Big Mac versus Small Mac

Exploring the Benefits of a Cheeseburger Made from Locally Sourced Ingredients

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Introduction

In 2000 a team of Swedish scientists calculated how much energy was required to produce a single McDonald's Big Mac cheeseburger. The results were sobering; it was estimated that up to 20 megajoules of energy goes into each burger (Carlsson-Kanyama, A. and Faist, M.). This is the equivalent of .84 gallons of crude oil. Some studies estimate that the average American eats one burger every week (Cascio, J.). These numbers indicate that it takes approximately 87 billion gallons of crude oil each year to feed America's cheeseburger habit. Assuming that we aren't going to eat fewer burgers, are there ways we can reduce the amount of energy it takes to produce them?

A large part of the energy required to produce a Big Mac is due to transporting the ingredients. Wheat for the bread must be trucked from the field to the milling facility to the bakery to the restaurant. Beef must be moved from the feedlot to the slaughterhouse to the restaurant. Each ingredient makes several stops along its way to the cardboard box you order at the counter. So what if we made a burger from ingredients that were produced locally, closer to your dinner table?

This report explores the impact of making a cheeseburger from local and usually organic ingredients. All major components were produced within a radius of 18 miles from Bellingham, with the raw ingredients coming from within the state of Washington. An analysis of the data gathered shows that it is much more economical to produce a local burger due to reduced transportation and processing costs.

Many people are under the false impression that eating locally severely limits your choices or is too expensive. It is hoped that this project will highlight the benefits of eating locally, and illustrate the variety of these foods that are available here in Bellingham.

Research

The eating local movement has gained popularity recently. Many reasons are cited in support of the concept that appeal to both personal health and the pocketbook. Proponents argue that local foods are fresher and riper than their conventional counterparts and also contain higher levels of nutrients and promote healthier eating habits. A case is also made for local foods' contribution to a community economy by keeping money circulating within a geographical region. Lastly, local food is being highlighted as a partial solution to the peak oil and climate change challenges that we face (Sustainable Connections).

The Swedish study mentioned above synthesized a vast amount of international research on the energy requirements of a wide array of foods and produced a report on the cost of a very common food item; the fast-food cheeseburger. Because the production of food affects the environment at all stages in its lifecycle, either by consuming resources or releasing emissions, the authors covered virtually all phases of cheeseburger ingredients production. They calculated figures for cooking, preparation, transportation, storage, processing, and farming or animal husbandry, as applicable. Recognizing the growing importance of securing a stable future for food production, the goal of the study was to "find ways to make food consumption patterns sustainable" (Carlsson-Kanyama, A. and Faist, M.).

The Project

To complete my own version of the cheeseburger analysis, I constructed a burger using products purchased either at locally owned businesses or farmer's markets.

Ingredient	Source	Location	Cost
Bun	Avenue Bread	Bellingham, WA	$1.25
Cheese	Samish Bay Cheese	Bow, WA	$2.00
Beef	Bennett Farms	Everson, WA	$0.98
Lettuce	Holistic Homestead	Everson, WA	$0.50
Tomato	Holistic Homestead	Everson, WA	$0.25
		TOTAL	$4.98

Each ingredient was individually analyzed for its energy consumption between the time it is produced to when it appears on your table. Figures were either calculated from data given by the producers or, if that information was unavailable, estimated based on similar research.

Generally, each ingredient's energy costs were calculated by first determining the energy required during each phase of an ingredient's production. The units of energy were not always consistent. For example, the energy costs of tomato production were calculated in gallons of biodiesel used in a tractor, while energy costs for baking the bun were calculated in kilowatts of electricity. These units were all converted into megajoules and then added together to find the total energy cost for a specific quantity of that ingredient. Then I found to proportion of that total energy cost that was allocated to the mass of that ingredient used in one single burger. Finally, the energy costs for each individual ingredient in a single burger were added together and converted from megajoules into gallons of crude oil equivalent to give a more accessible result.

Bun

The bread used in this project was purchased from Avenue Bread's downtown Bellingham location. It was made with Washington state wheat locally milled at Fairhaven Organic Flour Mill, also in Bellingham. The wheat traveled a total of 383.6 miles.

Energy Use in Bread Production (gal. crude oil equivalent)		BigMac
Crop production	0.009	0.010
Milling	0.008	0.016
Transportation	0.0009	0.0019
Baking	0.048	0.042
TOTAL:	**0.066**	**0.067**

Cheese

I used two slices of Chipotle Cheddar from Samish Bay Cheese located in Bow, WA, 15.7 miles from Bellingham.

Energy Use in Cheese Production (gal. crude oil equivalent)		BigMac
Feed for dairy cows	0.011	0.016
Milking and production	0.007	0.013
Transportation	0.0033	0.0063
TOTAL:	**0.0213**	**0.0353**

Beef
The patty for my burger was 1/3 pound of ground beef from cattle raised on Bennett Farms in Everson, WA and processed by Keizer Meats in Lynden, WA. It traveled a total of 24.4 miles.

Energy Use in Beef Production (gal. crude oil equivalent)		BigMac
Feed for cattle	0.105	0.21
Slaughtering and processing	0.059	0.059
Transportation	0.0046	0.025
TOTAL:	**0.169**	**0.294**

Lettuce and Tomato
Holistic Homestead produced the lettuce and tomato I used in my burger. The farm is located in Everson, WA, 16 miles from Bellingham.

Energy Use in Lettuce/Tomato Production (gal. crude oil equivalent)		BigMac
Crop production	0.0017	0.179
Transportation	0.0019	0.0017
TOTAL:	**0.0036**	**0.181**

Total energy cost for a locally sourced cheeseburger: 0.26 gallons crude oil equivalent

Energy savings versus a conventionally produced McDonald's Big Mac: 0.32 gallons crude oil equivalent

Analysis

Even with some simplification of hard to obtain data, we can see that the energy savings are very noticeable. The energy needed to produce a locally sourced burger is only 45% of that required for a BigMac.

Although my cheeseburger cost $4.98 as compared to a $3.49 Big Mac, the savings of 0.32 gallons of crude oil brings the price difference to only 91 cents. I argue that this 91 cent difference is made up for in supporting the local economy, increased nutrition, and avoiding damage to the environment.

Future Research

Estimation and simplification were sometimes used in this report due to scarce or inapplicable data. Many studies that I used as references were several years old, meaning

that technology may have improved, or performed in a foreign country where energy sources may be different. More detailed research about food production energy costs using current technology and energy sources would give a clearer picture than that which is presented here.

Additionally, this report focused on the benefits of local foods, some of which, but not all, were also organic. A similar report could be generated that explores the benefits of 100% organic ingredients.

It is recognized that not everyone, no matter how dedicated they are to eating local, will have the time or the desire to prepare their own locally sourced burgers every time a craving hits. A survey of restaurants offering local choices would perhaps be a useful guide for the localvore who enjoys eating out. Also, other common food items could be explored, perhaps pizza or a sandwich.

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