



WHAT THE **FUTURE** | FALL 2018



FOOD

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What's for dinner?

It's about as fundamental a question as you'll find in most people's day-to-day lives.

And while the answer can take many forms in terms of the incredible range of cuisines served, whether dinner is eaten as a family around a table, on couches in front of the TV, or on the run to soccer practice, the conversation about food today is much broader. It encompasses topics such as the way food gets to you, how it is grown or prepared and even how it's packaged or sold.

We can have a discussion about the role of food in our culture, or the options for home delivery or partially prepared meal kits, or the ingredients we use, or the way scientific advancements are shaping the very foods we eat.

If you are reading this publication on your laptop, tablet or phone, chances are pretty good that procuring enough calories every day to survive is not a challenge for you. And while this is still not the case for millions of people on this planet, we have come incredibly far. Not that long ago, the vast majority of human energy was spent in the search for and the cultivation and preparation of food. The answer to "What's for dinner?" used to be whatever was grown in your garden or on your farm or hunted on your land, prepared in a way that was relevant to your local culture. Now, thanks to technological advances in everything from agriculture to packaging, genomics to transportation, each item on your plate might come from a different part of the globe, brought to you fresh through the complex array of industries that now make up our food supply chain.

As we break bread around the table, scientists are decoding the genome to make crops drought-resistant, chemists are creating better fertilizers, mechanics are fixing tractors, farmers are growing, pickers are harvesting, airlines are ferrying, manufacturers are packaging, bottlers are capping, stores are stocking, chefs are crafting, restaurants are serving, and couriers are delivering all so we can trust that when we reach into our fridge we'll find something for dinner.

Beneath all of that are the support industries: fuel, marketing, finance, trade, policy-making, manufacturing, hospitality, logistics, communications, technology, housing, storage, chemicals and energy. It's hard to think of an industry that isn't directly or indirectly impacted by food. After all, 7.5 billion customers need to interact with these products several times a day, every single day.

That's all happening today, but what about tomorrow? For as complex and functional as they are, these economies are in the midst of disruption from a number of directions, and that's

what this issue of **What the Future** is about. We'll talk about the variety of new ways our food gets to our table and debunk some myths about that table and who sits around it. We'll talk about changing definitions of terms like "convenience," "meat" and "sweet."

Crucially, as we think about **What the Future**, we'll talk about how fragile this food economy is. For most, we've reached a point of relative abundance, yes, but it's not necessarily a permanent one. The struggle and race to keep our food supply going is on. Scientists like Pam Roland and organizations like the Good Food Institute are working to ensure that as our climate changes and our planet tries to support the growing population of humans, we will still have enough food to put on the table. Much work is focused on increasing the yield and reducing the water needed to grow crops, while reducing greenhouse emissions and other pollution related to raising animals for meat consumption, and creating healthier products to sustain us as well. Many of these changes can't come fast enough, as storms become stronger, droughts become more frequent and severe, and the populations that are closer to subsistence-level farming face continued risk. We have to think about food packaging, which must attract customers, of course, but must also protect our food as well as our environment, by being easily reusable. The communications and infrastructure surrounding that "easily" part are critical to our future. And of course, beyond all of these supply challenges, we need to think about the most fickle of human tastes and preferences, around flavors, ingredients and trends.

It's not an overstatement to say that the work of the virtual panelists in this issue is vital to creating the sustainable, healthy (and tasty!) future we want, and to getting food to you in a way that works with your busy life. And whether you are a food marketer, a logistics expert, a restaurateur, a busy mom or just someone who loves to eat, when it comes to food, **What the Future** will be absolutely critical. Because the future we need is not inevitable.



Oscar Yuan
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*He advises Fortune 500
clients about the future
of their industries and
how to plan accordingly
in the present.*

Projections of food consumption, and hunger to 2050, with and without climate change

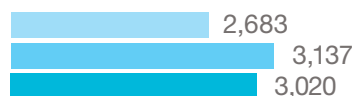
2010 2050 without climate change 2050 with climate change

Food consumption (KCAL per capita per day)

World



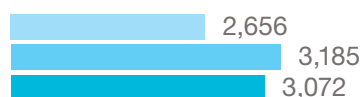
Developing countries



Developed countries



Asia and Pacific



Africa and Middle East



The Americas

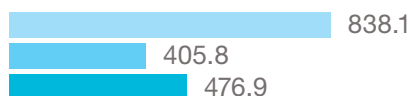


Europe and former Soviet Union

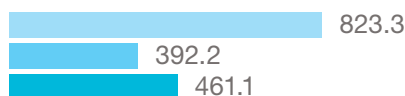


Hunger (millions of people at risk)

World



Developing countries



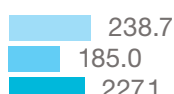
Developed countries



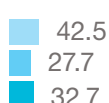
Asia and Pacific



Africa and Middle East



The Americas



Europe and former Soviet Union



(Source: IFPRI, IMPACT Model version 3.3, October 2016)

Editor's note

Welcome to the fourth installment of our What the Future series.

Over the past year, we have talked about the trends impacting changes to three of the top areas of consumer spending: housing, transportation and health care. This issue is focused on a fourth key sector: food. Specifically, we have conversations with the difference-makers about how our food gets to us, where that food comes from today and will come from tomorrow. The answers to these seemingly straightforward questions are in a surprising amount of flux.

