
VHD
PORT

1
00:00:00,000 --> 00:00:01,278
- There's no refrigerator on

2
00:00:01,278 --> 00:00:03,185
the International Space Station.

3
00:00:03,185 --> 00:00:06,948
The food all has to be shelf
stable, at room temperature.

4
00:00:06,948 --> 00:00:07,984
And the reason there's no refrigeration

5
00:00:07,984 --> 00:00:09,926
is because there's limited resources

6
00:00:09,926 --> 00:00:11,443
on the International Space Station.

7
00:00:11,443 --> 00:00:14,048
And this is also going to be
true on a mission to Mars.

8
00:00:14,048 --> 00:00:16,965
Keeping foods stable for five years

9
00:00:18,073 --> 00:00:20,141
is a difficult challenge because,

10
00:00:20,141 --> 00:00:21,813
you have to stabilize the nutrition,

11
00:00:21,813 --> 00:00:23,793
and you have to stabilize the quality

12
00:00:23,793 --> 00:00:25,358
of the food, so how will it taste.

13
00:00:25,358 --> 00:00:26,863
So if you've ever had a food that's been

14
00:00:26,863 --> 00:00:28,713
in your pantry for a
certain amount of time,

15
00:00:28,713 --> 00:00:30,130
and it's past best if used by,

16
00:00:30,130 --> 00:00:32,197
but it's something like a granola bar

17
00:00:32,197 --> 00:00:33,051
and you still try it,

18
00:00:33,051 --> 00:00:34,378
or you have some crackers in there,

19
00:00:34,378 --> 00:00:35,211
and you try them and you're like,

20
00:00:35,211 --> 00:00:36,146
oh, these aren't very good.

21
00:00:36,146 --> 00:00:39,019
Chances are that food's
still not five years old.

22
00:00:39,019 --> 00:00:41,699
So when we go to Mars, the food actually

23
00:00:41,699 --> 00:00:43,715
might get sent ahead of the crew.

24
00:00:43,715 --> 00:00:44,835
On the International Space Station

25
00:00:44,835 --> 00:00:46,837
they get resupply
missions every few months.

26
00:00:46,837 --> 00:00:48,850
On a Mars mission they probably

27
00:00:48,850 --> 00:00:49,980
won't have any resupply.

28
00:00:49,980 --> 00:00:51,430
The astronauts are really excited

29
00:00:51,430 --> 00:00:54,111
when fresh fruit comes
up on resupply missions

30
00:00:54,111 --> 00:00:55,681
because they don't get it very often,

31
00:00:55,681 --> 00:00:58,382
only when a resupply mission docks.

32
00:00:58,382 --> 00:01:01,655
- NASA cares a great deal
about food for the astronauts.

33
00:01:01,655 --> 00:01:04,057
They need to consume enough calories,

34
00:01:04,057 --> 00:01:07,332
enough nutrients to stay
healthy for the whole mission.

35
00:01:07,332 --> 00:01:10,105
And so a mission to Mars is
particularly challenging.

36

00:01:10,105 --> 00:01:12,872
It could be 30 months, six months there,

37
00:01:12,872 --> 00:01:15,178
18 months stay, six months back.

38
00:01:15,178 --> 00:01:16,790
And the food system might be deployed

39
00:01:16,790 --> 00:01:18,474
in advance of the astronaut.

40
00:01:18,474 --> 00:01:20,915
We may need food that
will last five years,

41
00:01:20,915 --> 00:01:23,832
and be delicious in the fifth year.

42
00:01:24,814 --> 00:01:28,110
- Flavor includes taste which is

43
00:01:28,110 --> 00:01:29,955
things like salty, and bitter,

44
00:01:29,955 --> 00:01:32,488
and sour, and sweets, and umami

45
00:01:32,488 --> 00:01:34,052
which is actually savory.

46
00:01:34,052 --> 00:01:36,792
And it's also a lot of what you get

47
00:01:36,792 --> 00:01:38,478
when you're smelling the food.

