NASA FOOD TECHNOLOGY COMMERCIAL SPACE CENTER
PRODUCT DEVELOPMENT COMPETITION

Iowa State University

http://www.ag.iastate.edu/centers/ftcsc/

2004-2005

NASA FTCSC Mission

The mission of the NASA Food Technology Commercial Space Center (NASA FTCSC) is to lead a national effort in developing foods and food-processing technologies that enhance space missions and advance commercial food products through cooperative efforts with NASA scientists and technologists, commercial companies, and academic researchers.

Competition Objectives

- To increase awareness on the part of food scientists and technologists regarding issues related to foods and processes designed for long-term space travel.
- To increase interest by food science and technology students in opportunities related to foods and processes designed for long-term space travel.

Competition Goals

Student teams will design a food product, food packaging, and/or a processing system that will meet the criteria for moon/planetary missions using Advanced Life Support technologies. The criteria for this type of mission are presented on page 3-4 of these guidelines.

Schedule

September 2004	Announce contest via e-mail to all U.S. college and university food science and ag/food engineering departments and on the NASA FTCSC Internet site (http://www.ag.iastate.edu/centers/ftcsc/).
February 1, 2005	Deadline for submission of letter of intent to participate in the competition. Letter of intent should be submitted electronically to creitmei@iastate.edu.
March 31, 2005	Deadline for submission of final proposals via e-mail to creitmei@iastate.edu and deadline for submission of actual product sample to: NASA Food Technology Commercial Space Center Attn: Dr. Cheryll Reitmeier 2901 South Loop Drive, Suite 3700 Ames, IA 50010-8632
April 30, 2005	Judging completed.
July 16-20, 2005	Poster of the winning proposal will be presented in the NASA FTCSC booth at the Institute of Food Technologists' Annual Meeting and Food Expo, July 16-20, 2005, New Orleans, Louisiana. NASA FTCSC will prepare the poster from the winning proposal.
November 2005	Winning team members will travel to Johnson Space Center, Houston, Texas, to present their idea during November 2005.

Participants
Graduate and undergraduate students from any college or university with food science and/or agricultural or food engineering programs are eligible to enter this competition.

- All students from each team must be enrolled as full-time students in a food-related discipline.
- A letter of intent identifying the name of the team wishing to participate in the competition along with a brief description of the product being considered for development must be submitted by a team leader or advisor in the form of an email to Dr. Cheryll Reitmeier at (creitmei@iastate.edu) prior to the submission of the proposal.
- Documentation of full-time student status by student ID card or fee statement and a letter from the advisor and IFT membership by membership number is required upon submission of the team's proposal.

Judges
Two NASA representatives and three food industry representatives will judge the proposals and product submissions. The NASA FTCSC will coordinate the judging.

Awards
One winning team of four students and one faculty advisor will receive expenses-paid trips (up to $8,000) to:

- The IFT Annual Meeting and Food Expo, New Orleans, Louisiana, July 16-20, 2005.
- Johnson Space Center, Houston, Texas, November 2005.

At least one student must be present at all times at the NASA FTCSC IFT exhibiting booth. Travel expenses will be paid after each trip; receipts are required. Financial support is provided by NASA FTCSC and their industry partners.

PRODUCT DEVELOPMENT GUIDELINES

Teams

- Each college or university can enter a proposal from only one team. The team must consist of a maximum of four full-time students (fewer or more students can work on the project, but only four students can travel to New Orleans and to Houston with NASA FTCSC funds).
- Entries must be the students' work. Professors may be consulted but cannot be major contributors. Industry support and participation is encouraged and can be acknowledged.
- **Students are encouraged to contact Dr. Reitmeier (515-294-4325, creitmei@iastate.edu) for guidance during development of the proposal.**
- Submissions to both the IFT Student Product Development Competition and the NASA FTCSC Product Development Competition are allowed.

Proposal

- The proposal must be submitted electronically via e-mail to Dr. Cheryll Reitmeier at creitmei@iastate.edu (limit 6 pages, including supporting tables, graphs, photos).
- One copy of the proposal and an actual product sample must be shipped by one-day express delivery to:

NASA Food Technology Commercial Space Center
Attn: Dr. Cheryll Reitmeier
2901 South Loop Drive, Suite 3700
Ames, IA 50010-8632
Phone: (515) 296-5383

The proposal must include the following elements without reference to the university or individual team members:

- Title
- Introduction
- Rationale
- Procedures
- Evaluation of parameters for success (i.e., marketing on earth, criteria for moon/planetary mission met)
- Inclusion of graphs, photographs, and visuals are encouraged.
- Do not include the name of team members, department, or university in the proposal.
- The names of the team members, the address, telephone number, and e-mail address for one contact person, and a photograph of the team members should be included on a separate page of the proposal. This page is not included in the 6-page requirement.

