

Food in Space

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Type: Design Problem
Student Time: One semester
Location: Classroom/Home

Summary

Recent biological experiments have shown that fertilized tadpole eggs do not incubate very well in weightless conditions. On earth, as the embryo grows, the waste products fall to the bottom of the egg, away from the embryo. In space, the waste products surround the egg, killing the embryo. If the Astronauts want frog legs for dinner as they fly to Mars, design a system that will solve this problem, i.e., design a frog farm in space.

ABET Descriptors

Engr Sci Content: First Year Engineering
Type: System
Elements: Analysis, synthesis, construction, testing
Features: Design methodology, creativity
Constraints: Reliability, limited resources, economic factors
Effort: Team

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Go to the library and research what experiments NASA has conducted to provide food for astronauts on long trips. Propose a method for generating an artificial gravity for a frog farm. Also research what type of environment frogs need to grow. What type of environment must you provide? How would you accomplish this task. Can you think of other ways to grow food in space? Write a report on your findings and a proposed solution.

Construct a hardware solution to this problem. Include in your report engineering drawings, the method of achieving the artificial gravity, and show how the necessary ecological environment will be provided.

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Engineering Notes:

Objectives/Comments: This is a good opportunity to discuss some basic physics principles while encouraging the students to develop a very useful system.

Expected Outcomes: The most probable solution here is some type of spinning wheel. You should be prepared to discuss the types of acceleration a body experiences while rotating about a point. Be prepared to answer questions about what NASA has done. This information can be obtained from one of the many teacher resource centers around the country. See what kind of solutions the students come up with to provide the necessary ecological environment.

Expect some lively discussion to develop. These types of discussions generate a lot of interest.

Discussion/Follow Up: Encourage the students to consider other methods of food generation. Could catfish farms be developed? Is the requirement for water for these proposed food sources a major drawback?