

U.S. NEWS

Pepper Popularity Puts Heat on Measurement

When Jason McNabb, a Kentucky dentist, set world records in 2013 and 2014 for eating blazing-hot chili peppers, the intensity of the fruits he consumed was measured with a metric called the Scoville Scale.

This way of estimating how hot chilis taste was invented in 1912 by American pharmacologist Wilbur Scoville, whose contribution was recognized earlier this year when Google posted a Doodle on its search engine page in honor of his 151st birthday.

Mr. Scoville's standard, which measures hotness in Scoville Heat Units, is well-known to competitive chiliheads in pursuit of searing challenges. But there are other, more practical reasons for measuring chili heat.

Capsaicin, the chemical that is primarily responsible for the burning sensation caused by the peppers, is also used in products such as cough drops, analgesic creams and pepper spray. The peppers punch up foods ranging from salsa to bubbling bowls of chili. And mild varieties lend their red hue to candy and cosmetics.

"It's the No. 1 red food coloring in the U.S.," said Paul Bosland, director of New Mexico State University's Chile Pepper Institute,

which uses the Spanish spelling of chili. "It's a natural coloring agent."

To ensure consistent and appropriate levels of heat for different products requires a method for quantifying their pungency.

Mr. Scoville, who worked for Parke-Davis pharmaceutical company, needed to standardize the production of medical ointments that used capsaicinoids, and back in the day, the tongue was the most accurate instrument for the task.

He extracted capsaicinoids from chili peppers then watered the chemicals down until three of five tasters could no longer detect their heat. The ratio of the dilution served as the measurement of the pepper's heat. The bigger the number—indicating a larger amount of water was needed to dissipate the heat—the hotter the pepper.

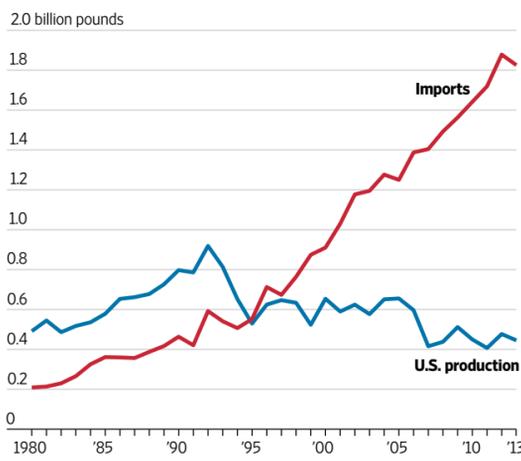
Pure capsaicin measures 16 million Scoville Heat Units. In comparison, jalapeños measure a tolerable 2,500 to 5,000 SHUs. Cayenne comes in at a respectable 30,000 to 50,000 SHUs. And habaneros are a feisty 80,000 to 150,000 SHUs.

But there were some built-in complications with using tongues to test hot stuff.

"The problem with the method is you get tasters fatigue," Dr. Bosland said. "Tasters can only sample so many dilutions before their mouths say they can't do it anymore."

Feeling Hot Hot Hot

Although domestic production of chilis has declined, imports have increased steadily to keep pace with demand. Food purveyors, drug makers and others who use the hot peppers must be able to measure the intensity of their heat.



Sources: Agriculture Department; Chile Pepper Institute (Scoville scale)

In addition, not everyone has the same number of heat receptors in their mouths. Capsaicin doesn't raise the temperature in the mouth; it triggers pain receptors that send a signal to the brain, which interprets the pain as heat. The more receptors someone has, the more sensitive they are.

Now, a machine using a process called high-performance liquid chromatography measures the exact quantities of capsaicinoids in chili peppers and, thanks to increasing demand, the process is more important than ever.

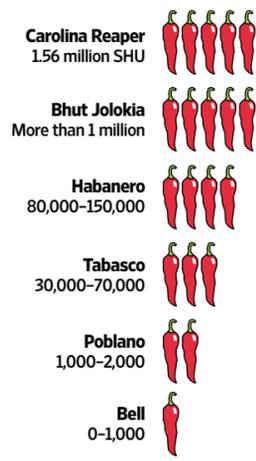
Although U.S. production of chili peppers has fallen in recent years, imports climbed from 209,000 pounds in 1980 to more than 1.8 million pounds in 2013, according to the U.S. Department of Agriculture.

Kalustyan Corp., an industrial supplier that sells ingredients to other companies, won't say exactly how much it imports, but most of its peppers arrive from India in 20-metric-ton containers filled with bales that weigh 200 to 400 pounds each.

