More healthful milk chocolate by adding peanut, coffee waste

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Milk chocolate is a consumer favorite worldwide, prized for its sweet flavor and creamy texture. This confection can be found in all types of treats, but it isn't exactly health food. In contrast, dark chocolate has high levels of phenolic compounds, which can provide antioxidant health benefits, but it is also a harder, more bitter chocolate. Today, researchers

report a new way to combine milk chocolate with waste peanut skins and other wastes to boost its antioxidant properties.

The researchers will present their results today at the American Chemical Society (ACS) Fall 2020 Virtual Meeting & Expo.

"The idea for this project began with testing different types of agricultural waste for bioactivity, particularly peanut skins," says Lisa Dean, Ph.D., the project's principal investigator. "Our initial goal was to extract phenolics from the skins and find a way to mix them with food."

When manufacturers roast and process peanuts to make peanut butter, candy and other products, they toss aside the papery red skins that encase the legume inside its shell. Thousands of tons of peanut skins are discarded each year, but since they contain 15% phenolic compounds by weight, they're a potential goldmine of antioxidant bioactivity. Not only do antioxidants provide anti-inflammatory health benefits, they also help keep food products from spoiling.

"Phenolics are very bitter, so we had to find some way to mitigate that sensation," Dean says. In fact, the natural presence of phenolic compounds is what gives dark chocolate its bitterness, along with less fat and sugar compared to its cousin milk chocolate. Dark varieties are also more expensive than milk ones because of their higher cocoa content, so the addition of a waste like peanut skins provides similar benefits for a fraction of the price. And peanut skins are not the only food waste that can enhance milk chocolate in this way; the researchers are also exploring the extraction and incorporation of phenolic compounds from used coffee grounds, discarded tea leaves and other food scraps.

To create their antioxidant-boosted milk chocolate, Dean and her team of researchers at the U.S. Department of Agriculture's (USDA's) Agricultural Research Service worked with peanut companies to obtain

the peanut skins. From there, they ground the skins into a powder, and extracted the phenolic compounds with 70% ethanol. The lignin and cellulose left behind can be used in animal feed as roughage. They also worked with local coffee roasters and tea producers to obtain used coffee grounds and tea leaves, using a similar methodology to extract the antioxidants from those materials. The phenolic powder is then combined with maltodextrin, a common food additive, to make it easier to incorporate into the final milk chocolate product.

To make sure their new confection would pass gastronomic muster, the researchers created individual squares of chocolate with concentrations of phenolics ranging from 0.1% to 8.1% and had a trained sensory panel taste each one. The goal was to have the phenolic powder be undetectable in the flavor of the milk chocolate. The taste-testers found that concentrations over 0.9% were detectable, but incorporating the phenolics at 0.8% resulted in a good compromise of a high level of bioactivity without sacrificing flavor or texture. In fact, more than half of the taste testers preferred the 0.8% phenolic milk chocolate over the undosed control milk chocolate. This sample had higher chemical antioxidant activity than most dark chocolates.

While these results are very promising, Dean and team also acknowledge that peanuts are a major food allergy concern. They tested the phenolic powder made from the skins for presence of allergens, and while none were detected, they say that a product containing peanut skins should still be labeled as containing peanuts.

Next, the researchers plan to further explore the use of peanut skins, coffee grounds and other waste products into additional foods. In particular, Dean is hoping to test whether the antioxidants in peanut skins extend the shelf life of nut butters, which can go rancid quickly because of their high fat content. While commercial availability of their boosted chocolate is still a ways off and subject to corporate patents,

they hope that their efforts will eventually lead to a better milk chocolate on supermarket shelves.

More information: Enhanced bioactivity of milk chocolate using extracts from food processing waste materials:

Abstract
Dark chocolate is noted for its health benefits which have been attributed to small molecule phenolic compounds such as flavonoids. It is also noted for its increased bitter flavor and hard texture over more popular chocolate products such as milk chocolate. Other foods such as nuts, peanuts, coffee, tea, and various dark fruits contain the same or similar small molecule phenolic compounds. These compounds are also present in the processing waste material from these food products. Using peanut skins, a waste product of the peanut blanching industry as a case study, the development of a functional food ingredient was prepared. Aqueous ethanolic extracts were prepared from peanut skins and their phenolic compounds characterized. The extracts were found to consist of catechins and other procyanidins. The extracts were encapsulated with maltodextrin to create a free flowing powder. After incorporation at levels from 0.1 to 8.1% into molten milk chocolate, the matrix was molded to form individual squares. The resulting chocolate products were analyzed for chemical antioxidant activity using the DPPH assay. Sensory analysis using consumers was conducted and it was found that the consumer threshold for detection of the presences of the ingredient was above 0.9% which produced a product with DPPH activity higher than dark chocolate. When the ingredient was incorporated at a level of 0.8%, 60% of the consumers preferred the flavor of the dosed product to the untreated control. This indicates that extracts of waste peanut skin material can provide bioactivity to milk chocolate without interfering with the preferred taste. Other waste streams from food processing that contain similar compounds would be candidates for this treatment and lead to increased utilization and economic value.