Big. Fat. Research.

by Jacoba Poppleton
Making customers happy is big business. Positive consumer response drives all aspects of the food industry. Pinpointing exactly what characteristics in food make consumers the happiest is a job recently taken on by USU researcher Silvana Martini.

Martini, an assistant professor in the department of nutrition, dietetics and food sciences, conducts research with an end goal of improving food quality and fighting obesity, cardiovascular disease and diabetes. Using state-of-the-art technology, Martini and her team work on a number of projects to improve the quality and nutrition of foods—and to do so in a way that will keep consumers happy and coming back for more.

Using high-tech ultrasound technology, Martini and her team are working to develop health(ier) fats that offer the same taste and texture of dreaded, and dangerous, trans fats.

Fat Crystals
Have you ever eaten room-temperature butter that was a bit crunchy? Consumers find the experience jarring and unappetizing because of preconceived expectations about the way butter should taste and the way it should feel on your tongue; we expect butter to be hard when it comes out of the fridge and
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soft when it melts; we expect butter to be silky smooth.

“It’s the fat in the butter that gets crunchy—the lipids in the butter crystallize as they change temperature,” said Martini. “It’s the crystallized lipid that crunches, the presence of big lipid crystals—a sensation most consumers do not like.”

The size of the crystals don’t change the way food tastes; the size of the crystals changes the way the food feels. Consumers simply don’t like it.

Consumer acceptance is big business for food companies who have in recent years had to find alternatives to trans fats. “Trans fats are bad for us but good for food structure even though they tend to crystallize more,” according to Martini. “When trans fats are taken out of foods, something has to replace them.”

Using high intensity ultrasound technology, Martini changes the structure of healthy fats to behave like a trans fat would, but without big lipid crystals.

“This ultrasound technology has a wide range of applications,” said Martini. “The filling in sandwich cookies, for example, can’t be too hard or too soft. Consumers expect the filling to be a certain way.” Meaning, of course, that consumers want cookie filling to be as it was when manufactured from trans fats—smooth and soft.

The same can be said with chocolate candy bars—the white film that is sometimes found on a discounted candy bar at a gas station isn’t mold; it’s crystallized fat from changes in temperature.

“All products that formerly contained trans fat are suffering from the same problem,” said Martini.

In 2009 Martini received a grant from the U.S. Department of Agriculture to fund her research, which includes applying high intensity ultrasound to a fat that is more heart-healthy than trans fat. She is currently in the initial phases of applying the high intensity ultrasound technology.

Whey Too Heavy

The problem with protein-rich energy drinks is that they all taste just about the same: malty, heavy, thick and hard to swallow. Martini knows this and so does the food industry—consumers want something else in a protein energy drink. Consumers want a clear drink loaded with protein, not one weighed down and hard to drink after a strenuous workout.

Whey proteins suspended in water make these drinks malted in texture. The problem? Consumers don’t love the texture and taste of the whey protein—something that is
A lexicon is a list of words often used by a specific group. Wine enthusiasts, for example, have developed a lexicon of terms to identify flavors in wine and give consumers an idea of what to expect before purchasing or opening a bottle.

Consumers want to know what to expect—they want to know what their dollar is purchasing, even in intangible terms. Knowing flavors ahead of time gives consumers an idea of what to expect.

Developing lexicons to give consumers an idea of flavors in other items—meat, for example—is another way Martini’s research helps to keep consumers happy.

With a grant from the National Cattlemen’s Beef Association, Martini, along with USU researchers Robert Ward and Daren Cornforth, has developed a lexicon with eighteen terms that can be used to describe the flavor of meat. They have plans to develop more terms in the lexicon for flavor identification and correlate them with chemical compounds in the meat itself.

“Our lexicon is similar to the one used to distinguish and describe the flavors in wine,” said Martini.

What Martini has learned from her work with Ward and Cornforth is that grass fed cows, according to consumers, fit into categories labeled as gamey, grassy, barny, less fatty and less juicy. Martini’s study showed that consumers like grass-fed beef less than corn-fed beef—a preference that is distinct to the demographic surveyed.

In the future these flavor lexicons developed by Martini, Ward and Cornforth can help characterize meat in grocery stores across the country. Labels like “gamey” or “barny” can help consumers identify products they wish to purchase and instruction packets could provide guidance to consumers wishing to mask undesirable qualities found in the meat itself.

of major concern to Dairy Management Incorporated, the entity funding Martini’s whey research. This research was performed in collaboration with Marie Walsh, an associate professor in nutrition, dietetics and food sciences at USU.

“One of the biggest problems with whey is its astringency,” said Martini. “People are put-off by the drying effect it has on their mouths—a serious problem if you market your product to consumers of energy protein drinks.”

Using the same ultrasound technology used to change the crystallization of lipids in fats, Martini and Walsh have developed a method to decrease the turbidity of the whey and increase clarity. Whey proteins could soon find their way into clear energy drinks and could fill a niche unsatisfied by current products.