cattle headed for slaughter. Pathologist Chuck Holmberg is studying the ecology of *E. coli* O157:H7 on farms. Jim Cullor, director of The Veterinary Medicine Teaching and Research Center and head of the Dairy Food Safety Lab in Tulare, is developing on-farm HACCP programs for dairies, directed at reducing or minimizing contamination with microbial pathogens such as *Salmonella* or *E. coli* O157:H7.

The California Veterinary Diagnostic Laboratory System, a component of the School of Veterinary Medicine, plays a major role in identifying foodborne illnesses of animal origin. When public health officials identify human foodborne illnesses, the Diagnostic Laboratory becomes involved in the investigation of the potential animal sources. The laboratory has been instrumental in identifying sources of infections caused by *Listeria* and *Salmonella* contamination.

"We probably have one of the best beef-quality assurance programs in the world here in California," says Osburn.

A recent trade incident highlights the importance of such programs. Last spring, a Russian delegation came to the U.S. to examine poultry processing procedures and found that there was no uniform HACCP or ISO9000 (a European quality assurance program) for *Salmonella*. "They cancelled a contract for \$700 million a year," says Osburn. "Production came to a screeching halt and broilers dropped 2 to 3 cents a pound in price. Along with the \$700 million, 25,000 jobs were lost in the U.S. Politically speaking, this was significant."

To regain the business, USDA quickly put together a program to show the Russians that U.S. producers can meet their standards. With new food safety rules now being implemented, USDA officials also aim to reassure the American public about the safety of meat and poultry products in U.S. stores.

—Editor