

Harmonics

What is food engineering?

Do you know where your food comes from? Do you know its nutritional value? Do you know how it is raised, harvested, processed, packaged and transported before it gets to your table? These are the questions which concern food engineers.

Food engineering is a combination of chemical engineering, mechanical engineering, and food science applied to the food we eat. Food engineers are interested in improving the taste and nutritional content of food. They study the conversion of raw foods, like corn, into packaged foods, like Pepsi. (Did you know that Pepsi is made from corn?) They examine the processes of food production, like pasteurization. Food engineers also research and develop safe transportation and packaging for delivery of food. (Who did you think developed the pizza box?) They look at how to produce enough food to feed people, how to move fresh food over long distances, and how to make sure food remains bacteria-free for as long as possible.



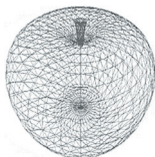
Geese and moose meat cooking in Waskaganish, a northern Cree Community.

As a general rule, food engineers are involved with large-scale food processing; examining questions related to how food is raised, harvested, processed, stored and transported before it gets anywhere near our mouths and stomachs. Do any of these activities sound familiar? If you hunt, fish, harvest maple syrup, gather herbs and berries, raise your own fruit and vegetables, or cook, you're involved in food engineering on a smaller scale.

People didn't start out as food engineers. In fact, for thousands of years it was a feast or famine situation: in times of plenty when the salmon were running, or the berries were ripe, everyone in a community had enough to eat, but in the winter or during a drought, food could be extremely scarce. The first food engineers were the people who figured out how to smoke meat, dry fish, boil maple sap and plant seeds from the best growing plants. These practices allowed for the gathering and preservation of food, so that it was available throughout the year.

While few people live off the land completely today, traditional ways of gathering, hunting and preserving food are still passed from one generation to the next. Most people weave together traditional methods with newer technologies so that parts of the job are easier, or more efficient or safer. As a food engineer you too could blend traditional and engineering knowledge to benefit your community. You could:

- contribute to local economic development through the creation of businesses that export local foods;
- work to lower import costs of southern foods for rural and remote communities;
- figure out how to grow fruits and vegetables in northern climates;
 - develop packaging that allows for longer preservation of food;
 - collaborate with hunters to get meat back to town more quickly.



Read the rest of Harmonics to get a better idea about what you could do as a food engineer or scientist.



Native Engineers & Scientists

A place to meet people from your community.

Name: Jane Mt. Pleasant

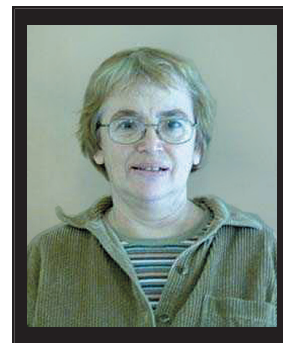
Nation: Tuscarora

School (s) Attended: Cornell University, North Carolina State University

Degree (s): Ph.D. (Soil Science), M.Sc. (Agronomy), B.Sc. (Agronomy)

Job Title: Associate Professor, Department of Horticulture, Director, American Indian Program

Favorite thing about job: *"I love working with corn. I really enjoy teaching."*



Jane Mt. Pleasant says that in high school "I thought I wasn't smart enough in science and math." And yet, she persisted. With lots of hard work, determination and the support of her husband, Jane obtained a bachelor of science in Agronomy at Cornell University in 1980.

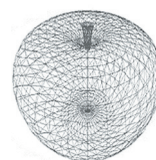
Jane then decided to pursue graduate studies because, "They would enable me to contribute to something I thought was critically important: making our agriculture more sustainable." And so, she obtained a Master's degree before moving to North Carolina State University where she finished a Ph.D. in Soil Science in 1987.

These days Jane is an Associate Professor of Horticulture back at Cornell University. Her research focuses on a topic she loves – corn. More specifically, she examines traditional Iroquois methods of raising corn. "Iroquois agriculture is a sophisticated and complex knowledge system that is worthy of respect and emulation," and her research is helping people understand just how advanced traditional methods can be.

She is also the Director of Cornell's American Indian Program (AIP) which "strives to develop new generations of educated Native and non-Native peoples who will contemplate study and contribute to the building of *nation* and community in Native America". Within AIP Jane teaches a writing seminar called *Science Meets Spirit*. The course explores the similarities and differences between western science and indigenous knowledge, "Native peoples have always been involved in science. We just called it by different names."

