CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J2407

Project Title
The Effect of Bird Formation on Flight Efficiency

Abstract

Objectives/Goals
This project studied the amount of energy birds saved by flying in a V formation compared to solo flight. My hypothesis was that flying in formation reduces wind drag and leads to greater flight efficiency. I focued on Pink-Footed Geese because published information on this bird species was readily available. My work was unique because it used a wind tunnel rather than mathematical models.

Methods/Materials
For the experiments, a wind tunnel was constructed using a large fan and side walls. A pair of geese were built out of Legos at 1/5 scale. The birds were positioned at several different offsets relative to each other. The force on the rear bird was measured using a scale and simple lever mechanism. I compared the force on the rear bird for the various positions of the front bird and analyzed the results.

Results
I found that there is a significant advantage for flying in formation. When flying in very close formation, the rear bird requires 53.3% less energy than flying solo. For more realistic spacing, the rear bird saves about 30%.

Conclusions/Discussion
Although the experiments were a bit crude and could be refined, my results matched the efficiency gains found in the published literature. My work can be extended to other applications such as bicycle racing or race cars.

Summary Statement
This project studied the amount of energy birds saved by flying in a V formation compared to solo flight.

Help Received
My dad reviewed the experiments and helped plot the data