As part of those discussions, we have asked thousands of Americans and tens of thousands of citizens from around the globe about the role of food in their lives and how that is changing. All of that exclusive data is presented here for the first time as well as other explorations from Ipsos into packaging, food culture, delivery, convenience and the ever-evolving tools and methods we use to understand the human aspects of these areas.

But we start, as we should, with a look at the role food plays in nurturing our families, our society and our culture as well as filling our bellies.

So head to your pantry and grab a snack. Snag a drink, get a coaster and put your feet up and enjoy this issue of **What the Future**.



Matt Carmichael is the editor of *GenPop*, a magazine produced by Ipsos where he serves as the vice president of Editorial Strategy in North America.



Question:

Is there a future for the family dinner?



Rick Bayless

Chef

Multiple James Beard Award-winning chef Rick Bayless will feed you in his Chicago restaurants, including the Michelin-starred Topolobampo.

He'll teach you how to cook with help from his cookbooks and TV shows, such as "Mexico—One Plate at a Time." He'll help you out in the kitchen with his line of craft Mexican foods produced by ConAgra. But wherever and however you eat, he doesn't want you to eat alone. When he thinks **What the Future**, chef Bayless is concerned about the future of the family dinner. But he's excited by what he sees in our survey results.

“One of the things that is most important about gathering a group of people around the table is that it’s like the microcosm of civilization.”

GenPop: Why do you think that’s an interesting question to ask?

Rick Bayless: I think media is mostly out of touch with what’s really going on in the U.S. We are bombarded with the notion that nobody has time to cook and that nobody eats together in groups. I wanted to see if that was really true because I know so many people that actually treasure time with other people. Interaction with human beings is one of the things we’re built for. And if you took it all away, the society would crash. If we didn’t have any dining room tables, probably there wouldn’t be any more society.

GenPop: And what did you think of the data, which showed that most people do indeed spend time together around the table?

Bayless: Your findings were very interesting because they were not what the media tells.

GenPop: If you look at science fiction, which is occasionally a really good predictor of things, you see the Jetsons still sit around the table, and in “Star Trek” they still go to Whoopi Goldberg’s bar and everybody has their meals even if it’s 3-D printed.

Bayless: I never thought of it in those terms, but I’m stealing that from now on when I speak.

GenPop: You see compression of time in terms of “We want more delivery” or the rise of meal kits or delivery of groceries. Do you think that will translate into more time at the table if we compress all of the other parts of “cooking”?

Bayless: It’s funny that you mention the Jetsons because I was having a conversation with somebody yesterday about this new prototype that would basically make your food. You just put

Most eat with their family at least 3 times a week.

How often, if at all, do you typically have dinner at home with your family?

■ U.S. ■ Canada

33%/45%

Every day

31%/28%

5-6 days per week

20%/12%

3-4 days per week

11%/9%

1-2 days per week

5%/5%

Never/NA

Families typically spend at least 20 minutes at the table together.

And when you have dinner at home with your family, about how much time do you typically spend at the dinner table together?

5%/10%

Over an hour

20%/24%

40-60 minutes

28%/26%

30-39 minutes

25%/22%

20-29 minutes

13%/11%

10-19 minutes

2%/2%

Less than 10 minutes

6%/6%

None / we don’t sit together

(Source: Ipsos survey conducted between Sept. 21 and 25, 2018 among 1,574 adults in the U.S. with at least two people in their household and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)

the raw ingredients in there. I think that’s probably what I would predict, that it can relax your time at the table a little bit more. Meal kits are a phenomenal idea. I wouldn’t get them because of how much trash they produce.

GenPop: That’s the only reason?

Bayless: Also I’m a chef so I don’t really need that. Could you imagine what the guy would think if he delivered one of those to my house?

GenPop: Why is it important to start with raw ingredients?

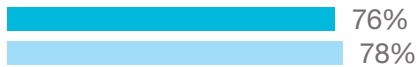
Bayless: I often think about when I was a kid, all the guys had to learn how to change the oil in your car, how to change the air filter in your car. And then the next step up was how to tune up your engine. And it was just expected that you could do the first two and that most people could do the third. Well, now nobody would think about doing that. That’s high-stakes stuff. You have to take [your car] into a special

Why and how do we eat together?

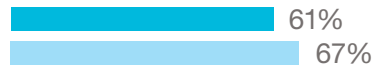
Please indicate whether you agree or disagree with each of the following statements about eating dinner at home with your family. (Agree net)

■ U.S. ■ Canada

Eating together means that we communicate better with each other.



Eating together means that everyone eats a more well-balanced meal.



We eat together because it is our habit or custom to do so.



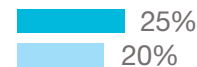
Eating together is a priority for our family.



We often have the TV on during meals.



We use phones or tablets during meals.



In our household we do not allow phones or tablets during meals.



In our household we do not allow the TV on during meals.



I wish our family spent more time eating together at home.



(Source: Ipsos survey conducted between Oct. 10 and 12, 2018 among 2,010 adults in the U.S. and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)

place to do it. I'm thinking that we're going that way with food. That people are thinking, "Oh, if you want a really good meal then somebody else has to prepare it or at least part of it." And I don't know if that is a good thing or not because what it takes out of the equation is you putting your hands on raw stuff.

GenPop: Why is that important?

Bayless: The truth is it makes you healthier because it makes you come in contact with nature. Lots of people have done studies on what it means to interact with your food source, not just eat it but actually do some of the prep. That's why I really like the pouches that Frontera Foods does because they don't give you everything.