Jane encourages Aboriginal students to not only stay in school but to learn more about growing food because "growing food is one of the key ways that communities can judge their self-sufficiency." She knows that math and science courses are tough, but she also knows that, "All of us can learn math and science if we're given a supportive environment, are willing to work hard and stay focused." Her advice to students, "build a support network and use it" to get through difficult courses.

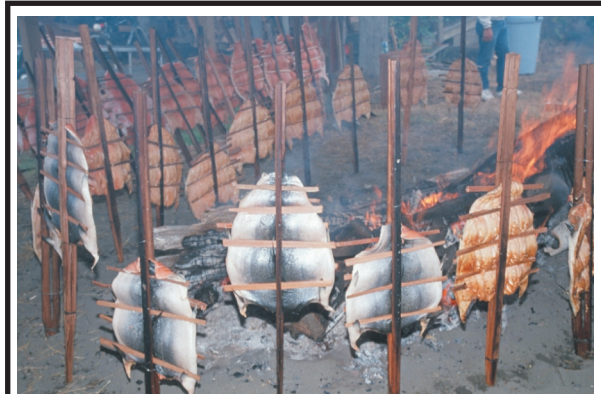
In her own time, Jane enjoys spending time gardening, hiking, cooking and reading.



Traditional food

Go to a celebration anywhere in the world and people bring out their traditional foods - olives and fish in the Mediterranean or spice laden vegetables in India. As a general rule, traditional foods become traditional because they are available locally: it's not likely that Arctic char would be served at the celebration of a Maori wedding in New Zealand. For Aboriginal peoples on Turtle Island, traditional foods include many different kinds of fruit, fish and meat like blueberries, salmon and caribou.

Traditional foods, sometimes called country foods, are a good source of nutrition. If they weren't, we wouldn't have been able to survive for thousands of years by eating them. Traditional foods tend to have fewer calories, be lower in saturated fats, and have more iron and vitamins than store-bought, commercially produced food. Traditional foods are also good for health because they involve exercise: most of the time, we can only get them by hunting or gathering on the land.



Traditional northwest coast salmon barbecue.

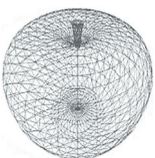
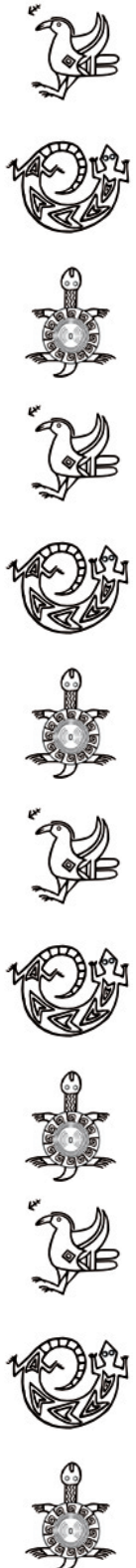


Traditional food sources of food, like caribou, also provide us with other necessities, like clothing.

There is some risk to eating a diet completely based on traditional food, especially for people in the North. The natural flow of wind and water has a tendency to bring pesticides and other chemicals produced by industrial and farming activity in the South, to the North where they build up and contaminate the water and land. As fish live and breathe in these contaminants, and land animals eat them through plants and other animals, the chemicals from the environment get transferred to their bodies and stored in fatty tissues. Scientists refer to the build up of chemicals in animals over time as bioaccumulation. When larger animals or people eat these animals, the chemicals are transferred up the food chain through a process called biomagnification.

It isn't completely clear how this build up and transfer of contaminants affects people and other animals, so in 1992 McGill University opened the Centre for Indigenous People's Nutrition and Environment (CINE). CINE works with Aboriginal peoples and communities to look at the impact of pollutants in food. The centre also studies the nutritional value of traditional foods, and their role in preventing diseases like diabetes and conditions like hypertension (high blood pressure).

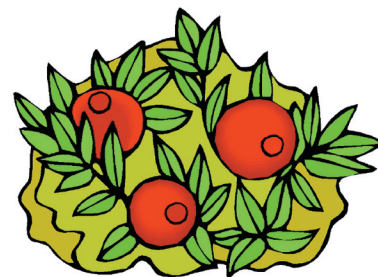
For more information on traditional foods (as well as some great recipes) visit the CINE web site at <http://cine.mcgill.ca/>.



Community Profile

Wahta First Nation, Ontario

Wahta means *sugar maple* in the Mohawk language. So, of course, if you were to visit the Watha Mohawk Territory near Bala, Ontario, you would expect to see ... cranberries!



