

By Lorne McClinton

THE ENERGY SPEND

It takes a lot of energy to put dinner on the table

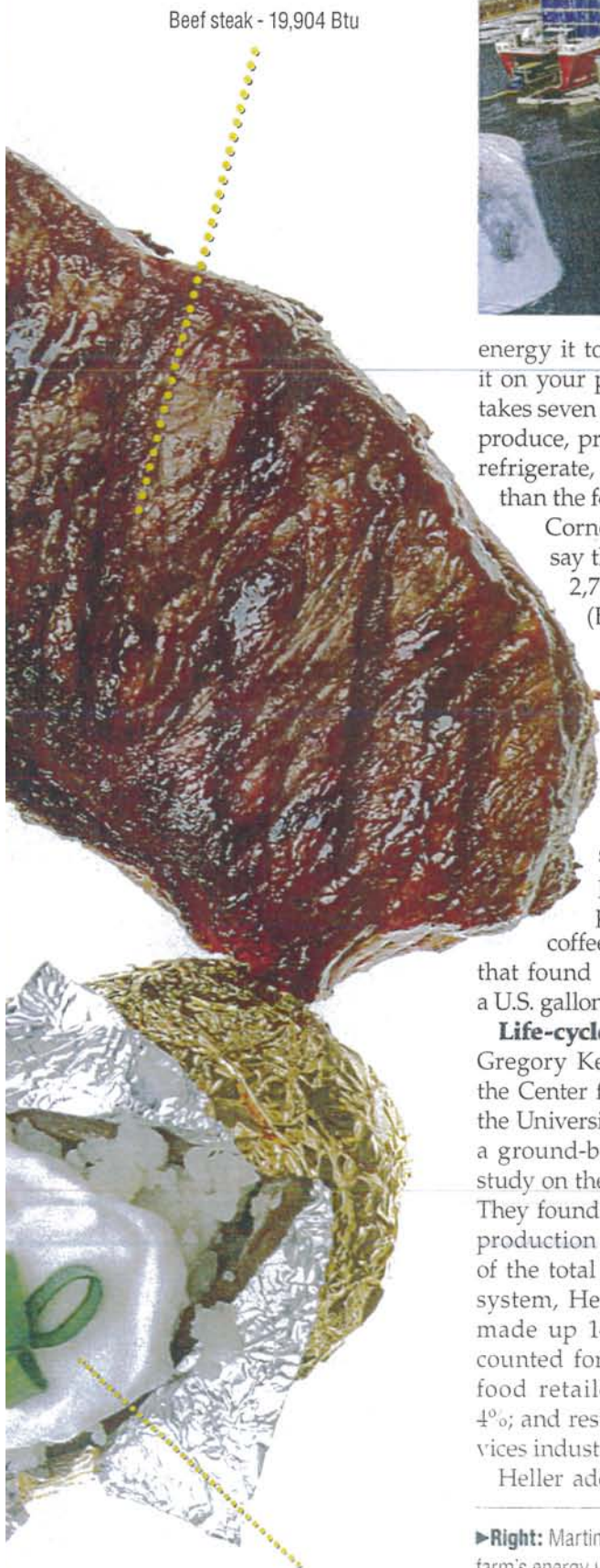
Food production is an energy intensive business, and energy costs money. That's why Martin Prince and his father, Bernard, spend a lot of time thinking about how they can increase their farm's efficiency and cut their fuel bill. Since 1997, the father-son team have reduced their per-acre fuel consumption by more than 15% while increasing production on their operation near Delmas, Sask.

But, as a component of energy use in the food chain, diesel fuel only makes up 30% of the total energy used on a grain and oilseed farm. Experts say 50% is used to manufacture and transport nitrogen fertilizer. And they point out that nearly 80% of the energy needed to put dinner on the table is consumed by other parts of the food sector after a product has left the farm.

Embedded energy. A quick glance at a nutrition label shows that every food contains energy. The higher the number of calories in the product, the more food energy it contains. The number doesn't show how much

► **Large photo:** As shown by these figures, developed from U.S. and European studies, it takes a lot of energy to put dinner on the table.





Beef steak - 19,904 Btu

Sour cream - 1,090 Btu



PHOTO: PORT OF MONTREAL

energy it took to produce it and put it on your plate. Studies show that it takes seven to 10 times more energy to produce, process, package, transport, refrigerate, and prepare a food item than the food itself contains.

Cornell University researchers say that consumers burn about 2,700 British thermal units (Btu), a standard measure of heat energy, transporting a single can of sweet corn home from the supermarket in their car (assuming the can was part of a 33-pound order of groceries). These studies also show that processing a kilogram (2.2 pounds) of chocolate or coffee requires energy equal to that found in a little more than half a U.S. gallon of gasoline.

Life-cycle study. Martin Heller and Gregory Keoleian, researchers with the Center for Sustainable Systems at the University of Michigan, published a ground-breaking energy life-cycle study on the U.S. food system in 2000. They found that primary agricultural production was responsible for 21% of the total energy used by the food system, Heller says. Transportation made up 14%; food processing accounted for 16%; packaging for 7%; food retailers and wholesalers for 4%; and restaurants and the food services industry used 7%.