GenPop: With all the foodie culture some people still know how to cook and use ingredients, right?

Bayless: Do you know the site Serious Eats? It is sort of the Millennials' version of Cook's Illustrated. It's all people who are just diehard cooks and foodies, and

they want it. They want to spend time in the kitchen. Now, they may not cook every night of the week, but they love spending all afternoon in the kitchen and making stuff and having people over, and so they are precisely the group that most people would say wouldn't need a dining room table.

GenPop: And in your idealized world, what do you think the role of the table should be in a family or a group?

Bayless: Memory making. One of the things that is most important about gathering a group of people around the table is that it's like the microcosm of civilization, because there's no family where everyone fits together perfectly. You kind of learn, you know, to be civil to one another. You share really great moments together. The fact that nourishing ourselves is part of that codifies it in a very special way because everyone will tell you that one of the strongest senses is the sense of smell. I would say that the role of the table really is creating memories and those memories are the ones that promote civilization.

GenPop: At today's table, what is the role of devices?

Bayless: All I can tell you is what we do at our table. We always have our phones sitting next to our place setting, face down. They're there to help us to answer questions as we're having conversations – to deepen the conversation. If there's something critical that needs to be done, you have to get up from the table and leave. I'm not a Luddite. I love having the technology [and] being able to have great conversations at dinner and experience deeper knowledge.

GenPop: If civilization hinges on coming together to share a meal, how are you feeling about the future?

Bayless: Everything in [the survey] gave me hope because we haven't lost anything. It's just that we're being told we've lost it.

Question:

Will delivery change
our fast food culture?



Chris Kempczinski

**President,
McDonald's USA**

Chris Kempczinski, is leading the burger giant through a turnaround strategy as price-driven rivals battle for market share. One potential bright spot is in delivery, which is growing between 10 percent and 15 percent industrywide.

When he thinks **What the Future**, Kempczinski wonders what will happen if quick service restaurants are disrupted by delivery the way Amazon has changed other industries. If consumers embrace quick service restaurant delivery as they have for books and furniture, that could redefine how convenience fits into our food culture.

GenPop: You asked about how consumers choose quick service restaurants and define convenience, and about their interest in trying a virtual delivery restaurant. Why did you ask these questions?

Kempczinski: For us, quick service was for many years defined by how quickly you could get through McDonald's. With the growth of Amazon and the development of digital and mobile, the customer's expectation of convenience is evolving. Delivery is probably the most obvious manifestation of that because delivery is not particularly quick. On average [our delivery is] about 26 minutes through UberEats, but it is short, convenient, and you don't have to leave your house. It creates all sorts of opportunities for people that are a little bit more far-sighted about the ramifications. Anything that we can do to learn and think about that would be helpful to us.

GenPop: What potential do you see for delivery as a portion of future sales?

Kempczinski: What will be interesting is how delivery evolves. There are all sorts of new versions of that if you look at retail. Retail has delivery like you see with Amazon. But there's click and collect where you order online via mobile and on your way past the location you just pick it up and go. To the degree that folks like McDonald's come up with ways to keep innovating and delivering, it certainly could go above the 10 to 15 percent threshold.

GenPop: How might delivery change the dinnertime business in the future?

Kempczinski: We're seeing the American consumer, in general, less centered on the traditional three meals a day. People are snacking more, and the definition of "a meal" is becoming a little bit more blurred between snacking and dinner. There's maybe another thing, which is how people are working and whether fewer people are commuting because there's more telecommuting. Delivery might be a nice way to solve for that because the customer wouldn't have to go outside of the house. My sense would be that delivery would only help with development of dinner. We're seeing more than half of our deliveries going out in the dinner and evening hours as opposed to the middle of the day or breakfast.

GenPop: How might quick service restaurants change in an autonomous world?


Kempczinski: You could envision a scenario where, as customers get more comfortable with autonomous delivery and drones, it really will start to redefine their expectations of convenience. It probably starts to change people's driving habits which then impacts traffic through retail and QSR.

GenPop: What could that look like for the customer?

Kempczinski: You could be in an environment where customers are accessing entertainment more at home than they are out in theaters, cinemas, etc. That creates an opportunity for the restaurant industry because Millennials might not be going out to eat, but they're not preparing their own food. It becomes a question of who is best able to offer customers the food at a price point with the quality and the level of convenience that they're seeking. Scale becomes really important, because who's going to have the infrastructure to be able to partner with whoever those providers are?

GenPop: How might digital change things in the future?

Kempczinski: As more of the customer interface becomes through digital, it's not going to come potentially through someone at the front counter. That digital device opens all sorts of new ways for us to have a relationship with the customer. Are there ways that we can take out pain points in the ordering process? Maybe we know what that customer likes to order or order on a particular day at that particular hour. We can start coming up with solutions that make it easier for the customer when they're looking for a meal at home to pick McDonald's. We're investing quite a bit around [customer relationship management] capabilities around digital so we're going to have a strong IT platform to really forge those new customer relationships.



"For us, the word convenience is becoming a bit more ambiguous or situationally dependent."

GenPop: What cultural implications do you envision as delivery becomes more important?

Kempczinski: I can't ever envision the day where we're not going to have restaurants with lobbies that are hosting birthday parties and PlayPlaces and having families come in and enjoy meals in the restaurant. What I think ends up happening is people just have different ways that they access the brand. There will be times that they're going to be looking for an in-dining experience, or a drive-through experience, then other times that they have an at-home experience.