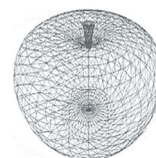
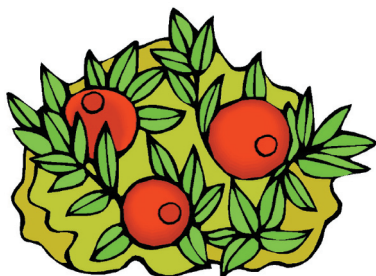
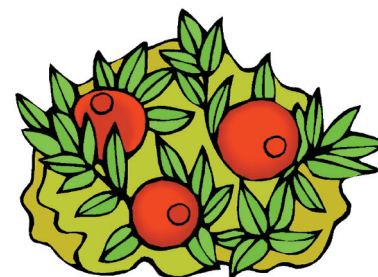
The community of Wahta was founded in 1881 when a group of Mohawks from Kanasatake moved to central Ontario. At the time, wild cranberries abounded near the Musquash River, and cranberry picking quickly became a tradition in the new community.

Aboriginal peoples have long known that cranberries are not just a tasty fruit, but that the berries have great medicinal properties. Cranberries are high in vitamin C, and were used to prevent scurvy. They also appear to have cleansing properties which help in the prevention and treatment of bladder infections. In addition, cranberries fight gum disease, heart disease, and prevent ulcers. More recently, it has been discovered that the little fruit is a great source of anti-oxidants, chemical agents which seem to help prevent cancer.

In the 1960s, the Wahta Mohawks created the Iroquois Cranberry Growers Company to grow, pick, and package local cranberries. The company became such a success that it now runs a 68-acre cranberry farm, the largest in Ontario. It is owned and operated entirely by the community.

Since 1984, an annual Cranberry Festival has been held to celebrate the October harvest. It features different products made from cranberries which visitors to the festival are encouraged to sample. You can taste dried cranberries, cranberry vinegar, cranberry juice, cranberry syrup, cranberry sauces, and cranberry crepes to name but a few of the mouth watering dishes on display

The Iroquois Cranberry Growers company welcomes visitors. So, if you're in central Ontario and craving the tangy taste of cranberries, Wahta Mohawk Territory is the place to go!



Fun facts and things to think about

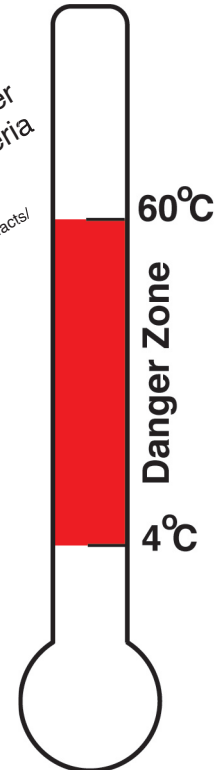


Rice is Life

- Rice is the staple food for more than half the world's population.
- Rice is cultivated in 113 countries.
- Rice cultivation is the principal activity and source of income for 100 million households in Asia and Africa.
- About 80% of the world's rice is produced by small-scale farmers and is consumed locally.
- Rice farmers lose between 10% and 37% of their crop each year due to poor storage facilities.
- In addition to being a rich source of dietary energy, rice is a good source of thiamine, riboflavin and niacin.
- Rice provides 20 percent of the world's dietary energy. In some developing countries, it accounts for 70% of dietary energy.
- Fort Frances, ON, is a major producer of wild rice. The Ojibway Nation of Wabigoon Lake runs a company which produces wild rice using methods which date back at least 1000 years.

The United Nations declared 2004 International Year of Rice. To find out more got to http://www.fao.org/rice2004/index_en.htm.

DANGER ZONE!!!
The temperature range between 4°C and 60°C (40°F and 140°F) is called the danger zone for food. Bacteria grow quickly in this temperature range. After only 2 hours, the level of bacteria in food could be dangerous.
Source: Canada Food Inspection Agency
<http://www.inspection.gc.ca/english/compaff/foodfacts/camping.shtml>



