The objective of this study is to evaluate three packaging materials for potential use in long duration space exploration missions. One of the materials, Combitherm, is currently being used for packaging of NASA’s natural form, bite size, and rehydratable foods. Due to the required 18 month shelf life for ISS missions, these foods are overwrapped with a high barrier material. Combitherm is considered the control due to the fact that it is the one currently in use. In an effort to reduce packaging mass, the ideal new material would not require an overwrap. The result would be a package of low mass and volume with reduced materials to discard.

In addition, a material similar to the overwrap material currently used to extend shelf life of ISS and Shuttle foods will be tested for its utility as the sole packaging material. This material, Technipaq brand, is incorporated in this study in place of the current overwrap because it is a common off the shelf item versus the current material which is made in small quantities specifically for the space program.

The third material is a new technology. The film is a very lightweight polyethylene terephlate (PET) with a thin coating of aluminum oxide. It is manufactured by Tolas Health Care Packaging. The thin layer of aluminum oxide coating over the PET provides an effective barrier based on MOCON analytical results.

The results confirm that the current primary package (Combitherm) is insufficient and therefore does require a secondary overwrap to provide the required 18 month shelf life.

The new Tolas material is not performing as well as the overwrap (Technipaq) material, but is doing well and may prove to be sufficient in providing the required 18 month shelf life, while reducing the packaging to a single pouch.

Final conclusions will be made once the 18 month study is completed in Sept 2009.

Experimental Design Matrix

FOOD SAMPLES
- Cottonseed Oil
- Cheerios
- Peanuts

MATERIALS
- Cottonseed Oil/Combitherm
- Cheerios/Combitherm
- Peanuts/Combitherm
- Cottonseed Oil/Tolas
- Cheerios/Tolas
- Peanuts/Tolas
- Cottonseed Oil/Technipaq
- Cheerios/Technipaq
- Peanuts/Technipaq

VARIABLES
- Storage: 3 variables - 72°F & 25%RH, 72°F & 50%RH, 72°F & 75%RH
- Rate of Analysis = Full testing every 3 months for 18 months, then quantitative analyses only through 36 months.

Conclusion

The results of the peanuts and cottonseed oil were not presented because to date, there have been no drastic changes found in the analytical results. Sensory evaluation for peanuts packaged in Combitherm and stored at 75%RH showed similar results to Cheerios, but no other noticeable changes were observed. Currently, the biggest factor effecting the samples is moisture, but rancidity, caused by oxygen ingress may become more apparent in the next 12 months of testing.

References