GenPop: How will you redefine convenience in the future?

Kempczinski: If you're at home, clearly, you've made a choice that you're willing to wait roughly 26 minutes for food to show up, but you never had to leave your house and you have the convenience of being able to order on your device and potentially add multiple orders. If you're in the drive-through on your way to work, you're all about how quickly you get through there and on your way. If you're in the restaurant and trying to enjoy time with your family, then the more that we can do things like table service, free refills or ask if we can get you a dessert, that becomes a different definition of convenience. For us, the word convenience is becoming a bit more ambiguous or situationally dependent, depending on the sort of customer and what their need is at that occasion.



Americans value quality and price when choosing quick serve.

Thinking of quick service restaurants that serve made-to-order foods like hamburgers, french fries, sandwiches, pizza, chicken, tacos, wraps, salads, and hot and cold beverages, please rank what's most important to you when deciding whether or not to visit.

Rank	Price/value	Convenience	Quality	Brand	Menu options	Location
1	24	6	41	6	15	7
2	24	12	22	7	21	14
3	18	18	14	11	19	19
4	15	23	11	12	17	22
5	12	26	8	16	17	22
6	8	15	3	49	10	16

Location drives convenience.

Thinking about quick service restaurants, what defines convenience for you?

Rank	Hours open	Location	Delivery	Drive-thru	App for ordering ahead	Speed
1	17	38	7	13	5	20
2	25	20	10	18	6	22
3	22	16	10	18	9	26
4	19	12	17	24	11	17
5	12	9	33	16	21	10
6	7	5	23	12	49	5

Timing is key to this disruptive scenario.

Think about if a company started a virtual restaurant. This restaurant has no retail locations (there is no seating and no drive-through). The restaurant will deliver hot and cold food to you that you order from a website or app. Please indicate how much do you agree or disagree with each of the following statements. (Agree net)

83%

I would be willing to try ordering if it was from a brand I know and trust.

77%

I would be willing to try ordering from this company.

79%

I would be willing to order from this company if the food was delivered in 20 minutes or less.

79%

I would be willing to order from this company if the food was delivered in 30 minutes or less.

28%

I would be willing to order from this company if I had to order 24 hours in advance.

31%

I would be willing to order from this company if I had to order 6 hours in advance.

64%

I would be willing to order from this company if I had to order 1 hour in advance.

(Source: Ipsos survey conducted between Oct. 10 and 12, 2018 among 2,010 adults in the U.S.)

Cooking? It's about more than convenience

The home-cooked dinner remains the quintessential symbol for family bonding (see our Rick Bayless interview on page 4). As most dinners require some preparation, new options like app-based grocery delivery and meal kits are vying to simplify the task for time-strapped and budget-conscious home cooks.

Conventional wisdom says convenience drives suppertime decisions for today's American families. But new research reveals other factors are at play, from people's confidence in their cooking skills to the expense and quality of meal kits compared to their own cooking, to the ease and control of shopping at grocery stores themselves.

More than half of home cooks think their dinner routines could improve. Yet consumers are reluctant to add these options to their dinner planning. Today, just one in 10 of these consumers is planning to use a meal kit in the next three months. So how can emerging alternatives play a bigger role with dinner?

In a recent syndicated study called "What's for Dinner," Ipsos interviewed people with the primary responsibilities for grocery shopping and home cooking to understand their habits and attitudes about making dinner. More than two-thirds of these people consider themselves competent in the

kitchen, and another 14 percent say they are experts. They also think grocery shopping in stores is easier than online and prefer the enjoyment, control and choice they get at the local grocer. Their reasons for eschewing meal kits are different. Some find the kits too expensive and feel they can make better meals without them.

In exploring the functional and emotional needs of these cooks, Ipsos identified four types of home cooks that would get the most out of meal kits and grocery delivery. By understanding these segments, their ideal dinner experiences, emotional drivers and barriers to trial, providers can play a bigger role in helping home cooks make dinner a more enjoyable family time.

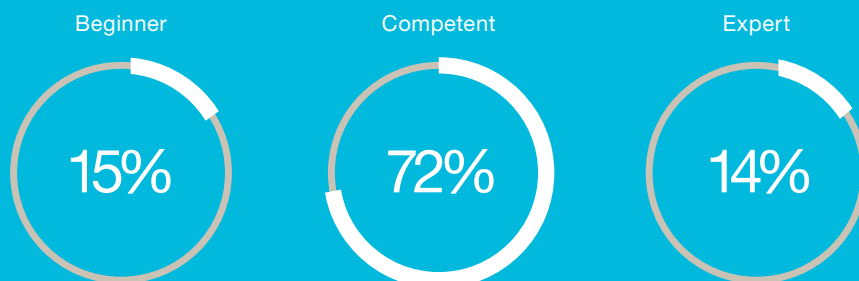


Neil Ellefsen is a vice president in Ipsos' Innovation practice. He focuses on providing insights to guide clients through market strategy and understanding, as well as innovation development.

Cooking skill level

Most own the responsibility for planning dinner and claim a "competent" level of cooking; speaking directly to the beginner or expert is more limited.

How would you rate the cooking skill level you employ on a regular basis to prepare the home-cooked dinners you normally serve?



(Source: Ipsos "What's for Dinner" 2018.)



Question: Who needs restaurants?



Luke Saunders

**Founder, CEO
Farmer's Fridge**

In offices, drugstores and airports in and around Chicago, a new vending machine concept has sprouted.

