Science Forward--Food

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http://cuny.is/scienceforward

[0:00] [background music]

Flora Lichtman: [0:01] When it comes to food, humans are in a pickle. That's an understatement. Here's the deal. By 2050, the human population is expected to hit nine billion, and the UN food and agricultural organization estimates that we're going to need to double our food production to feed all these people.

[0:17] But how do we do that? Our oceans are already overfished, and land and water for farming is already becoming scarce. So some policymakers and scientists are saying we have to start thinking outside the box. That's what brings me to the Black Ant, here in the East Village of New York City, and the name of the restaurant should give you a hint. Insects are on the menu.

Executive Chef Mario Hernandez: [0:40] It's traditional from Mexico, from all parts of Mexico, before the Spaniards comes to Mexico, it was one of the first protein resources on their diet. It's like a high-protein dish.

Flora Lichtman: [0:53] An estimated two billion people traditionally eat insects as part of their diet, and so I'm about to try a grasshopper taco. Wow, there are really a lot of them.

[1:05] [crunching noises]

Flora Lichtman: [1:14] It's delicious.

Eleanore Wurtzel: [1:16] Agriculture still holds the promise to provide food for the planet. We need to be thinking about the technologies that are available to take advantage of new technologies, such as GMO crops.

Flora Lichtman: [1:30] Wurtzel is talking about using genetic engineering to make crops more nutritious.

Eleanore Wurtzel: [1:35] We have a global health problem of vitamin A deficiency affecting about 250 million children around the world. Just to give you an example of what that means, if you were to look at the population of the United States, it's around 250 or more million. So imagine every person was vitamin A deficient.

[1:56] What does that mean? It means that children die from childhood diseases such as measles. They get blind. How to solve the problem? We could not solve it by traditional breeding, as we could for other crops. We could not solve it, so what else can you do?

Flora Lichtman: [2:12] Wurtzel explains one approach taken to address the problem. Genetically modifying rice, a food staple, so that it combats vitamin A deficiency.

Eleanore Wurtzel: [2:21] To make a GMO crop, you take a gene that is known, or perhaps it's a few genes, and you introduce it into the plant. You know exactly what you've introduced into the plant, and you can monitor it.

[2:32] That was done to create golden rice. With three genes that are already in plants, and actually rice has those genes, they just don't operate in the seed, which is what we consume. Those three genes were introduced into rice to make golden rice. It was a fantastic achievement, because this golden rice has the potential to solve a global health problem.

Flora Lichtman: [2:56] How do you explain the distrust some people have for GMOs?

Eleanore Wurtzel: [2:59] In terms of GMO, we've become distrustful of GMO because of all of the news that is associated with companies. Every technology has pluses and minuses. I'm not saying that GMO is perfect. It depends on the genes that are being used, but all things being equal, I see GMO as a new technology that could transform agriculture.

Flora Lichtman: [3:23] Golden rice is designed to be more nutritious than regular nice. But as Marion Nestle says, the problem is more complicated than not having enough healthy food.

Marion Nestle: [3:32] There are about a billion people in the world who don't have enough to eat, and another billion who have so much to eat that they're becoming obese and developing type 2 diabetes and all of the other diseases for which obesity is a risk factor. The problem isn't enough food, the problem is that the food is not distributed equitably.

[3:53] Food distribution is a political issue. It's not a question of food production. We've got plenty of food. It's a question of getting food to the people who need it, and that's a political problem.

Flora Lichtman: [4:03] But how do you know what sources to trust?

Marion Nestle: [4:06] My biggest concern about research in my field these days is who sponsors it. I encourage students who don't know a thing about science to read the original studies. Don't read the newspaper account, go look at the original study. Even if you don't understand a lot of it, you'll understand enough to know what it is you don't know, and then you can ask somebody in a really intelligent way.

[4:30] First of all, you read the abstract and see whether the methods were sufficient to give you the answer that the authors put in their conclusion. That would be one thing. If you're doing human studies, you want to look at the number of people who are involved. Is it a study on six prisoners in an Iowa state penitentiary, which is the way the original

nutrition studies were done? Or is it something that's done on thousands and thousands of people in a broader way?

Flora Lichtman: [5:00] Then there's the question of we know whether our own evaluations are reliable.

Brahmadeo Dewprashad: [5:05] We need to be aware of our own biases. As human beings, we all have biases. You need to be aware of those and tend to factor those into your calculations.

[5:19] A very common bias I find that folks have is sugar. The idea is that. OK, that sugar is a culprit and sugar has lots of calories. So a lot of folks, what they'll do, they take sugar out of products, out of tea or whatever and they think, well, that is the answer. If you think of it, a teaspoon of sugar is only 16 calories, not as many calories as you think.

Flora Lichtman: [5:45] Besides biases, we don't always have all the data required to answer a question. Good estimates can help. Let's run through this process of making an estimate on a scale you're not familiar with. Imagine you're tasked with running a cafeteria for a month. You're in charge of feeding 500 college students, and each of them needs three meals a day. How much food would you need? How much would it cost?

[6:06] Here's an instance in which reasoning might actually be faster than googling. You may not know how much food 500 students eat in a month, but you do know how much you eat, so you break the question down. You know what you eat for breakfast and about how much it costs. You know what you eat for lunch, and the cost of that, and you know what you eat for dinner. Then there's dessert, obviously.

[6:25] Some simple multiplication and you've got yourself a rough estimate, a back-of-the-envelope calculation. These aren't figures that you would put in your budget, but they give you a general sense, an order of magnitude that you can use for planning. They tell you whether you'll need closer to 5 pounds or 5,000 pounds of salmon.

[6:43] When researchers approach even bigger questions, like how much food is needed to feed every person on the planet, breaking the question down into smaller components and making assumptions based on things you already know are approaches scientists use to make an estimation.

Brahmadeo Dewprashad: [6:59] A good way to do estimation, really, is if you have several components of an activity, you break it up into each component, estimate it, each separately, and secondly, for each estimation, have some frame of reference that you can compare it. If you do that, it's more accurate. We do back-of-the-envelope calculations every day without really thinking about it.

Flora Lichtman: [7:21] At the same time, as we've heard from the researchers in this video, figuring out how to feed a growing human population is going to require more than back-of-the-envelope calculations and science.

Eleanore Wurtzel: [7:33] To me, science underlies all of my thinking about these kinds of issues. I started out as a bench scientist but ended up as a sociologist practicing without a license because I don't think that you can talk about scientific issues without looking at the social context in which the science is being played out.

[7:56] If you want to understand what's happening in agriculture, you have to understand the politics and the sociology. The science helps a lot, but if you're looking at the science without looking at the sociology and the politics, you really don't understand what's going on.

Flora Lichtman: [8:11] To address this problem, people with diverse perspectives, social, economic, scientific, political will all need a seat at the table.

[8:19] [music]

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