Kansas State University Research Foundation
TECHNOLOGY LICENSING PROFILE

Digital PCR Rapid Detection of Virulent *E. coli* in Meat Products

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Description: Researchers with the Kansas State University Veterinary Diagnostic Lab have created a new diagnostic technology that rapidly identifies virulence gene carrying Shiga toxin-producing *E. coli* pre- & post-harvest to improve the food safety of meat products for humans and pets.

Shiga toxin-producing *E. coli* ("STEC") is a major foodborne pathogen that causes more than 73,000 human illnesses and 20-60 deaths in the US each year. Only certain serogroups of STEC, i.e., O157, O26, O45, O103, O111, O121, and O145 are of the most importance for public health, especially those that carry *eae* (codes for intimin), *stx1* (codes for Shiga toxin 1), and *stx2* (codes for Shiga toxin 2) genes. USDA Food Safety and Inspection Services ("FSIS") requires the industry to test non-intact beef products (mainly ground beef and materials used for ground beef production) to confirm they are free of *E. coli* O157 STEC. **Regulations for testing six other serogroups (non-O157) will be in place soon, creating the need for higher efficiency diagnostic tools.**

The current FSIS testing protocols involve a conformational culture isolation procedure that normally takes a week to generate results. The main reason that culture-isolation is required and used most is because traditional PCR-based detection methods are not able to associate the virulence genes with the STEC O-groups. Virulence genes can be carried by different bacterial strains in the sample, but only the **STEC O-groups that carry certain virulence genes are considered important** for food safety.

Digital PCR greatly improves the efficiency over traditional PCR by reducing the time required from one week to two days. As an added advantage, Digitial PCR can also streamline the sample preparation and detection processes into a high throughput setting, especially when the 48-sample format is used.

Using our technology, samples can be collected from bacterial cultures, pre-harvest cattle feces & post-harvest meat products providing our commercialization partner(s) flexibility depending on application.

Advantages:

- Quicker: two days versus one week for the traditional method
- High-throughput format capability
- Flexibility in the type of sample that can be used

Patent Status: Patent Pending

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