Let food be your medicine, and your medicine be your food.
-Hippocrates

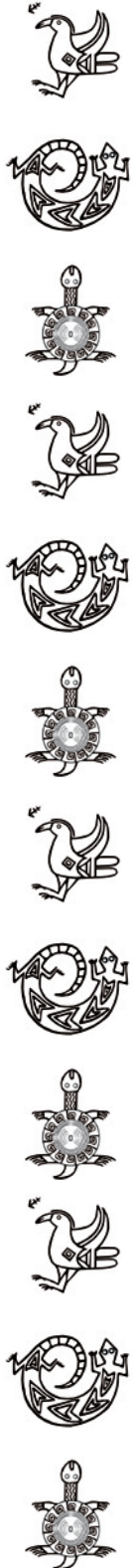
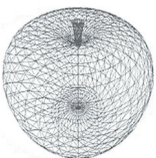
NUTRITION INFORMATION NUTRITIONNELLE per 175 mL serving / par portion de 175 mL

Energy/Énergie	80 Cal 330 kJ
Protein/Protéines	1 g
Fat/Matières grasses	0 g
Carbohydrate/Glucides	19 g
Sugars/Sucres	16 g
Sodium	0 mg
Potassium	320 mg
PERCENTAGE OF RECOMMENDED DAILY INTAKE POURCENTAGE DE L'APPORT QUOTIDIEN RECOMMANDÉ	
Vitamin C/Vitamine C	88 %
Folic acid/Acide folique	20 %

Nutrition Labels

All prepackaged foods sold in Canada require nutrition labels. The labels indicate single serving size, as well as the calorie, fat, cholesterol, sodium, carbohydrate and protein content of the product. They also list nutrient (vitamin and mineral) content. The labels are designed to help you:

- compare products easily,
- determine the nutritional value of food,
- manage special diets,
- increase or decrease your intake of particular nutrients.



Sucking it dry!

For Aboriginal peoples living on or near the water, fish have always been an important source of food. Different Nations have different staple fish depending on the species in their waters: the Inuit depend on arctic char, while the Skwah and Kwagiulth depend on salmon. In most places fishing is a seasonal activity, either because the fish migrate, or because the water is not accessible at certain times of the year. Before large, sub-zero freezers and co-ops and groceries stores, fish preservation was extremely important to many communities' survival.

Preserved food lasts much longer than fresh food because it is treated in some way that prevents the growth of bacteria in the food. Fish (and meat and berries) are often preserved by drying.

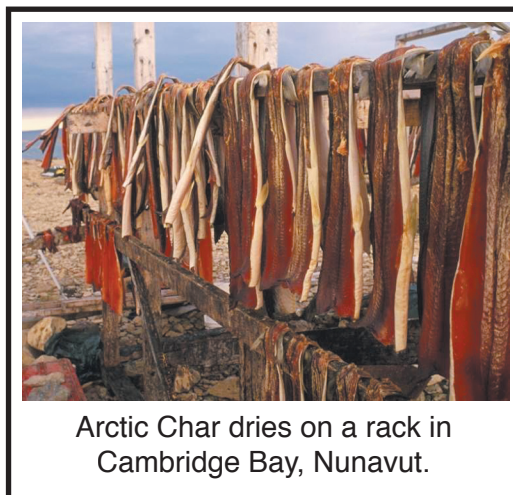
In drying, all the moisture is removed from the food. Food-rotting bacteria thrive in warm, wet conditions, so the drying process deprives them of their favourite environment.

To dry well, freshly caught fish is cleaned and cut into thin filets. The filets are then put out into the sun to dry, often on a drying rack. The amount of time it takes for the fish to dry completely depends on the weather. In hot, dry climates they dry quickly. In colder or more humid climates, fish can take much longer to dry. Once all the moisture is gone from the filets, they look a bit like beef jerky and are ready to be stored.

Drying is still used to preserve many foods today. Powdered milk, dried fruits, dried pasta, and beef jerky are all foods which last longer because they contain no moisture. Food drying can be done traditonally or can be really high tech. Freeze drying is a process where fresh food is flash frozen then put in a strong vacuum. In the vacuum, any water in the food changes from ice directly into vapour. Instant coffee is freeze dried. So is a lot of the food that astronauts carry with them into space. They can even have freeze dried ice cream as dessert while they orbit the planet.

Sources: <http://www.howstuffworks.com/food-preservation.htm/printable>
<http://www.schoolnet.ca/aboriginal/science>

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Arctic Char dries on a rack in Cambridge Bay, Nunavut.



All about us

Native Access provides culturally relevant learning opportunities in science, math, engineering and technology to Aboriginal students and their teachers across Canada.

Established in 1993, the project's ultimate goal was to increase the representation of Aboriginal peoples among the ranks of practicing engineers and scientists in Canada.

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