Cheese Chemistry: Is Your Parmesan Legit?

By Alex Berezow, PhD — May 22, 2016

Technological advances have made it rather easy to detect food fraud. The seafood industry, in particular, is rife with dishonesty. In 2014, the Los Angeles Times reported [1] that 93 percent of fish samples labeled "red snapper" were actually some other species, like tilapia. And more than half [2] of what you think is tuna isn't tuna.

Europeans are particularly touchy about their food. What Americans call Parmesan cheese is an abomination to Europeans. According [3] to Forbes travel and food writer, Larry Olmsted, authentic Parmigiano-Reggiano cheese:

"... is allowed to contain only three very simple ingredients: milk (produced in the Parma/Reggio region and less than 20 hours from cow to cheese), salt, and rennet (a natural enzyme from calf intestine). Three other ingredients, Cellulose Powder, Potassium Sorbate, and Cheese Cultures are not found in Parmigiano-Reggiano – they are completely illegal in its production. Yet all three are in Kraft 100% Grated Parmesan Cheese."

Even worse, Bloomberg reported [4] that the third-rate cheese that passes as Parmesan in America might contain more cellulose (a safe filler derived from wood pulp) than it ought to, or it might be a cheaper cheese altogether, such as cheddar.

A research group in Italy has had enough. In an effort to clamp down on counterfeit food, it has devised a chemical test to help determine the authenticity of Parmigiano-Reggiano cheese. Researchers results are published in the Journal of Agricultural and Food Chemistry.

For cheese to be considered authentically Parmigiano-Reggiano, it must not be produced from a cow that was given ensiled feed [5]. Thanks to this new research, however, the scofflaws who...
violate the law can be easily caught with a very simple technique used in chemistry laboratories. The bacteria that live inside cows, which help them digest their food, produce various kinds of fatty acids. One of them, called cyclopropane fatty acid (CPFA), is not produced by bacteria dwelling inside cows that are following the strict diet enforced by European cheese laws. CPFAs are produced, though, by bacteria living inside cows that are fed ensiled feed. Thus, detecting CPFA in cheese serves as a telltale fingerprint that it is not authentic Parmigiano-Reggiano.

Detection is easy and straightforward. The authors subjected cheese samples to gas chromatography-mass spectrometry, which essentially separates organic molecules based on their boiling point and mass. Phony Parmigiano-Reggiano contains a peak clearly identifiable as CPFA.

Using their technique, the authors were even able to tell if pure cheese had been contaminated with pseudo-Parmigiano-Reggiano.

Cheese cheats, you've been warned.

Source: Augusta Caligiani, Marco Nocetti, Veronica Lolli, Angela Marseglia, Gerardo Palla. "Development of a Quantitative GC-MS Method for the Detection of Cyclopropane Fatty Acids in Cheese as New Molecular Markers for Parmigiano Reggiano Authentication." J. Agric. Food Chem. Published online: 02-May-2016. DOI: 10.1021/acs.jafc.6b00913

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