

FOOD ACCEPTABILITY, MENU FATIGUE, AND AVERSION DURING THE SIRIUS-21 ANALOG MISSION

Grace L. Douglas¹, Thomas Oswald², Suzanne T. Bell¹, Millennia Young¹

¹NASA, Johnson Space Center, Houston, TX; ²KBR, Houston, TX

Spaceflight food systems are closed systems, meaning they are restricted to the variety and quantity of food launched within resource limitations of the mission. The acceptability of the food system has been linked to caloric intake and associated nutritional benefits. ISS crew members receive substantial personal food preferences (around 25% of their total intake) but have noted in debriefs that they would prefer more food variety and preference for the length of the missions and they tire of certain foods over six months. Limits on variety and personal preference are expected to increase as missions become further from Earth. It is possible that menu fatigue leads to decreases in acceptability and increased aversion to available foods that may contribute to the body mass loss often experienced by spaceflight crews. However, the impact of repeat food consumption on acceptability has not yet been systematically investigated across potential spaceflight food systems. Limited variety and crew preferences within food categories may have more severe physical and behavioral health and performance consequences as mission duration increases. Characterizing the relationship between food acceptability and mission duration will contribute to defining requirements for an acceptable food system that will support crew health and performance on long duration missions.

This study evaluated acceptability of the food system used in the SIRIUS-21 8-month mission in Moscow, Russia. To capture *in situ* scoring of repeat consumption experiences, we administered a weekly food acceptability questionnaire to all 5 crewmembers throughout the mission. Crewmembers scored foods they consumed at 3 meals every 6 days on a 9-point hedonic scale and provided open-ended feedback regarding food context, attributes, and the meal. The sequence was intended to capture all days in the 7-day menu cycle. The repetition was intended to target repeat food ratings that may provide insight into onset of menu fatigue where they might stop eating some foods or limit their choices to their favorites. Every 30 days crewmembers completed two additional surveys to characterize the food system, any changes to the food system, and their experience with the food system.

Data collection is complete. Data are currently being assessed by descriptive statistics and visualizations of the ratings over time. The primary goal is to look for trends in the trajectories of ratings of the food items over time – both within and between individuals – to determine if there are substantial decreases in acceptability across all foods, or within specific food categories (e.g., vegetables). The number of times a particular item is scored provides some information on the frequency of consumption (preference), and the overall number of unique items can give a measure of overall variety. We will assess whether individuals were more likely to have more observations on food items that are rated higher, and whether those who rated foods higher had more or less overall variety. Since the data are composed of longitudinal subjective ratings, repeated measures techniques will be used to quantify trends over time and how these may relate to preference and variety. We will assess how these trends relate to their characterization of and experience with the SIRIUS-21 food system. We will also provide content analysis of any additional feedback collected on the open-ended questions and debrief interviews.