

499c The Challenges in the Development of a Long Duration Space Mission Food System

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The National Aeronautics and Space Administration (NASA) is working towards future long duration manned space flights to Moon and Mars. The Mars missions may be as long as 2.5 years. These missions require development of both a Transit Food System and a Lunar or Planetary Food System. These two systems are intrinsically different since the first one will be utilized in the transit vehicle in microgravity conditions while the second will be used in conditions of partial gravity (hypogravity). The Transit Food System will consist of prepackaged food with an extended shelf life of 3-5 years. It will be supplemented with salad crops that will be consumed fresh. The Lunar or Planetary Food System will allow for food processing of raw commodities in the presence of some gravitational force ($1/6$ to $1/3$ that of Earth). Ingredients such as wheat, soybean, rice, potato, peanut, dried beans, and salad crops, will be processed to final products to provide a nutritious, safe, and acceptable diet for the crew. The design of the food system will require optimization within several constraints. Some of these constraints will be to minimize power, mass, water usage, waste production, and volume needs. Concurrently, the food system must maximize the safety, acceptability, and nutritional content of the food. The balancing of these constraints will be the challenge in developing a food processing system for planetary missions.