Safer meat through marinating?

Many a TV chef marinates meat in concoctions of vinegar, soy sauce, spices and fruit juices for extra flavor. NMSU scientists are testing whether some of those ingredients could give consumers an added measure of food safety.

"We know that thorough cooking works in killing microorganisms on meat," says food science professor Lisa McKee. "But there's quite a bit of data that shows people don't always cook meat properly, so we wanted to see if rinsing it with common ingredients in the kitchen could reduce bacteria and lessen the risk of getting sick from undercooked meat or poultry."

The last two summers, McKee and graduate students Lori Neish, Chris Moore and Ann Pottenger measured bacteria on 100 beef loin steaks, 100 boneless chicken breasts and 100 pork loin chops from the grocery store. Next, they shook each cut for one minute in a sealed bag with a single-ingredient marinade.

They tested water, milk, Coca-Cola, soy sauce, chicken broth, clam juice, salt water, baking soda solution, Italian salad dressing, cranberry juice cocktail, white or balsamic vinegar, red or white wine, and apple or orange juice. Another bacterial count was made after the marinade.

"We wanted to test marinades with varying pH levels," McKee explains. "I got a few questions about why we were using clam juice, which isn't so common here, but we had a lot of acidic marinades and clam juice and baking soda are on the basic end of the spectrum."

Several ingredients, particularly acidic marinades such as plain white vinegar and cranberry juice cocktail, showed promise, McKee says. "Plain white vinegar rises to the top of the results almost every single time, and it did reduce some of the counts from high levels to zero after rinsing."

Even water washed away some bacteria, though that shakes up traditional food safety advice against rinsing meat and poultry because of the potential to spread bacteria around the kitchen.

"We know that meat processing plants rinse carcasses, but there hasn't been much research on what consumers can do," McKee said. "We started with cuts from the grocery store because that's what consumers use."

Fran Roybal, a graduate student in food science, will carry out the next installment of the research over spring break with a $3,000 Health Oriented Themes or HOT topics grant from NMSU. She and McKee will spend painstaking hours with 100 raw chicken breasts and scores of dilution bottles and petri dishes.

McKee is applying for additional U.S. Department of Agriculture funding to expand the research. She hopes to compare one-minute and overnight marinades and to test whether marinades can work on meat and poultry that was improperly thawed on the countertop.

"After we find the most promising rinsing solutions, the next step would be to bring people in to a kitchen facility and test the results in a more realistic setting," she says.

Stay tuned for the next episode of marinade research from NMSU's food science labs.

D'Lyn Ford

Pouring on research: Food science professor Lisa McKee, left, and graduate student Fran Roybal demonstrate how to marinate a chicken breast in cranberry juice for a food safety experiment. Scientists want to know if marinating raw meat and poultry with cranberry juice or other common ingredients could give consumers extra protection against foodborne illnesses.

Jaguar surveillance

Caught in the glare of an automatic camera trap that sensed his silent passing, Panchito, a 150-pound wild jaguar, barely registers a flicker of interest as he pads past. Panchito seems just as determined to roam free as his namesake Pancho Villa, the elusive Mexican revolutionary who invaded New Mexico in 1916 and was chased into Mexico by U.S. forces but never captured.

The big cat is one of at least five rare, wild jaguars discovered by a team of NMSU wildlife researchers living in what amounts to an isolated ecological sanctuary deep in the mountains of northern Mexico, but less than 120 miles from the U.S. border. Though jaguars are the third-largest cats in the world, topped only by tigers and lions, they remain mysterious.

"Jaguars are probably the least studied large cats in the world," says Raul Valdez, a wildlife ecologist with NMSU's fishery and wildlife sciences department. And there's a good reason. The stealthy cats are solitary animals, often going to great lengths to avoid humans and even other jaguars, he says.

Many experts believed that the big cats had virtually vanished from the United States, but a few are still around. In 1996, two sightings were documented in the Baboquivari Mountains west of Tucson and in the Peloncillo Mountains, along the New Mexico-Arizona border.

Those discoveries led Valdez to ponder just where those cats came from. Soon he and his team were headed south, conducting field surveys along a natural wildlife corridor that runs from Douglas, Ariz., to Mexico's Sierra Madre Occidental Mountains. The search for *el tigre,* as the locals called the jaguar, turned up little until NMSU scientists arrived in Nácori Chico, a tiny Sonoran farming community.

Situated at the confluence of three rivers—Yaqui, Bavispe, Papigochic—the area is a transitional land zone that resembles tropics more than desert mountains. From horseback, the research team combed the mountains, plowing through dense vegetation to interview farmers and ranchers, as well as search for tracks and jaguar sign.

"We found *el tigre,*" says Octavio Rosas, a native of Mexico who leads NMSU's field studies as part of his doctoral research at NMSU. From jaguar tracks and camera traps, Rosas now knows there are at least three female and two male jaguars in the area. "They're well-fed and doing well."

Using a 130-square-mile region around Nácori Chico as an experimental base, researchers have several studies under way to determine the jaguars' feeding and breeding habits, along with their range. Scientists are also laying the groundwork for a mutually beneficial conservation agreement between local landowners and the jaguar population. The plan focuses on jaguars' ability to bring in new income for farmers and ranchers through ecotourism.

Easily identified by their bold polka-dot fur, jaguars are great cats in every sense of the word. Belonging to the genus *Panthera*, the big cat clan includes leopards, lions and tigers.

OCTAVIO ROSAS

Camera shy: A lithe adult jaguar, its eyes aglow, triggers a camera trap that is automatically activated by heat and motion. NMSU researchers have been clicking away along known jaguar corridors in the mountains of northern Mexico for the past two years.