Criteria for Moon/Planetary Outpost Missions

Marketing The product or process will be suitable for moon or Mars outposts and could also be commercialized for use on Earth. A marketing plan and cost analysis may be included in the proposal.

Preparation The product or process should include foods derived from the list of potential crops indicated by NASA's Advanced Life Support (ALS) program as being suitable for long-duration space missions. These crops include:

- cabbage
- carrots
- chard
- dry beans (pinto beans and lentils)
- lettuce
- onions
- peanuts
- radishes
- rice
- soybeans
- spinach
- sweet potatoes
- tomatoes
- wheat
- white potatoes

Assume that grains are processed into products similar to those available on Earth (e.g., wheat into whole grain flour). The product should be convenient to prepare, require minimal time and water to prepare (water is limited and recirculated), yield no crumbs, and generate minimal waste.

Resupply List and explain use of all ingredients that must be supplied from Earth (e.g., spices, baking powder, flavoring agents, etc.).

Equipment	The galley will house a microwave, convection oven, refrigerator, and freezer. There is partial gravity.
Sensory characteristics	The product should be appealing and provide variety to the space food menu. If a process is developed, it may provide multiple uses for the food ingredient.
Storage and safety	The product should be microbiologically safe. Address packaging and storage, if applicable.
Nutrition	List nutritional characteristics and nutrient content of the product. The product should fit into a meal plan that meets US DRI for men and women over age 40. Products should have fewer than 30% of the calories from fat. Foods with a high fiber content and/or a high vitamin or mineral (except sodium and iron) content are beneficial. See (http://advlifesupport.jsc.nasa.gov) for details about requirements for Advanced Life Support foods and refer to the NASA FTCSC Internet site (http://www.ag.iastate.edu/centers/ftcsc/) for the research challenges to be addressed in developing new space food products.

Criteria for Evaluation

Proposals will be evaluated for creativity and development of a novel product or process. Proposal format should be followed and standard scientific writing style should be used. Application to space and terrestrial markets; preparation time, convenience, water use and amount of waste; sensory attributes; weight, packaging, and storage life; and safety and nutritional aspects of the product will be evaluated. Emphasis on these factors may vary, depending on the product or process that is developed. Comments from the judges will be provided to teams and advisors after completion of judging.

2005 NASA FTCSC Product Development Evaluation Guidelines

Product / Packaging / Processing System: _____ Reviewer: _____

Evaluation of each proposal and product is based on 100 points. The evaluation should be based on the technical merit and creativity of the proposal as well as the final product.
See Product Development Competition Guidelines for full description of parameters for success.

Parameters for Success		Please put an X in the box by your answers.
Marketing (10 points)	Product is appropriate for space as well as terrestrial markets.	1 2 3 4 5 6 7 8 9 10 Not appropriate — Moderately appropriate — Very appropriate
Preparation (15 points)	a) Based on the crops to be grown in space.	1 2 3 4 5 6 7 8 9 10 Crop preparation is high — Crop preparation is low
	b) Factors related to preparation considered.	1 2 3 4 5 Preparation time is high — Preparation time is low
Resupply (10 points)	Few items needed for resupply that are not grown on the outpost.	1 2 3 4 5 6 7 8 9 10 Requires a lot of resupplies — Requires almost no resupplies
Equipment (5 points)	Appropriate processing equipment used, environmental constraints of processing considered, and proposed equipment needs addressed.	1 2 3 4 5 Incomplete explanation — Complete explanation
Storage and Safety (15 points)	Addressed mechanisms related to product shelf-life.	1 10 15 No — Yes
Nutrition (15 points)	Meets DRI, % fat, fiber, vitamin, and mineral recommendations.	1 10 15 No — Yes
Proposal Format (5 points)	Proposal does not exceed six pages and includes title, introduction, rationale, procedures and parameters for success, is organized and grammatically correct.	1 2 3 4 5 No — Yes

SUBTOTAL: _____

To be completed when product is available.

Sensory Characteristics (20 points)	Product is appealing and adds variety to diet plan.	1 10 20 Unsatisfactory — Satisfactory
Product (5 points)	Product matches characteristics described in proposal.	1 2 3 4 5 No — Yes

TOTAL POINTS: _____