48
00:01:38,478 --> 00:01:40,728

So most of flavor is aroma.

49
00:01:42,939 --> 00:01:45,648
When you're looking at taste changes

50
00:01:45,648 --> 00:01:47,600
there's a lot of things that are going on

51
00:01:47,600 --> 00:01:49,404
in orbit that could be contributing

52
00:01:49,404 --> 00:01:51,198
to a sensation of a taste change

53
00:01:51,198 --> 00:01:54,074
so potentially it could be
the fluid shift in the body

54
00:01:54,074 --> 00:01:55,411
so you don't taste things as well

55
00:01:55,411 --> 00:01:58,404
because you have a sensation
that you ave a cold.

56
00:01:58,404 --> 00:02:01,112
The aromas don't dissipate the same,

57
00:02:01,112 --> 00:02:03,940
they don't rise like they do
here on Earth without gravity.

58
00:02:03,940 --> 00:02:06,372
So they dissipate instead of rising.

59
00:02:06,372 --> 00:02:07,592
And so they're not getting that aroma

60

00:02:07,592 --> 00:02:09,397
which is most of flavor.

61
00:02:09,397 --> 00:02:11,305
The astronauts have about 200

62
00:02:11,305 --> 00:02:12,711
different food options and that

63
00:02:12,711 --> 00:02:13,675
includes their beverages.

64
00:02:13,675 --> 00:02:15,053
It's cooked and prepared here

65
00:02:15,053 --> 00:02:16,196
on Earth where we remove the water.

66
00:02:16,196 --> 00:02:17,712
When they add it back, it's real food.

67
00:02:17,712 --> 00:02:19,922
This actually will taste
just like you would expect

68
00:02:19,922 --> 00:02:21,550
a pasta with shrimp product to taste

69
00:02:21,550 --> 00:02:22,988
when you add water back.

70
00:02:22,988 --> 00:02:24,058
The reason we remove the water

71
00:02:24,058 --> 00:02:25,527
is partially for mass saving.

72
00:02:25,527 --> 00:02:26,890

So when you send this up into orbit

73
00:02:26,890 --> 00:02:28,208
it weighs a lot less.

74
00:02:28,208 --> 00:02:31,998
And it costs a lot to
launch a kilogram into space

75
00:02:31,998 --> 00:02:33,676
so they recycle a lot of their water

76
00:02:33,676 --> 00:02:35,073
on the International Space Station

77
00:02:35,073 --> 00:02:36,227
so they can add the water back.

78
00:02:36,227 --> 00:02:37,595
And we expect that that will continue

79
00:02:37,595 --> 00:02:39,131
as they go on Mars missions,

80
00:02:39,131 --> 00:02:41,372
that they'd still be recycling
a lot of their water.

81
00:02:41,372 --> 00:02:43,544
We know from studies that only

82
00:02:43,544 --> 00:02:46,108
about seven of 65 of these that are

83
00:02:46,108 --> 00:02:48,019
currently in our food system,

84
00:02:48,019 --> 00:02:50,594

would still taste good after five years.

85
00:02:50,594 --> 00:02:51,855
So this is like canned food

86
00:02:51,855 --> 00:02:53,146
that you'd buy in the grocery store

87
00:02:53,146 --> 00:02:55,131
except in a flexible, lightweight pouch.

88
00:02:55,131 --> 00:02:56,072
So if we do send these to Mars

89
00:02:56,072 --> 00:02:58,362
we have to have a
counter measure in place,

90
00:02:58,362 --> 00:03:00,826
which could be a new
technology to produce them.

91
00:03:00,826 --> 00:03:03,714
So we're still looking
into different technologies

92
00:03:03,714 --> 00:03:06,774
and how much extra shelf life we can get.

93
00:03:06,774 --> 00:03:09,008
Can we get to five years by
using those technologies,