Using Hot Water as a Solvent To Analyze Atrazine in Meat

Concerns about food and environmental quality underscore the need for quick, nontoxic analysis of food contaminants. That's why Agricultural Research Service scientists are developing cleaner analytical methods that use nontoxic solvents and a new technique called subcritical water extraction.

In laboratory studies, ARS postdoctoral research chemist Meredith S.S. Curren in Peoria, Illinois, is testing subcritical water extraction to remove potential contaminants from meat samples. Working under the direction of ARS chemist Jerry W. King at the National Center for Agricultural Utilization Research, Curren starts with highly purified water and heats it under pressure to 212˚F. That's as hot as water in a teakettle gets before boiling. Then she flows the hot, compressed water through a meat sample that's been mixed with an adsorbent to extract the pesticide residue.

Curren is using subcritical water extraction to remove atrazine from beef kidney samples. Atrazine is an herbicide widely used to control weeds in Midwest corn and soybean fields. The tolerance level for atrazine in livestock meat, fat, and meat byproducts is 20 parts per billion. But this level may change after the U.S. Environmental Protection Agency reviews atrazine for its potential as a food and environmental contaminant.

Federal agencies like USDA's Food Safety and Inspection Service need safer analytical methods like this one to check pesticide levels in foods. Traditional extraction techniques use toxic organic solvents, which are costly and unsafe for laboratory workers and the environment. These solvents also require safe disposal, which adds to the cost of their use. Filtered, purified water systems, however, are inexpensive and don't require a disposal system.

"Besides being safer for the lab worker, our method is faster than other analytical techniques," says Curren. She streamlined the technique by performing extraction and sample cleanup concurrently. Cleanup of lipids and proteins from the sample is required since the subcritical water extracts other components in addition to the target pesticide. The total time for analyzing atrazine in beef kidney with this new method is about 90 minutes. In a single day, the researchers can analyze a minimum of 20 samples.

The hot-water extraction method can also be used to analyze samples for other pesticides and antibiotics and their metabolic breakdown products. Use of this method by food-testing laboratories will ensure that the food we eat continues to be among the safest in the world.—By **Linda McGraw,** ARS.

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ARS Research Targets Bovine Viral Diarrhea and Other Pestiviruses

A new type of pestivirus in wildlife has been identified by Agricultural Research Service scientists. "Pestivirus" is a scientific term for a group of viruses that includes economically important ones such as bovine viral diarrhea (BVD) viruses and hog cholera virus, also known as classical swine fever virus. Pestiviruses can also cause reproductive failure and congenital defects in ruminant animals.

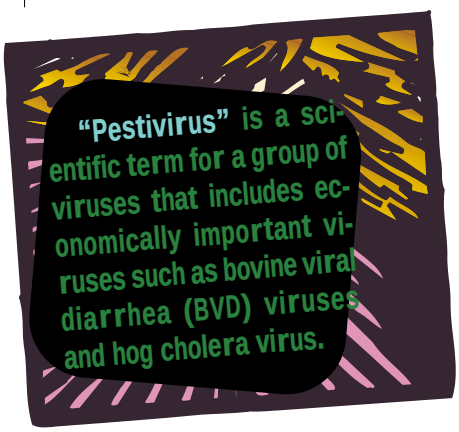
Microbiologist Julia F. Ridpath and others at ARS' National Animal Disease Center (NADC) in Ames, Iowa, characterized the new virus, which was isolated from antelope tissues by Wyoming State University researchers.

"While no disease is yet associated with the new pestivirus, its presence in wildlife is significant because wildlife come in close contact with domestic livestock and can transmit disease," says Ridpath. The identification of this new pestivirus is the result of ongoing research being done at NADC to improve the detection and control of pestiviruses.

Research on pestiviruses dates back to the 1930s, when USDA researchers showed that hog cholera was caused by a virus. They developed a test and a vaccine that led to eradication of hog cholera in the United States in 1978.

Current pestivirus research at NADC focuses on BVD viruses, which circulate in cattle herds, leading to lower milk production, poor feed conversion, and significant reproductive problems. They are the most important enteric viral agents of cattle in the United States. Although many commercial vaccines exist for BVD viruses, they continue to be one of the most costly disease problems facing U.S. cattle producers. Losses could be reduced if a quick, reliable, and technically simple test were available to field veterinarians.

With the goal of producing improved vaccines and diagnostics, ARS and ImmuCell Corporation of Portland, Maine, have entered into a research agreement to develop quicker, field-ready tests for detecting BVD viruses. And ARS and Intervet, Inc., of Millsboro, Delaware, have entered into a research agreement to develop a new, more effective vaccine for BVD viruses.—By **Linda McGraw,** ARS.



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