

## Is Your Sugar Vegan?

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In 1997, The Vegetarian Resource Group published an article on sugar refining, focusing in particular on the char derived from cow bones that is used as a filter to whiten cane sugar during the refining process. In this report, The VRG revisits the issue of bone char use in the sugar industry, examines emerging practices for refining sugar, and discusses alternatives to sugar refined with bone char.

### Where The Sugar Industry Stands Today

The sugar industry's practices haven't changed much over the past decade. The same large American cane sugar companies that were operating then are still in business and have bought out smaller operations in the United States. There are a few small cane sugar companies, but there are really only two large cane sugar enterprises—Imperial/Savannah Foods (Dixie Crystal) and Florida Crystals. Florida Crystals owns American Sugar Refining (Domino Foods) as well as the C&H Sugar Company, both of which now call bone char "natural charcoal."

The two major companies refine most of the sugar sold on store shelves in the United States. The majority of this sugar is produced and consumed domestically, although some of the sugar sold by American Sugar Refining is purchased from Australia or Brazil. (By comparison, much of the sugar in packaged products sold in the United States is imported.)

The U.S. companies still use cow bone char as the preferred filter for cane sugar. The exception is a plant that American Sugar Refining owns in Yonkers, NY, which uses an ion exchange system that cost \$30 million. Their refining process is quite different and involves liquid sugar that cannot be filtered through bone char. Jeffrey Robinson, Technical Director of American Sugar Refining, said the Yonkers, NY, plant is only the company's fourth-highest producing plant of five plants, yielding approximately 4 million pounds of sugar per day. On another note, Paul Caulkins, the Corporate Quality Assurance Manager of Imperial/Savannah Foods, said his company is seriously looking into overhauling its filtering system at a price tag of \$25 million because there have been recent improvements in ion exchange filter technology.

In 1997, The VRG reported that Refined Sugars, Inc., maker of Jack Frost sugar, used granular carbon instead of bone char. Refined Sugars was one of the companies bought out by Domino, which uses bone char for most of its sugars. (See the table on page 18 for the names of Domino's non-organic and organic brands that are not filtered through bone char.) Jack Frost sugar is still being produced at their Yonkers plant. It is available in New York and northern Pennsylvania and constitutes approximately 0.5 percent of Domino's total sugar production.

Imperial Sugar produces a turbinado sugar that has not been processed through bone char. The Imperial Sugar Company is part owner of Wholesome Sweeteners, which produces several brands of sweeteners that are not filtered through bone char. (See table on page 18.)

VegNews published a 2006 article stating that a small cane sugar company, U.S. Sugar Corporation, uses a 'new' sugar refining process that does not involve bone char. U.S. Sugar has not responded to several phone calls that The VRG has made regarding their cane sugar refining process.

### Why Bone Char In The First Place?

The average consumer's love affair with white, sweet foods prompted the sugar industry to develop a sugar refining process that would yield 'pure' white crystals. Hundreds of years ago, sugar refiners discovered that bone char from cattle worked well as a whitening filter, and this practice is now the industry standard.

Sugar cane has held an approximately 50 percent market share of sugar in recent history, with sugar from sugar beets taking the rest. Beet sugar is not refined in the same way as cane sugar. Bone char filtering is never used in beet sugar processing.

Unfortunately for consumers buying prepackaged, sweetened foods or those eating out, it is difficult to know the source of the white refined sugar that these foods contain.

Consumers should be forewarned that making a company inquiry will not usually resolve their concerns because many manufacturers purchase both sugar produced from sugar beets and sugar produced from sugar cane. Robinson stated, "Common practice at many manufacturers is to store refined sugar from both sources in the same bin, thereby co-mingling the two." It is likely that a certain prepackaged or restaurant-served food may contain both cane and beet sugar. Proportions of each in any given serving probably vary over time.

#### The Exact Role of Bone Char In Sugar Refining

A bone char filter acts like a crude filter and is most often used first in cane sugar refining. To sugar scientists, it is a 'fixed bed adsorption' filter, meaning that particles unlike itself stick to it. It is also the most efficient filter for removing colorants; the most frequently found colorants are amino acids, carboxylic acids, phenols, and ash.

The bone char is not as good at removing impurities such as inorganic ions, so after being put through bone char, sugar may be passed through activated char- coal or an ion exchange system as well. The sugar also goes through several different filters to remove larger particles. Nevertheless, bone char filters are the most efficient and most economical whitening filters, thereby maintaining their position as the industry's cane sugar filter of choice.