Heller adds that their study found

►**Above:** Transporting food attracts negative attention, yet studies show it accounts for only 13.6% of the energy used in the food system.

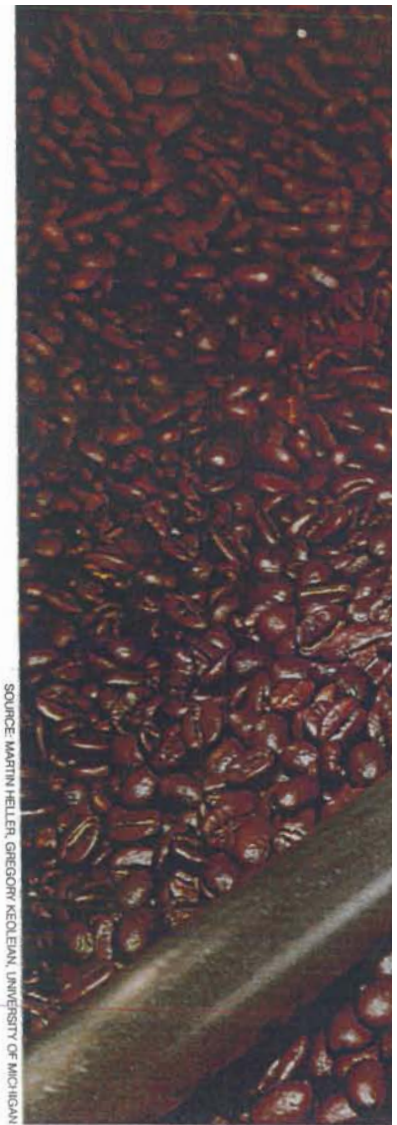
that consumers were the single largest energy users in the entire system. Home use was responsible for 32% of all food-related energy consumption.

"It's been 10 years since we did that study, but I don't think the percentages have changed very much," Heller says. "Refrigerators have gotten more efficient, but this has been offset by people buying larger ones, so the amount of energy used for refrigeration hasn't decreased a whole lot in the past 20 or 30 years."

Increased usage. On the contrary, the total amount of energy used by the U.S. food system is growing, according to a 2010 study by Patrick Canning with the USDA's Economic Research Service. The sector used 2.6 quadrillion Btu more energy in 2002



►**Right:** Martin Prince works hard to reduce his farm's energy use. Since 1997 he's cut his costs by 15% per acre while increasing yields.



SOURCE: MARTIN HELLER, GREGORY KENNELMAN, UNIVERSITY OF MICHIGAN

than it did in 1997. This increase represents 80% of the rise in total U.S. energy use during this period.

"Three factors were responsible for the jump in food-related energy use," Canning says. "Population growth accounted for 25% of the higher food-related energy use. The U.S. population grew by more than 14 million between 1997 and 2002. More mouths to feed means increased production of food and food-related items, ranging from fertilizer to frying pans."

Another 25% of the increase was caused by consumers buying more food, Canning explains. The amount of food marketed to consumers, measured in inflation-adjusted dollars, increased 6.6% from 1997 to 2002.

The final factor is the continuing trend to replace human labor with energy intensive technology. Canning cites the egg industry as an example. Producers have been switching from human labor to high-tech, energy intensive hen houses for years. Further downstream, both the food service industry and processors have steadily moved away from whole eggs to liquid, frozen, and dried eggs for foods like mayonnaise and baked goods. This translates into a 40% increase in the amount of energy used per egg between 1997 and 2002.

►**Above:** Consumers burn about 2,700 Btu of energy just to transport a can of corn home from the supermarket. ►**Below right:** Home energy used to refrigerate and prepare food has dramatically increased. Twenty-two percent of American homes now have two or more refrigerators.

