

Luis Rodriguez-Saona is helping Ohio's cheese industry go high-tech, boosting quality and profits.

CHEESEMAKING GOES HIGH-TECH

For those in the dairy business, “the power of cheese” lies in the product’s profitability. But much of cheese production is still done the old-fashioned — and not very cost-effective — way.

Now, food scientists Luis Rodriguez-Saona and Jim Harper have harnessed the power of science and technology to improve the quality of cheese and the efficiency of the cheese-making process.

The technique they’ve developed, using Fourier transform infrared (FTIR) spectroscopy, has been patented, and they’ve shown it is valuable not only for the cheese industry, but also for wider uses, such as quick measurement of phytochemicals in potatoes, tomatoes, and other plant-based foods, and rapid identification of food-borne pathogens.

With cheese, though, “the main objective is to predict flavor quality,” Rodriguez-Saona said. “But we’re also very interested in learning the chemical changes that take place during ripening.” FTIR more than fills the bill. The technology is important to Ohio, which is first in the nation in Swiss cheese production and ranks in the top 10 for production of all cheese (excluding cottage cheese).

Cheeses get their flavor from a complex matrix of compounds that develop during ripening. Still today, most cheese is graded by sensory panels of specially trained people who smell and taste the product.

“There have been many attempts to use technology to grade cheese,” he said. But those methods were costly, time-consuming, and required a substantial amount of skill and laboratory equipment. Using this FTIR technique is quick, and so simple that almost anyone could do it, Rodriguez-Saona said.

The technique is based on the principle that different chemical compounds respond differently when exposed to infrared light. These responses produce a fingerprint spectrum showing the sample’s overall chemical composition, including protein, fat, sugars, and moisture content and the type and amount of organic, amino, and fatty acids, all of which affect cheese flavor and texture.

Even better: The technology can predict the final product’s quality early in the ripening process, which, depending on the cheese, can last for weeks to years.

“We found that most of the changes during cheddar cheese ripening occur between the first 15 to 30 days.” Companies can use FTIR during the early stages of ripening to predict which cheeses will end up as high quality, and which will likely have to be diverted to processed cheese products.

“Manufacturers may even be able to take corrective steps to improve the final product,” Rodriguez-Saona said. “At the very least, they will be better able to manage their inventory.”

Much of the research has been made possible by funding from Ohio’s cheese industry, the Ohio Agricultural Research and Development Center and the Midwest Advanced Food Manufacturing Alliance (MAFMA). For more information on FTIR and its applications, contact Rodriguez-Saona at rodriguez-saona.1@osu.edu or (614) 292-3339. ■ MARTHA FILIPIC