Luke Saunders and his company, Farmer's Fridge, are bringing consumers meals they're used to — fresh salads, wraps and more — by using a device they're not expecting. It's attracted media attention and a new \$30 million round of investment from former Google CEO Eric Schmidt and others. When he thinks **What the Future**, Luke Saunders wonders what it means to be a “restaurant” and how willing people are to let vending machines step in to that space.

GenPop: Your question was essentially what would it take for vending machines to play a bigger role. Why is this an important question for the future of food?

Luke Saunders: I think for Farmer's Fridge, the goal had already been to create a restaurant experience through the vending platform from a quality perspective and from an experience perspective.

GenPop: We're getting a wider range of products from vending machines. You can get an iPad at the airport, for example. Are we getting used to vending machines being a part of our consumer experience?

Saunders: I do think there's a behavior change in the pattern of shopping. For example, if you [look at] banking, it was probably very common 30 years ago to show up at a bank on Thursday or Friday and wait in line for people to cash their paychecks. Then the ATM machine started to get introduced, and that pattern of behavior shifted relatively slowly. It has more to do with the way you spend your time and how you can plan ahead differently.

GenPop: No one has really disrupted the vending industry.

Saunders: Yes. When you think of the vending model, [it has been stagnant] for the last 50 years. The products in it change, but the concept is similar. You buy third-party products and sell it to consumers through a route-based distribution model.

GenPop: What has changed that allows you to offer this now? Was there a technological shift somehow?

Saunders: I think there are four or five phenomena that are really important. One is the cost of the technology, from an electromechanical standpoint, has come down quite a bit, as well as the internet connectivity and software side of things. We don't own a single server. Two, the ability to organize the information that we're getting and create personal relationships with consumers through a digital medium has definitely changed – not just vending but people's comfort level with purchasing things with little or no human interaction. You've become used to this idea that you don't need to touch and feel something. People are seeking better quality meals, but they aren't necessarily making more money. So that creates an opportunity for businesses to consider how to [meet

that need]. And I think it's important for our BtoB partners and investors that you now have previously proven models for consumers shifting [their] behavior from a physical interaction to a kiosk model like ATMs and Redbox.

GenPop: Looking at the survey data, it seems like if you can crack the hot food problem, people are receptive to the idea that a vending machine can be as good if not better than a quick serve restaurant. Will that be possible?

Saunders: I had my first hot meal yesterday and it was excellent so I'm excited about that. It was a variant of the almond butter oatmeal that we currently serve cold.

GenPop: What's possible in the next few years?

Saunders: [In the next few months,] we'll be launching some meals that can be heated. There will certainly be a space in the marketplace for serving a hot meal from a machine. In fact there's a pizza concept that exists and a french fry machine and a machine that is microwaving frozen burritos. There are businesses that [were] built around trying to serve food from a vending machine, but they failed because the food quality [wasn't] matching restaurant quality.

"When you think of the vending model, [it has been stagnant] for the last 50 years."



GenPop: What do you think all of this says about the future of the concepts of fast and convenient?

Saunders: I think consumers want everything faster and cheaper and more convenient. So, to the extent that the model can deliver from a quality perspective, ultimately that's the path for the consumer market.

GenPop: What food items wouldn't work in a vending machine?

Saunders: I think customizing through a vending machine presents quite a few challenges. And I'm not talking about mixing and matching a couple of different things. But if you walk into a salad chain, the number of possible outcomes for your salad is limitless. I don't think fine dining or anything above the QSR category is really in play.

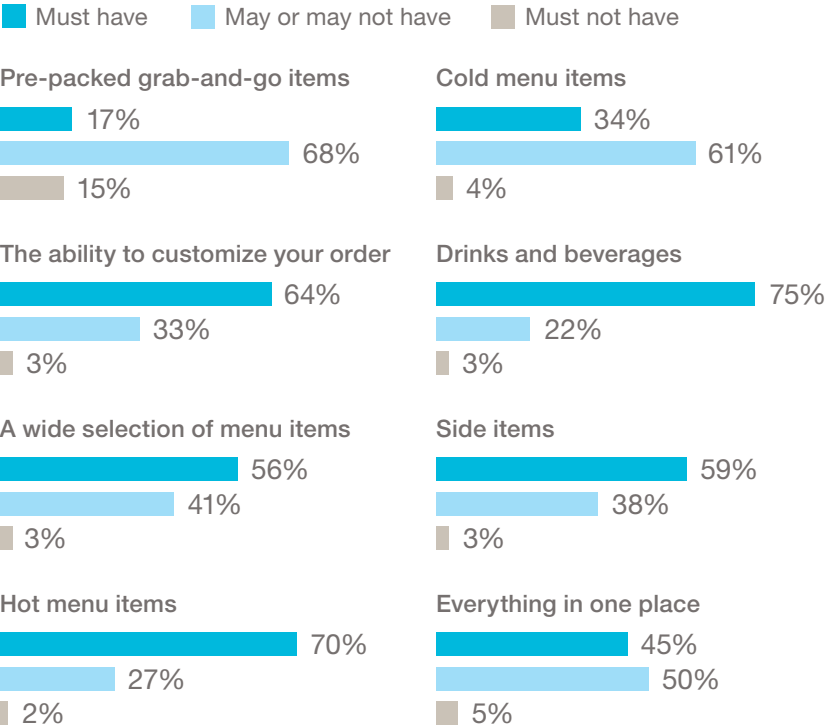
GenPop: In terms of convenience, how do you see the interplay of vending and delivery?