"Most customers use our peppers in blends," said Greg Lightfoot, the company's vice

Measuring the Heat

The Scoville scale is a measurement of the heat of chili peppers. The hottest chilis exceed 1 million Scoville Heat Units.



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laca, pasilla and habanero.

"We sell flavor," said Kirk Bewley, the company's president. "The heat just kind of comes along for the ride."

The hottest part of a chili pepper, Mr. Bewley said, is the white membrane that attaches the seeds to the inside of the pod—not the seeds themselves, as many people believe. Some like it hot, Mr. Bewley said, but, a self-described lightweight, he's not one of them.

"There have always been people who love crazy hot stuff," he said. "Are you looking for heat or are you looking to blow your head off?"

Thanks to Mr. Scoville and those who have improved his method, spice vendors, pharmaceutical companies and chiliheads know what they're in for before the heat is on.

Dr. McNabb set his first record by downing a dozen ghost peppers measuring a blistering 1 million SHUs in 25 minutes. He set his second record when he scarfed down three Carolina Reapers measuring an even hotter 1.56 million SHUs in 10.95 seconds.

"It's a little bit of pain for a big payoff," he said.

Dr. Pepper, as he is nicknamed, is still up for a chili challenge, but this year he intends to inflict a different sort of pain on his body when he runs his first marathon.

More pain. What is it with dentists?

RALLY

Continued from Page One
sure them on the hourlong call, Mr. Arnopolin stressed that a global recession would be avoided, that oil prices would bottom and that bargains were at hand. He thought he might convince some investors to shift more money into his funds. But afterward, at the group's New York office, Mr. Arnopolin and his colleagues grew edgy as the phones remained mostly silent.

"I thought we could get people excited, but it went into a void," Mr. Arnopolin said. "Everything was collapsing."

The next day, the panic broke. Stocks, oil prices and U.S. Treasury yields hit their 2016 lows, then the market roared higher.

Now that emerging-market bonds are rallying and oil has steadied, Mr. Arnopolin finally is seeing a pick-up in interest in emerging-market funds.

The hair-raising volatility of the first two months of the year underscored in dramatic fashion how investors are struggling for direction in markets that have lost all of their main underpinnings. For the better part of a decade, there had been nothing more certain than easy money from the Fed, steady growth from China and a commodities boom that lifted many nations.

All three disappeared at once over the course of 2015. In their wake was nothing but questions: What would happen when China and the Mideast started liquidating assets instead of buying them? Where were the risks hiding in all the debt that had been issued over the past half decade? And could the U.S. economy withstand the fallout?

The first semblance of an answer this year was an upbeat report on U.S. retail sales on Feb. 12 that showed the American consumer had kept on spending through the turmoil—which wouldn't be happening if the markets' fears of a recession were correct. A strong jobs report three weeks later provided further evidence that the U.S. economy wasn't losing traction.

Yet while investors have for now set aside the concerns that consumed them in January and February, few are taking much comfort in the reversal. Heavy intervention by central banks has failed to lift the economic malaise that has persisted since the financial crisis. It has, however, raised the risk of unexpected shocks as investors adjust to the unprecedented new reality of



'Markets go a little manic sometimes,' said David Rosenberg of Gluskin Sheff & Associates.

negative rates, competitive currency devaluation and the reversal of a once steady flow of cash from emerging markets.

Oil remains in a glut, stock valuations are high by historical standards and the earnings of S&P 500 companies have fallen from year-ago levels for three straight quarters. With growth softening, few investors foresee an imminent reversal of any of those trends.

"Markets go a little manic sometimes," said David Rosenberg, chief economist at Toronto asset manager Gluskin Sheff & Associates Inc., which manages \$6.4 billion. "We've gone from fear to complacency very quickly."

The turn in sentiment started with early buying by people like Mr. Arnopolin and the Goldman team, who were at the center of the worst turmoil.

By late January, investors were demanding risk premiums for emerging-market bonds that were close to 5 percentage points above supersafe Treasury bonds—about the same yield spread they were receiving at the depths of the financial crisis in early 2009.

The selloff didn't make sense to Mr. Arnopolin. Falling oil prices shouldn't cripple the ability of most emerging-market countries to pay their debts, he argued to colleagues. Even commodity exporters didn't have a lot of government debt denominated in dollars.