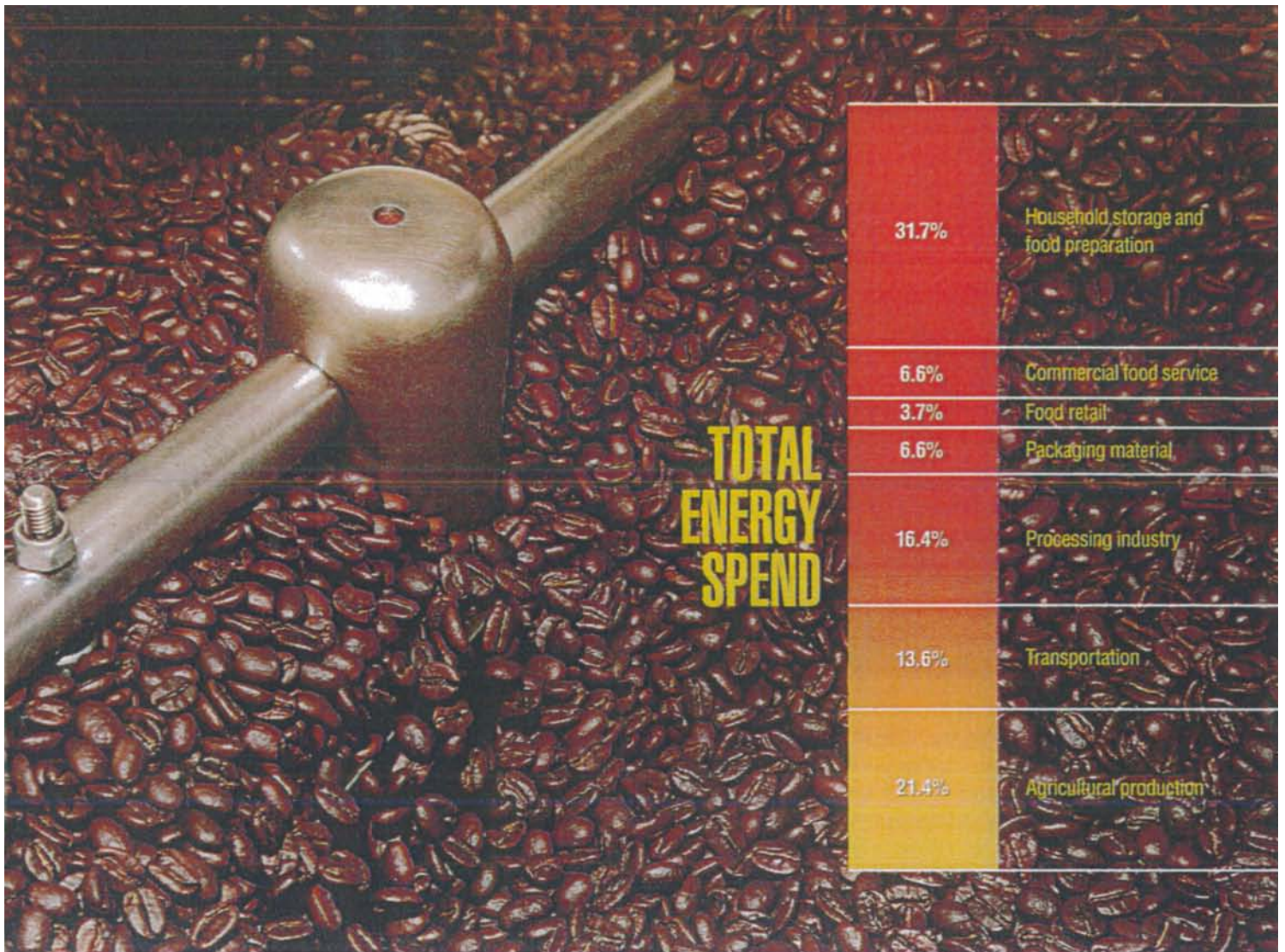
It's easy to see how energy use has increased on the home front, too. Consumers have happily embraced labor-saving devices in the kitchen.

"Consumers are relying on blenders and food processors instead of knives and chopping blocks," Canning says. "In 1985, 18- to 64-year-olds spent an estimated average of 49 minutes on cooking and cleanup per day. Bureau of Labor Statistics data indicates this fell to 31 minutes per day by 2008."

More appliances. More households now use dishwashers and microwave ovens than ever before. Twenty-two percent of American homes, and likely a similar number in Canada, now own two or more refrigerators. While newer models are more energy efficient, the rapid increase in numbers alone requires more energy.

"Since the late 1990s, consumers have been demanding more convenience foods that involve more processing," Canning says. "Between 1997 and 2002, energy use by food processors grew 49%, roughly the heat-energy equivalent of 24 gallons





of gasoline per person annually.”

The entire food system, from the farmer to the consumer, requires a vast amount of energy to operate. Canning says it accounted for 15.7% of total U.S. energy consumption in 2007, up from 14.4% in 2002. Since a high percentage of the food chain’s energy comes from burning fossil fuels, any increase or decrease in the cost of a barrel of oil has a serious effect on it.

Three times. The spike in 2008 grain prices can largely be attributed to the corresponding jump in oil prices. A 2007 study by John Urbanchuk at the LECG Institute in Wayne, Pa., shows that an increase in the cost of gasoline has three times the effect on the consumer price index as an increase in the price of corn does.

The food sector is so sensitive to rising fossil fuel costs, it’s uncertain if its energy consumption will continue to rise. Most analysts are forecasting

► **Above:** Processing a kilogram (2.2 pounds) of coffee or chocolate requires the amount of energy found in a half-gallon of gasoline. ► **Right:** Marty Heller’s research found that farms use 21.4% of the energy consumed in the food system—consumers account for 31.7% of the total.

higher oil prices in the future.

If the price of oil continues to rise, Statistics Canada says farmers are very good at cutting their energy costs when they expect higher fuel prices. Since prices began rising in 2000, farm fuel sales by volume have dropped by an average of 2% a year.

“Switching to no-till made the biggest difference,” says Martin Prince, a Saskatchewan farmer. “It cut a tillage pass in the spring and one in the fall, to apply anhydrous. Increasing your fuel efficiency is possible if you take small incremental steps. Stop and evaluate your results after each one. If it was successful, try another.” ■

