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The Corn Burner, An Alternative Heat Source

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Abstract
Several companies are producing corn burning stoves that are capable of heating homes during Iowa winters. The objective of this study was to see if a corn stove was able to effectively maintain the same temperature as a gas furnace in the test area.

Disciplines
Agricultural Science | Agriculture

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Introduction

Several companies are producing corn burning stoves that are capable of heating homes during Iowa winters. The objective of this study was to see if a corn stove was able to effectively maintain the same temperature as a gas furnace in the test area.

Materials and Methods

The study was conducted the Northwest Research Farm shop. The shop area is 3,023.1 ft^2 with a 16 ft ceiling. Opening the overhead door was kept to a minimum as poor door seals let in cold air. The test area also included a loft over the office. It 1,098.6 ft^2 with a 7 ft ceiling. The installed propane furnace has an output of 200,000 BTU's. The corn stove was a Baby Countryside rated at 40,000 BTU's. One bushel of No. 2 corn = 292,000 BTU's. One gallon of LP = 92,000 BTU's. Table 1 shows BTU value of corn vs. propane at various prices. Neither heater was provided with supplemental air distribution. The target temperature of the shop was 60^{o}F. A propane flow meter was installed to record daily use of propane. High-Low thermometers were installed on each wall of the shop and also in the loft to record daily temperatures. Corn was weighed using a conventional scale. Moisture was 14.4%. The study consisted of two days a week the propane furnace would heat the shop, and the following two days the corn burner would heat the shop. If there was a decline in shop temperature during the corn burner operation, the propane furnace would assist in heating.

Results and Discussion

Average use of propane during the study without use of the corn stove was about 6.9 gallons/day. Propane use while the corn stove was operating averaged 2.3 gallons/day. Average daily use of corn for 24 hours was 1.3 bushels (75 lb). Figure 1 outlines the indoor and outdoor (maximum and minimum) temperatures and Figure 2 shows usage of corn and LP during winter months. The corn stove was operated on its highest setting to allow maximum heating potential for the building. Near the end of the study the circuit board on the corn burner failed and a new board was installed. With a new circuit board new settings for the corn feed auger speed were needed. Due to the early warm spring weather the study ended prematurely without getting an accurate setting. Based on propane at $1.40/gallon and corn at $2.00/bushel, a savings of $3.84/day was calculated.

Acknowledgments

Appreciation is extended to Jack and Nancy Brake of J&N Corn Stoves for donating the corn stove and to Homan Seeds for donating untreated seed corn.

Table 1. BTU value of corn versus propane.

Using 95% efficiency	Using 75% efficiency
Price of propane	Equivalent value of corn/bu
$0.50	$1.68
$0.60	$2.02
$0.70	$2.35
$0.80	$2.69
$0.90	$3.03
$1.00	$3.36
$1.10	$3.70
$1.20	$4.03
$1.30	$4.37
$1.40	$4.70
$1.50	$4.91
$1.60	$5.38
$1.70	$5.71

Figure 1. Outside and Average Shop Temperatures for Winter 2005 (degrees Fahrenheit)

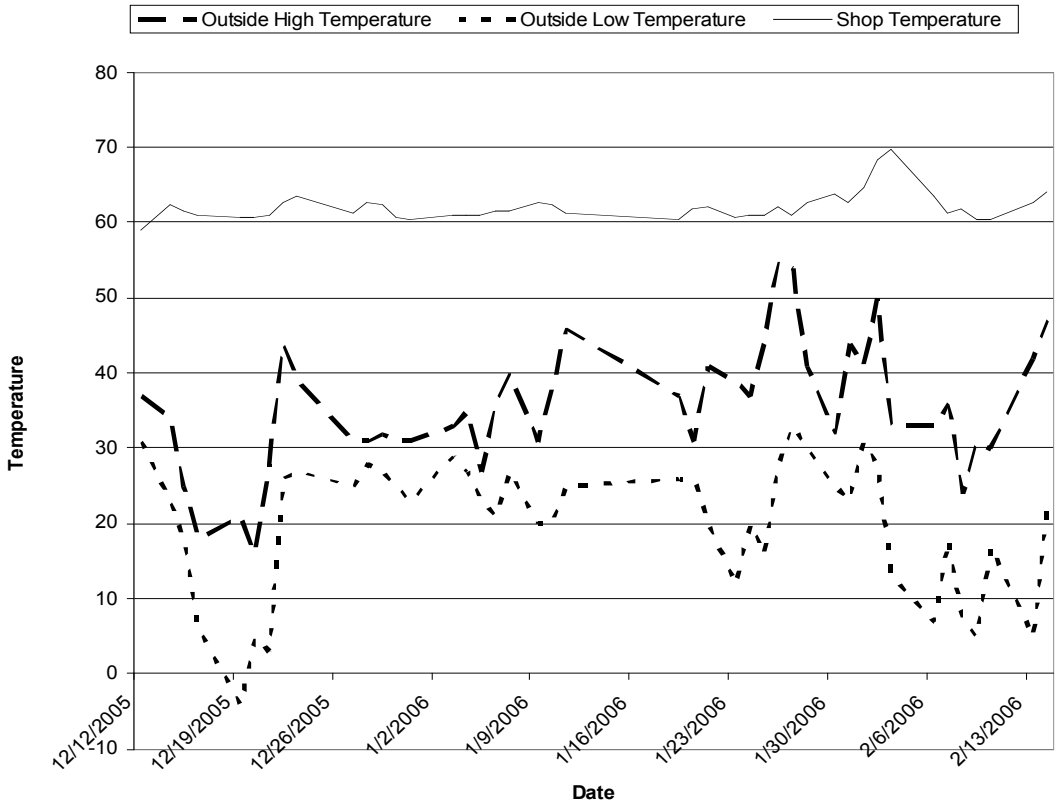

Figure 2. Corn vs Propane Usage