

New Vaccines May Help Thwart E. coli O157:H7

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Immunizing calves with either of two vaccines developed by ARS scientists may reduce the spread of E.coli O157:H7 bacteria.

(PhysOrg.com) -- Immunizing calves with either of two forms of a vaccine newly developed by Agricultural Research Service (ARS) scientists might reduce the spread of sometimes deadly Escherichia coli O157:H7 bacteria. The microbe can flourish in the animals' digestive tracts, yet doesn't cause them to show clinical symptoms of illness.

In humans, however, E. coli can cause bouts of diarrhea and, sometimes, life-threatening hemolytic uremic syndrome.

Research microbiologists Vijay K. Sharma and Thomas A. Casey developed the novel vaccines in their laboratories at the agency's National Animal Disease Center in Ames, Iowa and are seeking a patent for it.

Preventing *E. coli* O157:H7 from proliferating inside cattle helps limit contamination of meat at the packinghouse, and reduces shedding of the microbe into the animals' manure. Manure-borne *E. coli* can be moved by rainfall into drinking water. What's more, it can end up in irrigation water, and can contaminate fruits, vegetables or other crops, increasing risk of an outbreak of foodborne illness.

One form of the vaccine is comprised of cells of a strain of *E. coli* O157:H7 that is lacking a gene known as *hha*. A second form of the vaccine contains an *E. coli* strain lacking both *hha* and a second gene, *sepB*. In either vaccine, the *E. coli* strain produces a large quantity of what are known as immunogenic proteins. These proteins trigger the immune system response that prevents *E. coli* O157:H7 from successfully colonizing cattle intestines.

In preliminary tests, Holstein calves were immunized at age 3 months with a placebo or either form of the vaccine. Six weeks later, the animals were given a dose of *E. coli* O157:H7, and, for the next 18 days, their manure was tested for evidence of the microbe. Calves that received either [vaccine](#) had reduced or non-detectable levels of *E. coli* in their manure within only a few days after being inoculated with the [bacteria](#), Sharma and Casey found.

Some of the scientists' earliest work with the *hha* gene is documented in the journal [FEMS Microbiology Letters](#).

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