MedicalXpress

Improving food quality by studying the microbial composition of raw milk

August 23 2016

Findings from a new study, reported in the journal *mBio*, may help food companies improve the quality of dairy products. The researchers have discovered that bacteria in raw milk arriving at dairy processing facilities are highly diverse and differ according to season, but still contain a core microbiota.

"The ultimate goal in all of this research is to get dairy products with longer shelf life, less spoilage, and less waste. We don't know what kind of influences the environment has on the microbiome on our foods, and this study is a step forward in that direction," said Maria Marco, PhD, associate professor, Department of Food Science & Technology, University of California-Davis, and lead author of the paper. "If we can better understand and control the microbes coming into processing facilities, we can avoid some food waste."

The microbial composition of raw milk has an impact on the quality, shelf life, and safety of processed milk and other dairy products. While harmful bacteria rarely reach the consumer, because they are destroyed during pasteurization, other bacteria can cause spoilage issues or defects in the product, such as off-flavors in cheese, which can result in product being thrown away. While scientists have intensively studied the microbial ecology of fresh produce and animal products, little is known about the influences of storage, transport, and processing facilities.

In the new study, researchers set out to identify the microbiota of raw milks collected for large-scale product manufacturing in California.

California is the largest producer of milk in the United States, producing 20% of the total U.S. milk production. The scientists analyzed the bacteria in raw milk arriving in 899 tanker trucks at two different dairy processors in the California Central Valley in the fall of 2013 and the spring and summer of 2014.

Bacteria varied by season and were highly diverse, with roughly 50% of the taxa present at less than 1% relative abundance. As a comparison, roughly 20% of human fecal communities are composed of taxa below 1% relative abundance. Milk also had a core microbiome composed of 29 different taxa, including *Streptococcus, Staphylococcus*, and unidentified *Clostridiales*.

Another important finding was what happened to the milk after it got into the dairy processing plant. "We saw this interesting shift of the types of bacteria that are dominant in the milk when it goes from the truck to silos where the milk is stored before pasteurization," said Dr. Marco. The effects of the processing facility outweighed the raw milk microbiome and the microbial composition changed distinctly within some, but not all silos, a short time after transfer.

By knowing the types of microbes present in foods, scientists can devise ways to manage or get rid of spoilage microbes, so they don't make their way into the final product and cause quality problems. "This study was an exploratory mission to find out what types of bacteria are in our raw milk and what happens to them when they reach the built-environment," said Dr. Marco. "We now need to tackle the bigger problem of how can we control those microbes in an effective way."

Provided by American Society for Microbiology