

Read the article below about the problems that astronauts have with food in space, and then complete the notes on the opposite page.

Space Cuisine

Most people rarely consider what the three astronauts who live on the International Space Station are going to have for dinner. However, food scientists working with the project spend a good deal of time worrying about the astronauts' diet. When you spend 190 days on the Space Station, food can become the highlight of the day. There is nothing like the crunch of a fresh apple to lift the mood of the astronauts.

However, the food scientists need to consider some basic facts about the lack of gravity in space before they decide on how best to prepare the diet. Firstly, the astronauts' sense of smell is reduced in space. Moreover, weightlessness makes liquids move from the lower part of the body to the upper, sometimes blocking the nasal passages. Similarly, an atmosphere without gravity and with only re-circulated air tends to take away the pleasant odour of the food.

All these details give particular problems to the food scientists. The first rule about cooking for astronauts is never to prepare any food that breaks up too easily. No-one wants to chase a tiny piece of food around a space station. Scientists have developed a special dough-based sandwich which is useful in space because it does not break into little bits as easily as normal bread.

Because of the reduction of food odours, astronauts long for food which has a nice, sharp flavour. Salt and pepper can help to achieve this, but they must be in liquid form. Where there is a lack of gravity, grains of salt and pepper can damage equipment or become stuck in an astronaut's nose or eyes. Even a fresh tomato can cause problems. If a little tomato juice squirts out when they bite it, it has to be found, so the astronauts have to eat pre-sliced tomatoes. In addition, all the food has to be moist enough to stick together.

The astronauts eat almost all their meals together at a common table. Of course, they are not sitting. They are floating. They use a foothold to stay in place, and attach utensils to the table with straps and sticky tape.

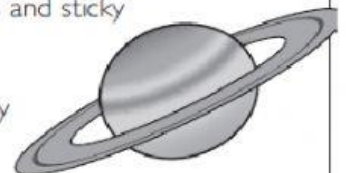
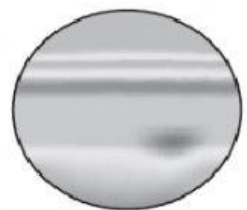
The astronauts are careful not to waste anything, even if they do not like a dish. 'We try not to throw food away because you never know what the future might hold,' said astronaut William McArthur.

The astronauts on the shuttles, who are in space for only 10 to 15 days, have to be content to end their meal with a vitamin tablet. But astronauts orbiting the earth for months need something a little special, so warm desserts like chocolate pudding cake have been developed.

The latest challenge is how to prepare food for the planned expedition to Mars. The timeline for the whole voyage is long because of the great distances. The food will need a 5-year shelf life, because it will be launched into space before the astronauts. In addition, allowances have to be made for unpredictable weather and mechanical problems that could add more time.

For these expeditions, scientists also have to research new kinds of packaging that help lessen a problem called "water activity", which can promote the growth of unwanted bacteria.

Astronaut McArthur commented, "The spread of bacteria in space is definitely not a good idea."



You are going to give a presentation to your class about the problems of food in space. Prepare some notes to use as the basis of your talk.

Make your notes under each heading.

Physical changes to astronauts caused by lack of gravity

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Special requirements for food in space

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Challenges for the voyage to Mars

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