Connie Hunter, Consumer Relations Specialist for Domino Sugar and the C&H Sugar Company, said the bones used to make bone char come from "non-European cattle." Robinson told us that American Sugar Refining purchases its bone char from a Scottish company, which did not respond to our inquiries. He said that he has been told these bones come from cattle that have died naturally in Brazil, India, Morocco, Nigeria, and Pakistan. The bones are sun-dried and incinerated for 12 hours at more than 700 degrees Celsius. During the burning process, all organic matter that may be present—including viruses, bacteria, and proteins—is destroyed, leaving only an inert granular substance that is 10 percent elemental carbon and 90 percent calcium hydroxyapatite.

The other major company that sells bone char to the sugar industry is the American Charcoal Company, which was started in 2002 and is located in Wyoming. According to American Charcoal representative Craig Giles, the company gets its bone char in ready-to-sell form from Brazil's cattle industry. Imperial/Savannah Foods purchases its bone char from both the Scottish company and American Charcoal.

#### How Much Bone Char Is Used?

Paul Caulkins, the Corporate Quality Assurance Manager of Imperial/Savannah Foods, said that little bone char can be obtained from a single cow "since only the dense bones of the animal, such as the pelvic bones, can be used." After checking with his suppliers, Caulkins informed us that "one cow averages 82 pounds of total bone. About one-fourth to one-fifth of the total weight (between 17 and 20 pounds per animal) is the load-bearing bone used for char (due to its strength). Since our yield conversion to char from that is approximately 50 percent, on average, one cow will produce nine pounds of bone char."

Sugar companies purchase large quantities of bone char for several reasons, the first being the sheer size of their operations. Large commercial filter columns often measure 10 to 40 feet high and five to 20 feet wide. Each column, which can filter 30 gallons of sugar per minute for 120 hours at a time, may hold 70,000 pounds of char. If

nine pounds of char is produced by one cow and 70,000 pounds are needed to fill a column, a simple math calculation reveals that the bones of almost 7,800 cattle are needed to produce the bone char for one commercial sugar filter. (We did not receive a verification of this estimate from another source.) Furthermore, each refining plant may have several large filter columns.

Companies use up their supplies of bone char relatively quickly. Since bone char is the first filter used in the sugar refining process, its granules absorb large amounts of colorants and impurities. This means that the overall working life for bone char granules may be reduced significantly. In general, bone char may last for five to 10 years, depending on the volume of raw material filtered through it and the level of impurities in the sugar. The bone char may be rejuvenated several times by burning it at 9,500 degrees in a kiln for 20 minutes, but this typically occurs only once.

Over time, some of the char disintegrates and becomes too small in particle size to filter anymore, so that portion is screened off. Also, colorants and other impurities begin to permanently fill the bone char's microscopic holes, compromising its effectiveness. These impurities make the char heavy, and it can't be volatilized off when rejuvenated in a kiln. Even with the massive quantities of bone char that industries secure, these factors contribute to the need to replenish their bone char stores regularly.

At this time, the cane sugar industry believes that only more cow bone char can fill the same roles as well as bone char. Other technologies, such as reverse osmosis, have been under study for a long time, but they don't perform as well as bone char does at the high temperatures used in the refining process. Perhaps by the time of our next update on the sugar industry, bone char will no longer be a mainstay of sugar refining, especially since Caulkins stated that the prices of bone char, activated carbon, and ion exchange technologies are comparable. What's needed is improved technology, consumer pressure on the industry to change its refining methods, and the capital investment a tall order for now but maybe a reality one day.

#### Organic Sugar: Always Bone Char-Free

The increasing popularity of organic foods in the United States has bolstered the production of the organic sugar industry. In fact, The VRG is happy to report that there is a large market niche for organic sweeteners.

To maintain its organic integrity, organic sugar is only minimally processed or not refined at all. Since bone char is not on the National Organic Program's National List of Allowed and Prohibited Substances, certified USDA organic sugar cannot be filtered through bone char. In fact, the technical directors of both Imperial Sugar and American Sugar Refining told us that organic sugars are only milled and never go to the refinery where the bone char filters are located.

A common processing aid, lime, is used as a clarifying agent in organic cane sugar processing, removing cane fibers and field debris. Since lime is on the National List, it can be used in organic sugar production. However, because the lime itself is synthetic, no organic sugar processed in this manner can ever be certified 100% USDA Organic; the maximum certification it can receive is 95% certified organic. Consequently, any sugar-containing product made with organic sugar can achieve only a 95% certified organic rating.

There are a few organic clarifying agents, such as the seeds of the drumstick tree (*Moringa oleifera*) and the edible fruit of *Cordia myxa*, that could produce 100% certified organic sugar. However, Dr. Stephen Clarke, Director of Technical Services at Florida Crystals, said, "These aids are a substitute for the polyacrylamide materials that we conventionally use in clarification and not for the lime that is used for pH adjustment. The 'natural' flocculants are basically acidic polysaccharides extracted from succulent plants similar to aloe." Clarke informed The VRG that Florida Crystals tested some organic clarifying agents approximately two years ago, but their performance was

◆poor and inconsistent." He did say, "Although the potential is there, the real problem is that another crop has to be grown and processed."

