Alternative Cooking Fuels and Cooking Principles

By Jay Whimpey

Cooking Principles:

Cooking consists of elevating the temperature for a period of time. The temperature should be at least 140 F to kill microorganisms. Cooking also makes the food more digestible in many cases.

The time can be reduced by half for every 20 ºF increase in temperature.

Increasing convection or movement of air can increase heat transfer by 2 to 4 times.

Conductive heat transfer is largely constant for a given material. Cooking times can be decreased by cooking smaller pieces.

The temperature of boiling water is a constant at a given pressure. Addition of salt or increasing the pressure can increase the temperature of boiling water and decrease cooking times. The temperature can be increased up to 80 ºF for normal pressure cookers.

Microwave radiation can penetrate foods very quickly if there is plenty of moisture present in the food.

Fuel Facts;

Hydrocarbon fuels, wood, alcohols, and charcoal provide about 20,000 btu/pound.

Costs of fuels vary substantially per unit of energy. Wood, coal, and charcoal are generally less expensive.

Smaller molecule fuels tend to burn cleaner and produce less carbon monoxide (CO).

Complete combustion will produce carbon dioxide (CO2), while incomplete combustion will produce CO.

CO is very dangerous because it combines with hemoglobin in the blood and interferes with oxygen transport to your body and brain making the person drowsy and confused.

CO2 is an irritant to the body and increases breathing rate and depth of breathing. It does not interfere with oxygen transport except that it may displace oxygen.

100 Watts = 341 Btu/hr = 0.14 hp

Stove Burner = 5,000 watts = 17,000 Btu/hr = 6.7 hp

Alternative Cooking Methods:

Solar Cooking

Global Sun Oven – www.terasano.net , Emergency Essentials, $260

- 300 watts heating capability producing temperatures up 400 F
- Requires full sun but can work in cold weather
- No fuel needed
- Requires repositioning every half hour of cooking

Alcohol Cooking

Origo Heat Pal 5100

- Cost of $200 at www.tacda.org
- Functions as space heater or 7,000 Btu/hr cooking adjustable output
- 1 Quart provides up to 6 hours of cooking
- Very simple operation with few moving parts
- Safe for cooking indoors

Homemade Alcohol Burner

- Made from a 1 quart epoxy coated paint can and a roll of toilet paper
- About 5,000 Btu/hr
- Cost is about $3

Kerosene Cooking

Butterfly Stove

- Cost of $140 at www.stpaulmercantile.com
- Simple operation with few moving parts
- 10,500 BTU/hr capability
- Suitable for indoor use
- Kerosene is $4 to $6 per gallon
- Also have camp oven for $70 that can be used with any heat source
- Variety of kerosene handling equipment

Kerosene Heater/Stove

- Home Depot at a cost of $140
- Rated at 20,000 Btu/hr
- Suitable for indoor use

Wood and Charcoal Cooking

Stovetec Rocket Stove

- Cost of $130 from www.stovetec.com
- Very easy to light and cook, very fuel efficient
- Must be used outdoors
- 10,000 Btu/hr
- Variety of water heating and pasteurizing pans available for $60

Electric Cooking

Microwave Oven

- Fairly efficient and quick
- More complex with higher maintenance

Convection Oven

- Fairly efficient and Quick
- 1200 Watts required

Generator

* Honda 2000 watt generator is roughly $1,000 and is very reliable, efficient, and quiet

Miscellaneous Equipment

Pressure Cookers greatly reduce cooking time and increase efficiency.

Wonder boxes or Thermos type containers greatly reduce fuel requirements.

The small stove from St. Paul Mercantile or a Dutch oven provides oven type cooking on a stove top or fire. Ceramic coated cast iron or stainless steel is preferred