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Newly developed medium may be useful for human health, biofuel production, more

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Texas A&M University System scientists from the departments of nutrition and food science and poultry science have developed a new medium for the cultivation of beneficial microorganisms called lactobacilli.

A better understanding of lactobacilli metabolism can help improve feed efficiency in animals and combat malnutrition in humans, according to the researchers.

"Lactobacilli are normal residents of the human gastrointestinal and urogenital tracts, where they promote host health and can be taken as probiotics," said Dr. Joseph Sturino, a Texas A&M AgriLife Research assistant professor in the department of nutrition and food science, Texas A&M's College of Agriculture and Life Sciences, and lead investigator for the study.

Other lactobacilli are used to manufacture fermented food products and to drive the bioconversion of waste streams into value-added products, such as biofuels and prebiotics.

"Unfortunately, the nutrient compositions of media that are traditionally used to cultivate lactobacilli are largely undefined," said Dr. Rani Menon, an AgriLife Research postdoctoral research associate who conducted this research.

This lack of definition complicates their use when trying to identify

nutrients to stimulate the growth and metabolic activity of these important microorganisms.

To address this need, Sturino and Menon, along with undergraduate researcher Meredith Shields and assistant professor of poultry science Dr. Tri Duong, set out to develop a better-defined medium for use in metabolic screens.

"We devised a series of single-component omission experiments to determine which undefined ingredients found in the current 'gold standard' medium could be eliminated or replaced," he explained. "Concentration titration experiments were then used to fine-tune the final formulation in order to support the growth of a benchmark species of interest."

As a result of these experiments, the overall contribution of undefined components, such as peptone, yeast extract and beef extract, was reduced by 70 percent in the final formulation of the new medium.

According to Menon, the new medium not only supported biomass accumulation comparable to the current medium, it also exhibited greater semi-selectivity against non-lactobacilli. "Together, these results suggest that the new medium is an acceptable alternative for use in many metabolic bioassays," she said.

Additionally, the pale yellow coloration and clarity of the new medium is significantly lighter than that of the current standard medium, know by the abbreviation MRS, which is amber in color.

"The improved coloration and clarity may also afford this new medium greater sensitivity for use in assays that measure biomass accumulation or use in molecular reporter systems," he said.

Sturino said the resultant medium will be used to identify new bioactive compounds capable of supporting the growth or activity of these important microorganisms.

"Bioactive compounds of interest might include those relevant to food and nutrition, such as in the screening for prebiotic compounds that may confer a health benefit, as well as compounds that might accelerate the production of biofuels," he said.

Provided by Texas A&M University