

# 21 – Cooking and the Culinary Arts

## SUMMARY

The Network's Food Working Group (FoodWG) has developed a Plan for how produce from the GreenHab would be converted into ingredients used in recipes to make meals that would meet the nutritional needs of the crew. It is an interesting challenge to produce the right amount of produce at the right time so that food storage is minimized. Automated / robotic systems would be used to free up valuable crew time. Cooking and the enjoyment of regular and special meals will play an important role in crew morale and interest by many in the watching public.

## THE FOOD WORKING GROUP

The Space Development Network has a specific group, the Food Working Group (FoodWG) dealing with the point after the Farmer(s) harvest and store produce. So, the ordered steps that the FoodWG covers are:

- 1) Start with produce
- 2) Process those into refined ingredients (e.g. flour)
- 3) Prepare recipes according to a menu
- 4) Meet the nutritional needs of the crew.

Along the way it includes the culinary arts, which are the creative aspects of cooking including presentation and holiday meals.

One of the main projects of the FoodWG is to produce a sophisticated Lunar Cookbook with recipes using ingredients grown within the Initial Permanent Base or shipped from Earth and stored (e.g. coconut cannot be easily grown in the StarHab).

## NUTRITION

### Nutritional Needs

Our working group briefly considered what the nutritional needs of the Initial Crew of eight would need. Apart from a higher-than-average caloric need due to a vigorous exercise schedule, we are developing the menu with the basic nutritional needs for people on Earth. At a fundamental level this means:

- 65% - Carbohydrates
- 20% - Fat
- 15% - Protein

There are other nutritional needs such as vitamins and micronutrients which would also need to be satisfied.

### **Meeting Nutritional Needs with Which Plants?**

We have the assumption that all the nutritional needs will be met by what the crew grows. This probably isn't exactly correct since, with the delivery of large payloads, the crew could probably be supplied only with deliveries from Earth if need be. In fact, the delivery of food is a very convenient way of supplementing carbon and nitrogen to the base. Also, there are certain "comfort foods" and certain important ingredients which cannot be easily produced early on the Moon. But to simplify matters, we are sticking with what we believe that the Initial Crew can grow themselves.

### **Variety**

We could theoretically meet the nutritional needs through a monotonous diet of, for example, potatoes for starch, peanuts for fat, and soybeans for protein. But we want to show that people moving off Earth don't have to be deprived but can have a nice variety of recipes. In fact, eating from our Lunar Cookbook would probably give more variety than most people normally get. And with good application of the culinary arts the dining of the Initial Crew could turn out to be very pleasant.

As we have generated an extensive Food List, we have found that, for most all of the foods we can think of, there is a way of growing them even in the initial habitat. It sometimes takes creative approaches like dwarf, fruit-bearing trees in a pot, but it can still be done.

### **Processing Into Ingredients**

There is a step in the from-plant-to-plate process that those of us on Earth often ignore. That is to take a plant and convert it into a useable ingredient. Nowadays, this is typically done at a manufacturing level using large, industrial equipment. We need such equipment but in low mass, small volume forms on the Moon. Typically, these already exist but it is going to add another time-consuming step in the process of preparing a meal that we don't normally deal with. Making soy milk from soybeans is an example of this. On Earth we just run out to the store and buy soy milk in a carton. But on the Moon, we'll need to use those small machines that do that process and spend the time running the machine.

Different ingredients will be processed at different times relative to their consumption. Some ingredients can be made just as soon as they are harvested. Flour from wheat grains is an example of this. Meanwhile, others will be processed closer to consumption. Guacamole is a classic example of this.

**Storage**

Storage includes:

- Keeping on the plant
- Baskets (e.g. fresh produce)
- Pantry (room temperature storables)
- Refrigerated (perishable but cannot be frozen)
- Frozen (perishable but freezable)

Keeping something like tomatoes on the plant until harvested for immediate use helps extend the period of time that they can be available fresh. If one were to pick all the tomatoes at once and put them in the refrigerator, then they would all start to go bad about the same time.



**Food Preferences**

As is done with crew traveling to the ISS, professional dieticians will have the crew undergo taste testing of different recipes during their training and before they launch to the Moon. The actual menu for the Initial Crew would reflect those preferences and the Agricultural Plan would be adjusted to reflect the ingredient needs of the recipes in the menu. Since the Initial Crew will be eating from the same produce of the GreenHab, one might think that conflicting food preferences would force some to eat foods that they don't like. But just like we do on Earth one could just avoid one dish and double up on another. So long as each meal has something enjoyable for each of the Crew then it should be OK.

## **From Nutrition Back to Planting**

So, there is a proper order for figuring out what to plant and when. One must work back and forth to figure it out. We start with the nutritional needs and look at what plant ingredients would meet those needs. Then we select or develop recipes which would meet the nutritional needs using those plants. Care must be taken to cluster ingredients between recipes to utilize the full amount of that ingredient that is being produced. So for example, if one grows a pumpkin for Thanksgiving but there is some left over then guess what type of soup you're going to have within a few days?

