

Study demonstrates the Efficacy of Individual and Combined Commercial Protective Cultures
Against *Listeria monocytogenes*, *Salmonella*, O157 and non-O157 Shiga toxin-producing
Escherichia coli in Growth Medium and Raw Milk

By Lindsay Pressman

In the United States, unpasteurized (raw) milk can be used to make certain cheeses, as long as these cheeses age for a minimum of 60 days as an alternative to pasteurization. Cheeses made from unpasteurized milk are favored by many consumers because of the complex aromas and flavors that the cheese possesses. However, using unpasteurized milk can be problematic because multiple studies have shown that bacteria that can cause food-borne illness (*Salmonella*, *Listeria monocytogenes* and Shiga toxin-producing *Escherichia coli*, including O157:H7 and non-O157:H7 serotypes) can still survive after the required aging period. In certain cases, it is possible that the aging process may increase the pathogen population and growth. This study, published in Food Control by Sulaiman F. Aljasir et al., entitled “The Efficacy of Individual and Combined Commercial Protective Cultures Against *Listeria monocytogenes*, *Salmonella*, O157 and non-O157 Shiga toxin-producing *Escherichia coli* in Growth Medium and Raw Milk”, describes the antimicrobial activity of a variety of commercially produced protective bacterial cultures when used individually and in combinations against *Listeria monocytogenes*, Shiga toxin-producing *Escherichia coli* (O157:H7 and non-O157:H7), and multi-drug resistant *Salmonella enterica*. An additional aspect to this study was to determine the efficacy of individual and combined protective bacterial cultures against these pathogens when co-cultured in raw milk post an incubation time and temperature profile similar to cheesemaking and ripening.

After the bacterial strains were prepared, nine individual protective bacterial cultures and 28 combinations were used to determine their antimicrobial activity. To determine the antimicrobial activity of protective bacterial cultures in raw milk, fresh raw milk was collected from locally produced milk, transferred to the laboratory and kept at 4°C before use. The pathogens were inoculated into the raw milk and were stored overnight at 4°C to simulate refrigerator storage of milk before making cheeses. All samples were incubated at 35°C for 4 hours and then left at room temperature for 20 hours to determine the antimicrobial activity of protective bacterial cultures. Then samples were kept at 12°C in an environmental chamber for six days to imitate cheese aging. After samples were incubated for 24 and 48 hours after plating at 37°C, they were evaluated for harmful bacteria.

The results gathered from the authors of this research establish the efficacy of commercially produced protective bacterial cultures and identify individual and combinatory treatments that can be used as natural strategies to control pathogens in raw milk cheeses. Possible synergistic activities were determined when various protective bacteria were combined. Co-culture results identify single and combination applications of protective bacterial cultures in controlling harmful bacteria in raw milk products. The protective bacteria and their synergistic combination have the possibility for use in differing food applications and the use of protective bacterial cultures is a promising plan to enhance food safety. It is necessary that further studies are conducted to foster a better understanding of the mechanisms associated with the synergistic combinations and the efficacy of protective bacterial culture treatments in raw milk cheeses.

“The identification and characterization of the antimicrobial activity of commercially available bacterial cultures is a major step towards the development and validation of preventive controls that can be readily implemented by the dairy and other food industries to enhance food safety.”

- Dr. Dennis D'Amico

To view the full article, Aljasir, Sulaiman, Gensler, Catherine, Sun, Lang & D'Amico, Dennis.

The efficacy of individual and combined commercial protective cultures against *Listeria monocytogenes*, *Salmonella*, O157 and non-O157 shiga toxin-producing *Escherichia coli* in growth medium and raw milk, visit: *Food Control* 109 (2019), Pages 1-12.