CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
S1806

Project Title
Comparing the Effectiveness of Natural and Synthetic Insulating Materials

Abstract

Objectives/Goals
My goal for my project was to see which was the most efficient and safest insulating material for our animals. I tested synthetic materials and natural materials for insulating areas where animals are unsupervised because fiberglass can do real damage to animals when ingested. I wanted to do this project because we have had such bad weather this winter in parts of the country. I feel bad for those animals that can't come inside. In dog houses, chicken coops, and barns they use straw hay on the floors, why not use it in the walls?

Methods/Materials
I got ten 1-gallon plant containers. I used three natural materials which were cedar shavings, shredded paper, and straw hay. My synthetic material was fiberglass insulation with an R-Value of 13. I packed the containers till they were completely full around a 15oz tin can. I taped thermometers to plastic straws to keep them from touching the edge of the cans which would give me a false reading. I heated the water in a tea kettle and brought it up to 70 degrees Celsius. I added the hot water to the cans and recorded the temperatures every ten minutes for three hours. I repeated this process for each material.

Results
The shredded paper lost a total of 39.1 degrees Celsius. The straw hay lost a total of 37.3 degrees Celsius. The cedar shavings lost a total of 40.1 degrees Celsius. The fiberglass insulation lost a total of 37.9 degrees Celsius. Most heat loss happened during the first two hours. I could have stopped the test at two hours but I wanted my data to be as accurate as possible. I also compared the properties of the four materials. I found that fiberglass insulation is unsafe for animals. The natural materials tend to decompose and need to be replenished.

Conclusions/Discussion
I proved that what people use all the time for insulation in their homes is not the best you can use in a place where animals are unsupervised. The natural materials decompose. However, the natural materials and the fiberglass insulation were very close in their thermal capabilities. As long as the natural materials are kept dry and clean and replenished when necessary, they are the better insulator for an area where animals are unsupervised.

Summary Statement
I proved that natural materials insulate as well as synthetic materials and are safer for areas where animals are unsupervised.

Help Received
I designed and performed my experiment myself.