After figuring out the ingredients needed then one can figure out how many of what types of plants need to be harvested by what time. The time factor can be made more variable via storage. So for example, if one has harvested a lot of strawberries at a given point in time, one could eat fresh strawberries but then consume frozen strawberries in the form of a smoothie weeks later.

After figuring out what the harvest schedule needs to be it is a fairly simple matter to calculate back the planting schedule including any seedling schedule.

## **Managing Produce / Ingredient Flow**

A complicated challenge will be how to ensure enough of an ingredient is available while not having large amounts of ingredients in storage. The easiest approach would be to look at what is currently being harvested and in store and to choose recipes / meals that use those things. But this may mean eating a whole lot of zucchinis in different forms for two weeks -- not exactly ideal! So, correctly managing harvesting and storage can help inform recipe choices to spread when one ingredient is consumed over time thereby avoiding overloading the crew with a particular ingredient all the while keeping an eye on making sure that the nutritional needs are being met. In practice, this could be challenging to figure out. It may be that AI would be used to identify which recipes should be used to manage this process. Trying to explicitly detail this process in a printed cookbook could be an interesting challenge.

## **Saving Time by Using Robots & Processors**

Crew time is extremely valuable. But in the Initial Permanent Base, crew time won't be so tied up doing many experiments like they have to do on the ISS. Rather, the focus of the Initial Base is sustainability and not just science. Instead, they will need to have a lot of time available for doing ISRU, growing food, producing parts, etc. So, any machine that can offload work will pay back the shipping costs very rapidly.

This is also a place where robots could be helpful. There are advanced robotic systems intended to cook in a kitchen setting. They move

around on tracks in the ceiling and have two arms and cameras. They can open cupboards, remove containers, open those containers, measure out portions, place ingredients in pots or whatnot, turn on the stove, stir, remove the cooked item and place on a plate. It's really quite amazing. Now, if they would only wash the dishes too! And these robots could be conducting this work just as people are about to wake up or while they are working in the WorkHab before lunch and supper.

But we don't want to let the robots have all of the fun. Cooking food and preparing meals is an important part of living off Earth. So, the robots could act as kitchen assistants that prepare things but the final steps including presentation are being done by whichever crew is on cooking duty for the day. In the eyes of their fellow crew and the people who are on Earth watching, it will be the human cook that will be taking credit for the final meal and its presentation.

But we mustn't get too hyper-focused on robots. Good old, automated equipment can be real time-savers too. Food processors, ingenious choppers, mixers, etc. are time-savers here on Earth and any piece of equipment that can save time up there should be considered too.

### **Who Does the Cooking?**

Besides the assistance of the cooking robots, all crew members would be scheduled to prepare some of the meals. But there could be a couple of Initial Crew members that were selected in part because they are particularly good at cooking. They would be the primary cooks provided that their specialty job allows them the time. So, depending upon what the daily job requirements might be for any given job, there may be some positions that would tend to have more free time than others. When selecting those positions, special preference could be given to either choosing people who have the cooking skills and/or they would be specially trained in cooking and the culinary arts.

### **The Lunar Cookbook**

As mentioned before, we'd like to develop a Lunar Cookbook that would lay out an example menu and set of recipes and even include a planting and harvesting schedule. This cookbook would be useful in simulations in analogues bases. But they could also serve as a unique cookbook for those who would like to have their own garden and recipes that would use those ingredients. Even if someone wasn't attempting to produce food for all their nutritional needs, it would still be interesting to attempt specific recipes.

If you, the Reader, think that you could help develop the Lunar Cookbook and you are willing to work within the guidelines of the Space Development Network we would love to have you join us (for free) and contribute your talents.

# THE CULINARY ARTS

Beyond just the work of cooking, the culinary arts include developing new dishes, balancing things like flavor, textures, and aroma, designing thematic menus, and, of course, presentation.

## Presentation

A big part of the culinary arts is the presentation of the food. Often, this doesn't take a lot of time to do but simply the knowhow and the motivation to make it special. In the Lunar Cookbook there should probably be a section about presentation in general and details about presentation with certain dishes.

## Cooking on TV

Another part of presentation would be conducting an occasional variety spot on the weekly TV show from the Moon, where there could be a cooking demonstration. These segments could help reach out to and inspire a group of people who don't normally think about space. But that's sort of the point here. As we go beyond exploring and start actually living off Earth, it will involve more parts of life than the space program normally has. And as a result, it will spark an interest in space in a more diverse group of people.



*Cooking demos will draw a different sort of space advocate.*

## Holidays

To be sure, holidays will have special meals with all the trappings possible and will likely be broadcast. Traditional dishes (e.g. turkey, pumpkin pie, cranberry sauce) would need to either be grown on the Moon or specifically shipped. There could be special holidays from the country of origin of one of the team members that would be introduced to Americans and others not from that nation. Along with the meal, there could be special aspects of the meal such as the telling of the traditional story. The celebration of holidays in this traditional manner would help make the point that this really is the beginning of humanity spreading out from space. This is home life and not a government outpost.