CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
J1516

Project Title
Safely Thawing Meat Used while Backpacking

Abstract

Objectives/Goals
I did this project so I would know how long I have when bringing meat backpacking until it spoils and which environment would be best for keeping the meat safe. My goal was to keep chicken, hamburger meat, and steak under 40 F until dinner time. From my research, I learned that 40 F is the temperature at which meats begin to spoil rapidly.

Methods/Materials
First, I inserted a thermometer into a chicken breast and covered it with plastic wrap. Then I froze the chicken overnight along with two other similarly-prepared pieces of chicken. In the morning, I inserted another thermometer outside each chicken piece just under the plastic wrap, and I put one piece in a backpack, another in a bear can, and the last one in an insulated lunch bag. All were put in a shaded area. I took temperature readings every half hour. I repeated these steps using hamburger and steak, and additionally, I repeated these experiments with steak in the sun.

Results
For all the meats, the temperature rose to about 32 F and stayed there until the meat was thawed. Once the meat thawed, its temperature rose quickly to 40 F and higher. The steak stayed coldest the longest, then the hamburger meat, and lastly, the chicken thawed the most quickly. When not in direct sunlight, the insulated lunch bag kept the meats the coolest, then the backpack, and finally, the bear can allowed the meat inside to thaw the quickest. The inside and outside temperatures of the meat did not vary considerably. Also, when the containers were put in direct sunlight, the meat thawed extremely quickly.

Conclusions/Discussion
All the heat and energy being placed into the meat is used in the process of thawing and keeps the meat temperature at about 32 F until the meat is unfrozen. As I predicted in my hypothesis, the insulated lunch bag proved to keep the food the coolest. The backpack was next, and finally, the meat in the bear can thawed the quickest. As I predicted, all of the meats thawed in the shade would have been safe to eat for at least eight hours. However, when I extended the experiment to include the thawing of the steak in the direct sun, the steak did not even last five hours in any of the environments. The most important conclusion is that to remain safe, you should not take frozen meat backpacking.

Summary Statement
I studied the thawing of different types of meat in different environments to find out whether it is safe to bring frozen meat while backpacking, and I concluded that it is not safe.

Help Received
My mother proofread my reports, and my father helped make the graphs using Microsoft PowerPoint.