Another reason why bone char is not used in organic sugar production is that its decolorizing function is neither needed nor desired. U.S. organic laws do not have any strict standards regarding the color of organic sugar (like those that exist for conventional white sugar). Unrefined sugar is naturally light tan to brown, and the medium to darker colored sugars are often described as 'golden.' "Retail customers seem to prefer this color and associate it with a more natural, less processed product," stated Tom Hasenstaub, the Organic Program Manager at Florida Crystals. He added that the natural color of organic sugar "has been somewhat problematic to certain industrial customers who are trying to formulate organic processed products to emulate the color profiles of their conventional products."

At the present time, most organic sugar used in the United States is imported from Paraguay, Brazil, and Mexico. Florida Crystals is the only U.S. producer of organic sugar, with approximately 4,000 acres of rotating organic sugar cane and rice in production and an additional 900 acres planned for the upcoming growing season. However, this quantity meets only 20 percent of U.S. demand. Approximately 80 percent of all organic sugar produced in the U.S. is used in industries manufacturing sugar-containing products, while 20 percent is purchased directly by consumers.

The table accompanying this article (page 18) lists the brands of organic sweeteners that we have determined to be bone char-free, based on correspondence with the manufacturers.

#### Bone Char-Free Sugars Produced By U.S. Companies

Company	Brand Name
C&H Sugar	C&H Pure Cane Washed Raw Sugar
C&H Pure Cane	Certified Organic Sugar
Cumberland Packing Company	Sugar in the Raw
Domino Sugar	Domino Demerara Washed Raw Cane Sugar
Domino Pure Cane	Certified Organic Sugar
Florida Crystals	Florida Crystals Demerara Natural Sugar
Organic Evaporated Cane Juice	(granulated and powdered)
Golden Granulated Evaporated Cane Juice	
Florida Crystals Milled Cane	Natural Sugar
Florida Crystals Certified Organic	Natural Sugar
Great Eastern Sun	Sweet Cloud Organic Raw Cane Sugar
Hain Celestial Group	Hain Organic Brown Sugar
Hain Organic Powdered Sugar	
Shady Maple Farms	Shady Maple Farms Granulated Maple Sugar
Tropical Traditions	Rapadura Whole Organic Sugar
Wholesome Sweeteners	Light Muscovado Sugar
Dark Muscovado Sugar	
Sucanat (granulated and powdered)	
Organic Sucanat (granulated and powdered)	

NOTE: 100% Pure Beet Sugar is not passed through a bone char filter.

Today in the United States, all organic sugar is produced from sugar cane. According to Ruthann Geib, the Vice President of the Sugar Beet Growers Association, there is no organic sugar beet production in the United States at this time. Clarke noted, "There are no technical reasons preventing the production of organic beet sugar; it has been done in Europe."

### Watch Out For Bone Char: Tips For Consumers

On your next trip to the sugar aisle at the grocery, you may notice many bags of sugar that are labeled "100% Pure Cane Sugar." Most likely, this sugar was refined using bone char. In contrast, sugar in bags labeled "100% Pure Beet Sugar" was never passed through a bone char filter.

Questions soon arise about sugar labeled, for instance, "Granulated Sugar." There is no way to tell based on this phrase alone whether the sugar had been filtered through bone char. The phrase "100% Sugar" is equally ambiguous. Supermarket chains that purchase sugar from a large sugar company but label it as their own may not indicate which type of sugar it is.

Brown sugar is made by adding molasses to refined white sugar. Therefore, companies that use bone char to produce their white sugar will also use it to produce their brown sugar. The same is true for confectioner's sugar, which is refined white sugar with added corn- starch. Invert sugar is filtered through the use of bone char. Fructose may but does not typically involve a bone-char filter. Molasses, turbinado, demerara, and muscovado sugars are never filtered through bone char. Evaporated cane juice is also bone-char free. If in doubt about any product, concerned consumers should direct inquiries to the manufacturer.

For now, The VRG suggests that those who wish to avoid bone char processing altogether purchase organic sugar and consume foods that list only organic sugar or evaporated cane juice as sweeteners. Eating prepack- aged foods and/or restaurant foods that contain refined white sugar will always be questionable.

When discussing ingredients, information changes and mistakes can be made. Please use your own best judgment about whether a product is suitable for you. We encourage everyone to be reasonable and realistic. Use this article with other information to assist you in making personal decisions, not as a standard that you or others may not be able to achieve. Don't let smaller issues get in the way of larger dietary or ethical decisions. Always be encouraging to others and do the best you can, taking into account that neither you nor the world is perfect.

For additional information, see