The NMSU project is supported by a grant from the Bronx Zoo-based Wildlife Conservation Society.

"Little by little, we are beginning to piece together the life history of jaguars," says Alan Rabinowitz, WCS director of science and exploration. "This project will provide much-needed data to better understand these mysterious big cats in their northernmost range."

Norman Martin

Reaching out to parents

Kids don't come with instructions, but a four-year parenting study at NMSU reveals that classes for at-risk moms and dads can help create happier, safer homes.

"We know that parenting education classes can decrease teen pregnancy, school dropouts and juvenile delinquency," said Esther Devall, a child development expert with NMSU's family and consumer sciences department. "But we've also been able to show that targeted parenting education for high-risk parents can lead to greater empathy for children's needs, a decreased belief in corporal punishment, fewer inappropriate expectations of children and less reversal of parent-child roles."

Some parents, especially teen parents, think their children should take care of them both emotionally and physically.

"We tend to parent the way we were parented," she said. "If our parents yelled and hit, that's what we tend to do, especially under stress. But there are more effective ways to handle stress and children's misbehavior. Parenting is a skill that can be learned."

Family friendly science: Esther Devall, center, a child development expert with NMSU's family and consumer sciences department, reviews a parenting handbook with the Sanchez family. From left, Hanna, Dawn, Miranda and Sam Sanchez look on. A four-year study of parenting behavior at NMSU reveals that parenting education classes can significantly improve family life.

Many of New Mexico's low-income parents lack adequate resources to raise their children. The Children's Rights Council, a children's rights organization based in Washington, D.C., has rated New Mexico as one of the worst states in the nation to raise a child due to high rates of adolescent substance abuse, teen pregnancy and juvenile delinquency.

Since the program began in 1999 with NMSU parenting experts collaborating with Doña Ana County's Women, Infants and Children nutritional program, the parenting education effort has expanded statewide. A new $1.4 million grant from the New Mexico Human Services Department funds programs for expectant families, parents and their school-age children, families dealing with divorce, incarcerated parents, military families, abusive families and young fathers.

"This program helped me realize what I was doing wrong and what I'm doing right with my child," said Las Cruces resident Maribel Salmon, a December graduate who has an 18-month-old son, Carlos. "It made me feel good about myself as a mother."

The classes, which are offered in English and Spanish, meet weekly for two and a half hours for four to six months. Sessions are held in a variety of locations across New Mexico, including county Cooperative Extension Service offices, schools and health offices. During class, parents learn how to nurture their children and themselves, while children learn through activities and play.

"Many of our participants are parents who have huge challenges in their lives from transportation issues to lack of child care, but we've found that after coming to the program they get hooked," said Lisa Shields, associate director of NMSU's Parenting Education Programs. "They see the benefit of support both from the instructors and from other parents."

Norman Martin

Planting poplars

Prolific poplars: Above, Farmington science center superintendent Mick O'Neill and agronomy and horticulture student Renae Pablo visit a hybrid poplar plantation in Oregon. O'Neill, left, examines a hybrid poplar planted at the Farmington center. The trees are expected to grow to 90 feet in 10 years despite alkaline soils in the semiarid Four Corners.

A 26,000-acre plantation of fast-growing poplars will be planted on Navajo land as part of a tribal project to supply timber to wood-processing companies during the next decade.

The Navajo Agricultural Products Industry (NAPI) will invest $2.3 million over 10 years to grow nearly 800,000 trees after NMSU researchers demonstrated that some hybrid poplars thrive in the semiarid Four Corners. Planting will begin this spring with an initial $230,000 investment.

"If this first planting is successful and the NAPI administration goes forward with its plan, then we're talking about a small forest of hybrid poplars," says John Keenan, former director of NAPI's agricultural research and testing lab. "It's a huge undertaking that's the direct result of NMSU research on poplars."

Poplar research has been done in wetter states such as Washington and Oregon, but this is the first hybrid poplar study in alkaline soils in the semiarid Four Corners, says Mick O'Neill, superintendent of NMSU's Agricultural Science Center at Farmington.

"Hybrid poplars are fast growing, very productive trees that could bring significant benefits to local communities, but they've never been grown here commercially," O'Neill says.

Commercial hybrid poplar production has expanded to nearly 50,000 acres nationwide because of the trees' rapid growth and potential for use in wood products and quality paper. Growers in the Pacific Northwest and elsewhere supply poplars for pulp, timber and excelsior for evaporative cooling pads and soil conservation blankets, O'Neill says.

O'Neill is testing 20 hybrid poplar varieties. He has planted about 1,000 trees at the center since May 2002. "We saw right away that some of those varieties won't do well here, but a few of them are very productive," O'Neill says.

The best-performing variety is OP-367; some trees reached 15 feet in 16 months. "That variety has tremendous adaptation potential," O'Neill says. "It just shot right up after planting."

The center is now compiling water requirements for poplars based on research that shows the trees are extremely water efficient, O'Neill says. "Water requirements for these poplars are about two-thirds of what is needed for alfalfa, even when the trees reach 90 feet high."

Poplars take 10 years to reach commercial size, so NAPI will plant about 79,000 trees per year during the next decade, Keenan says.

"We want to establish an ongoing cycle with a new harvest every year after 10 years," Keenan says. "You don't have to replant poplars after harvesting. They grow right up again from the stump after you cut them down."

Colorado-based Western Excelsior Corporation says it will buy all the poplars NAPI can produce to replace timber from the San Juan National Forest. "It's a win-win situation," O'Neill says.

Kevin Robinson-Avila