EFFECT OF PROCESSING AND SUBSEQUENT STORAGE ON NUTRITION

M.H. Perchonok ¹ and O.S. Lai²

¹ NASA/JSC, Mail Code SF3, 2101 NASA Parkway, Houston, TX77058
² Lockheed Martin Mission Services, 1300 Hercules MC:CO9, P.O. Box 58487, Houston, TX77058

OBJECTIVE

- To determine the effects of thermal processing, freeze-drying, irradiation, and storage time on the nutritional content of food
- To evaluate the nutritional content of the food items currently used on the International Space Station and Shuttle
- To establish the need to institute countermeasures

(This study does not seek to address the effects of processing on nutrients in detail but rather aims to place in context the overall nutritional status at the time of consumption)

BACKGROUND

- Food products for space feeding systems are processed to commercial standards.
- Thermal sterilization is one of the most effective food preservation processes; it affects vitamin and protein quality.
- The dehydration process has the smallest impact on nutrients.
- Microbiological stability is dependent on the composite macronutrient matrix.
- A kinetic model only provides an estimate of the remaining vitamin and protein content.
- It is difficult to extrapolate between systems.
- Food Composition Database does not take into account the effects of processing.

JUSTIFICATION

- Food with a 3-5 year shelf-life will be required for a mission to Mars.
- Nutrient loss during processing and subsequent storage can be significant.
- Nutritional requirements are delivered via the food system.
- The quantity of nutrients, e.g., vitamins, at consumption is currently unknown.
- Nutrients play a vital role in facilitating the capability of astronauts to tolerate physiological changes.
- As a result, despite increases, physiology changes gain importance.

DELIVERABLES

- Conduct a literature review to better understand the potential effects of retorting, freeze-drying and irradiation on nutrient loss
- Determine the effect of processing on representative flight foods by comparing the calculated nutritional content to the actual nutrition one month after storage
- Determine the effect of subsequent storage on nutrition by comparing the one month nutrition analysis results with those at 1 year and 3 years
- Determine the capability of the current food system to provide adequate nutrition for long duration missions

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