Halos and horns: Fixing the 'taste' of diet soda

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University of Illinois researchers Soo-Yeun Lee and Shelly Schmidt are trying to solve a mystery: Why doesn't diet soda taste more like regular soda? Can a well-trained panel of "taste testers" pinpoint the exact problem? And can food scientists do anything to fix it?

"If we could make diet soda taste better, it would be a big step in fighting the obesity epidemic," said Shelly Schmidt, a U of I professor of food chemistry. "Many people know they should cut calories, but they won't drink diet pop because they don't like the taste."

Consumers may claim they don't like diet soda because of artificial sweeteners, but Schmidt and sensory scientist Lee think people are also influenced by a subtle difference called "mouth-feel." Think body, fullness, thickness; regular soda contains high-fructose corn syrup, diet soda doesn't.

What makes these scientists think mouth-feel is the culprit? For one thing, artificial sweeteners have been greatly improved and extensively studied. "Taste profiles for artificial sweeteners now closely match the one for sucrose, which humans describe as the perfect sweetness," Lee said.

But the most compelling piece of evidence is the verdict of Lee's sensory panel--12 people trained for four weeks to use a 15-point scale in order to rate the characteristics that contribute to the mouth-feel of diet and regular soda. Lee called her panelists "highly trained instruments"

because they could detect significant differences in the mouth-feel of 14 samples that the scientist's super-sensitive lab instruments identified as very, very small.

"We worked with solutions of sucrose and high-fructose corn syrup, asking panelists to detect when beverages began to differ from water in mouth-feel. And they were able to accurately identify varying degrees of viscosity on our 15-point scale," Lee said.

"The human mouth cavity appears to be a super-rheometer (the lab instrument that measures viscosity or thickness)," Schmidt added.

Enjoying food, according to the scientists, is more complicated than you'd think, involving not only taste and mouth-feel, but aroma, vision, and even hearing.

"If you bite into an apple and it doesn't crunch, it affects your perception of the way the apple tastes. And if a beverage doesn't feel right in your mouth, that affects your perception of the way the beverage tastes too," said Lee.

All kinds of things affect the way we complicated humans make sensory "sense" of our food. Sensory scientists say an attribute has a halo effect if that attribute is enhanced by other characteristics of the product. If a sensory attribute is decreased by other characteristics of the product, it is said to have a horns effect.

"For example, when color was added to a lemon-lime beverage, panelists believed the beverage had more body (a halo effect). But color also influenced the panelists to think that the beverage had less carbonation (a horns effect)," Lee said.

The scientists found that flavor really can make a difference in the

acceptance of diet drinks. It's not all haloes and horns, or even hype, Schmidt said.

"We think the lemon-lime flavor, which is exciting to the mouth, helps mask the mouth-feel difference, and that's why diet lemon-lime drinks were perceived as tasting more like their non-diet counterpart than cola-flavored drinks," Lee said.

"It's probably also the reason the new lime diet colas are so popular. The sour taste of the lime works with the carbonation to keep the mouth busy so the consumer doesn't notice the lack of body as much," she added.

Ideally the scientists would like to find an ingredient that gives body to diet soft drinks without adding calories or other unpleasant side effects. "We've identified the problem, but we haven't solved it yet. We need to find an ingredient that has no calories but gives the same mouth-feel as sucrose," they said.

When science finds that ingredient, the researchers believe diet drinks will be a lot more appealing to people who want to make the switch from regular to diet soda.

Source: University of Illinois at Urbana-Champaign