Saunders: We see our model as a node in that delivery network. There are delivery services out there that would just go anywhere and pick up anything. We actually see those orders through our platform now. We see ourselves as complementary.

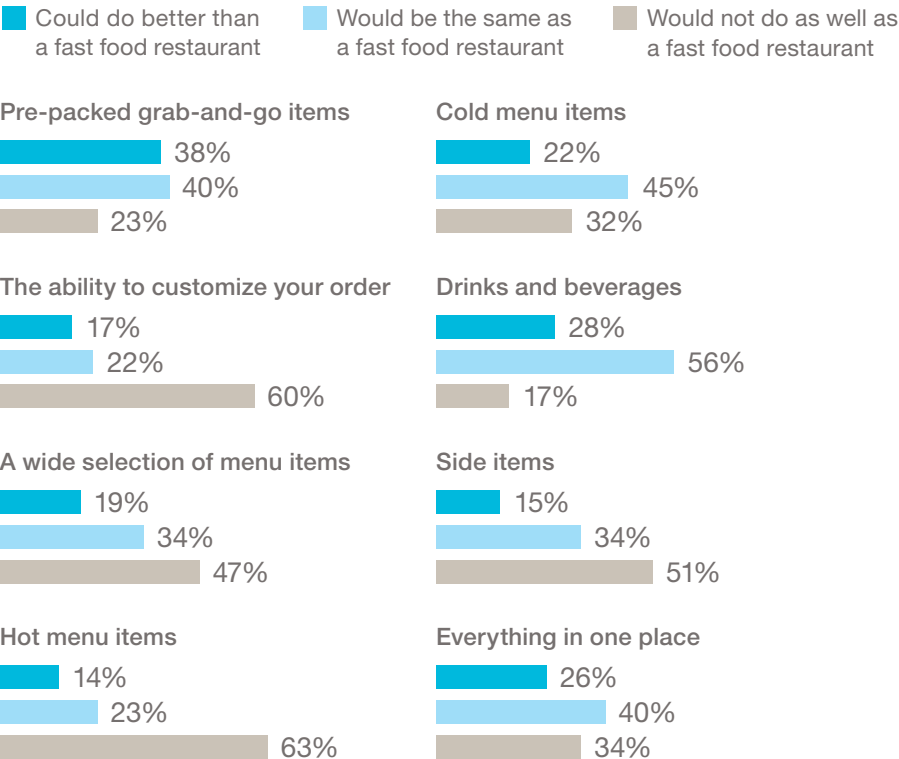


What does it mean to be “fast food”?

To what extent do you feel the following characteristics are necessary for a fast food restaurant?



...and could it be replaced by a vending machine?



(Source: Ipsos survey conducted between Oct. 5 and 10, 2018 among 2,010 adults in the U.S.)



How will our food preparations change?

Does our food come to us, do we go out, or do we cook at home?

These are big questions with broad implications. Ipsos asked people to predict the short-term future to see how things might change for themselves. The global results are in the spread on pages 18 and 19.

In the U.S., younger Americans think, to Rick Bayless' point (page 4), that they're likely to cook as many (48%) or more (39%) meals at home than they do now. They're also the most likely age group to say they'll increase the number of meals and groceries they get delivered, and to eat out more. The future can be summed up in one word: choice.



Kevin Nielsen is a client officer with the Ipsos client organization. He primarily partners with clients in the FMCG space to unlock new insights about people, markets, brands, and society.

How do you think the following will change over the next year?

Overall Under 35 35-49 50-64

Preparing meals at home



Having meals delivered to my home



Eating meals outside my home



(Source: Ipsos Global Advisor survey conducted between August 24 and September 7, 2018 among 1,000 U.S. adults.)

Question:

Could better packaging help save our planet?



**Claire Koelsch Sand,
Ph.D.**

**Founder, Packaging
Technology and
Research**

Packaging plays a critical role in selling, transporting, storing and protecting our food. But too much packaging (including recyclables) is still ending up in landfills where it can take hundreds of years to break down. When Sand thinks **What the Future**, she wonders how the packaging industry could help consumers recycle more. It's a challenge that she believes could save our planet if policies and communications made recycling more intuitive and simple.

GenPop: You asked whether consumers trust the process of recycling and whether the rules for recycling are clear, easy and convenient for them to follow. Respondents showed high confidence in the process and their understanding of the rules. What do you make of that?

Claire Koelsch Sand: If people in the survey were recycling at the levels that they said they were, we would have much higher recycling rates in our country. We have a lot of what's called "hopeful recycling" in our country, where people think something is recyclable but they're not sure. For example, pizza boxes that have been in direct contact with pizza are not recyclable. Yet most people throw their pizza boxes in the recycling bin. If you talk to recyclers, there's a big problem with hopeful recycling, so we do have a consumer disconnect.

GenPop: Why did you want to ask this question?

Sand: In the future, if we don't want consumers to push for reductions or bans on certain types of packaging — typically plastics — we need to build more value into the packaging. That's not just when the consumer uses the package but when they dispose of, reuse and recycle packages. One way is to make it what I call "recycle-ready," but it also involves clearer communication to consumers about how to recycle that package.

GenPop: Why does this need to happen?