In late January, Mr. Arnopolin and the Goldman Sachs emerging-market team began to buy. They snapped up more than \$1 billion worth of debt issued by Ghana, Ivory Coast and the Dominican Republic, as well as debt issued by bigger economies like Turkey and South Africa. The Goldman team even bought some Vene-

Bounce Back

The Standard & Poor's 500 moved to positive territory for the year on Friday.



Source: WSJ Market Data Group

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zuelan debt trading at less than 30 cents on the dollar.

Goldman's bet looked like folly on Feb. 17, when Standard & Poor's Ratings Services downgraded a large swath of emerging-market bonds.

But over the past month, the bonds have rallied back along with other investments, scoring recent gains of as much as 10% for the Goldman

fund managed by Mr. Arnopolin.

Today, the Venezuelan debt trades for about 37 cents on the dollar, a gain of over 20% since the lows of 2016.

Mr. Arnopolin remains wary of China but he is more upbeat on other countries and markets overall—mainly because he thinks the worst is over for oil prices, which he says could

top \$50 over the next year.

Oil prices have surged more than 50% since they hit a yearly low of \$26.21 on Feb. 11. On Friday, the International Energy Agency said that oil prices may have bottomed out, and it forecast U.S. output to decline by nearly 530,000 barrels a day this year, potentially pushing the market into better balance.

But this rally could lead to its own demise, many analysts warn. Higher prices will likely encourage shale producers to ramp up output again, at least at some point, muddying any forecasts for shrinking U.S. supply. Shale wells can be drilled and fracked within a matter of months, compared with the years it can take to complete other types of oil wells, though many producers would have to rehire employees and take other steps that could take a while.

Whipsaw trading has tested many traders. As global financial markets convulsed in early 2016, Paul Markham reminded himself not to check his smartphone overnight to see what markets in Asia were doing.

"It wakes you up and you start watching it, and it can play on your mind," said Mr. Markham, the London-based manager of a \$1 billion international stock fund managed by Newton Investment Management, a unit of Bank of New York Mellon Corp. with \$69 billion under management.

Mr. Markham went into 2016 anticipating a challenging period for markets following years of steady gains. But he didn't expect it to happen so fast. The Bank of Japan's decision to adopt negative interest rates in late January came as a particular surprise.

"There was a sense of something strange happening," the 43-year-old said.

That day, Mr. Markham and his colleagues met for much longer than their usual 15 min-

utes to discuss the implications of Japan's move on banks and companies in the country. Managers also debated whether the European Central Bank might respond with a strong easing of its own, which could make it harder for banks to be profitable. An investment the fund had in a Swiss bank was performing poorly amid worries about new problems in the European banking system. Following the meeting, the fund sold its shares in a Japanese financial firm.

During the market turmoil, Mr. Markham's fund added to positions in defensive stocks such as companies in the tobacco and food industries, and bought some high-dividend-yielding stocks to weather the storm. Through February, his fund was down 8% since the start of the year, in line with its benchmark. Recent gains have taken its year-to-date performance to negative 4.4%.

Peter Andersen, the Boston-based chief investment officer of Congress Wealth Management who oversees accounts for the wealthy and manages a mutual fund that owns just 20 stocks, arrived at work on the morning of Jan. 4 shocked by deep dives in stocks from Asia to Europe.

Even as he spoke, his \$25 million mutual fund was reeling. By mid-February, it was down 19% year to date, its worst-ever performance.

At the height of the market rout, "everything was moving in the same direction, and that's the thing we hate to see," said Mr. Andersen. "Sentiment was just so overpowering. We were in a storm and not getting any clear signals." He decided to stick with his holdings.

"We were hanging in tight, because this is very much an anomaly," he said. The decision was fortuitous as the fund's value surged 22% from mid-February to mid-March, recouping its earlier losses.

CORRECTIONS & AMPLIFICATIONS

The Dow Jones Industrial Average turned positive for 2016 this week after spending the first two and a half months of the year in the red. A Money & Investing article Friday about Thursday's market moves incorrectly said three and a half months.

President Barack Obama's first inauguration took place in 2009. A Page One article March 7 about the peer pressure on government staffers to

have seen the Broadway hit "Hamilton" incorrectly said that inauguration took place in 2008.

A photo of the estate of Martien de Groene and Yvonne van der Linden that accompanied a Mansion article Friday about Wassenaar, the Netherlands, showed two five-bedroom guesthouses on the estate. The caption incorrectly identified the complex as the estate's main mansion.

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