Sand: We can see the future of sustainable packaging in two different ways. One is an industry that is not able to protect our food supplies the way that we protect them now because consumers see packaging as waste. If the industry must respond with less packaging, that means more food waste because the food won't be protected as much. Everything would have to fundamentally change in our food system unless consumers start having a more positive relationship with packaging. The other scenario is where we recycle [at much higher rates]. We sustainably source materials from our planet, and we reuse them like we do with aluminum cans. But we don't have that same type of relationship with plastic packaging.

“We have a lot of what's called ‘hopeful recycling’ in our country, where people think something is recyclable but they're not sure.”

GenPop: What else could we improve on in the future?

Sand: We're the only industrialized country not to have post-consumer packaging legislation. Most countries have “extended producer responsibilities” so that the cost of disposal, whether it is recycling, composting or reuse, is built into the cost of manufacturing the package.

GenPop: Are there examples of where recycling is done well that we could model?

Sand: The Sustainable Packaging Coalition based in Canada has a voluntary industry program called “How2Recycle.” It takes the components of the package and tells consumers if it is recyclable or not. Now

companies are considering QR codes to provide recycling as well as ingredient information to consumers.

GenPop: Ipsos research shows there are four moments of truth for packaging and one is recyclability. How can recyclability factor into those moments of truth more effectively?

Sand: Recyclability and sustainability must be obvious. Just like consumers see labels on a product that the package conveys healthy, organic, GMO or non-GMO or some other benefit, recyclability and sustainability benefits need to be intuitive immediately. It can't be complicated directions. One of the things with recycle-ready is separable packaging – packaging that consumers can take apart. For the clamshell container with paper, for example, the paper can and needs to be separated, so the consumer can do that themselves.

GenPop: Can you paint a picture for us about other ideas that could inform the future of packaging?

Sand: In different spots in your refrigerator there are better places to store produce versus, say, cheese. So, we're trying to design our packages to fit only in those spots, so consumers don't have a choice. It can make the product last longer, but it has to be intuitive. It's kind of like when Ziploc bags came out, people knew exactly what to do with them for shredded cheese. That was a very successful innovation in packaging. It's obvious how to recycle bag and box wine. You take the bag out, and people do separate the paper versus the plastic. You might see technologies like time or temperature indicators that tell you when your product has gone bad or is OK to eat.

GenPop: Are there other ways we could improve package sustainability in the future?

Sand: One is for the packaging industry to communicate that packaging can reduce food waste. Thirty percent of food waste happens in the hands of consumers in their homes. Something like 40 percent of produce is thrown out in consumers' homes. But we can have packaging that makes those products last longer and communicates that value to consumers. Reducing food waste 5 percent or 10 percent will help us feed the world.

While generic in many ways, Americans trust the “green” product labeling.

When you see the following terms on grocery food packaging about their impact on the environment, how do you compare that packaging to food packaging that doesn't use these phrases? (Better net)

74%

Recyclable

71%

Eco-friendly

68%

Compostable

64%

Non-toxic

65%

Green

67%

Degradable

73%

Made from recycled materials

Americans see the value in environmentally friendly actions.

Please indicate how much you agree or disagree with each of the following statements. (Agree net)

85%

I'd like to be able to recycle more packaging from fast food or delivery restaurants.

76%

I trust that what I put in the recycling bin actually gets recycled.

92%

It's important to recycle at home.

67%

It's important to compost at home.

73%

Rules in my community for what can and cannot be recycled are clear and easy to understand.

73%

Rules in my community for what can and cannot be recycled are easy and convenient to follow.

87%

I'd like more food packaging to be made from recycled materials.

89%

I'd like more food packaging to be made of recyclable materials.

(Source: Ipsos survey conducted between Oct. 10 and 12, 2018 among 2,010 adults in the U.S.)

How packaging can balance being green and making green

The plastic drinking straw has become a symbol of society's growing concern over packaging convenience at the expense of our planet's health. Already, four in 10 consumers report they have started using fewer plastic straws due to recent attention on the issue, according to a recent Ipsos/Buzzfeed poll. Nearly half of those polled support local governments banning their use.

What's more, nearly eight in 10 people globally believe we're heading toward an environmental disaster unless we change our habits quickly, per the Ipsos MORI Global Trends Survey. That's put pressure on manufacturers – from competitors, consumers and governments – to create alternatives.

But brands need to balance the desire to meet this need with other concerns. Packaging still needs to work at key “moments of truth” for the customer. It must convey the brand promise, stand out on shelves and be functional in the home, as well as be recyclable or reusable.

To do that, companies will need good testing to make the most of the trade-off. For example, Ipsos' Behavioral Science Center evaluated whether a brand should cut the size of its bottle cap to reduce

plastic and production costs. Testing showed that the smaller cap captured less attention on the shelf and was perceived as smaller and harder to find, so changes were proposed to mitigate those potential negatives along with ways to test response to the options. Ipsos also uses artificial intelligence, neuroscience, virtual reality and augmented reality to glean more information and help consumers express their reactions more meaningfully.

By understanding how redesigns can innovate and protect the environment, marketers can accommodate consumers and our planet.



Ian Payne is an Ipsos client partner and serves as the global lead in pack testing development, advising clients on how to deliver more distinctive packaging design.

Packaging needs to deliver

“Zero moment of truth”

Memory saliency



Tangible features that define packaging

“First moment of truth”

Stand out in store



Ability to stand out from competitive set

“Second moment of truth”

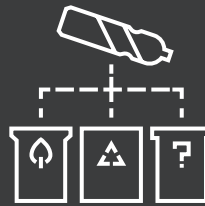
At home



Characteristics and functionality that can drive satisfaction and repeat use

“Third moment of truth”

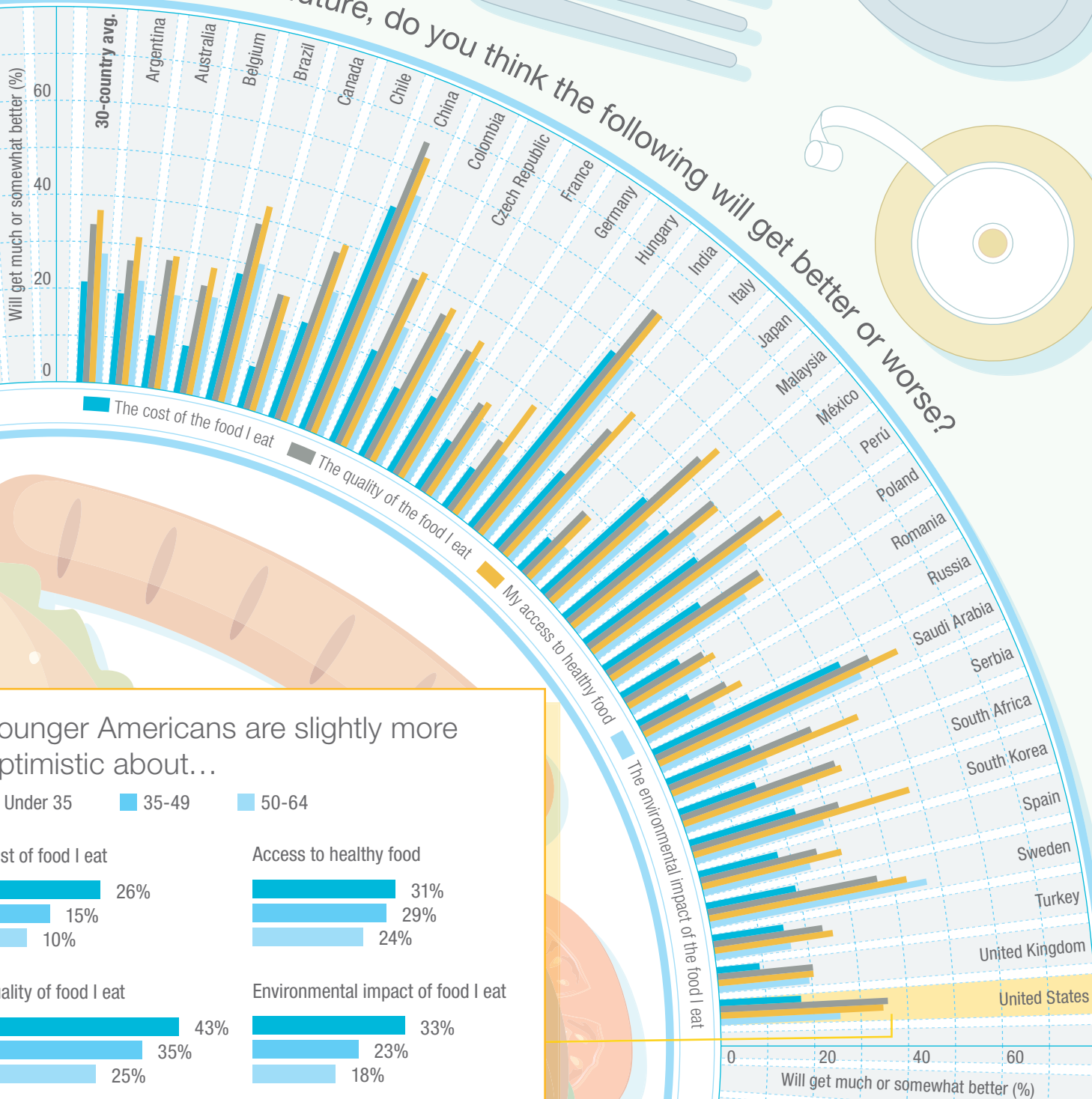
Reuse or recycle



Package's role as a positive aspect in terms of a product's sustainability credentials

The global view: Few truly upbeat about the future of food

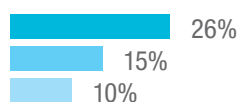
Looking into the future, do you think the following will get better or worse?



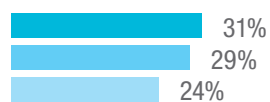
Younger Americans are slightly more optimistic about...

Under 35 35-49 50-64

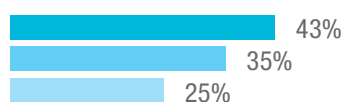
Cost of food I eat



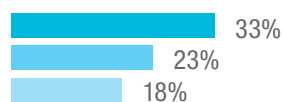
Access to healthy food



Quality of food I eat



Environmental impact of food I eat



Globally, most want to eat local and avoid GMOs.

To what extent do you agree or disagree with the following statements:

■ U.S. ■ Global

I only eat organic foods.



I would eat a plant-based substitute for meat.



I prefer to eat food produced locally, even if that means I have fewer foods to choose from.



I prefer not to eat any type of meat, poultry, or fish.



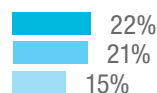
I would never eat a genetically modified food.



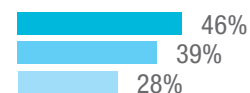
Older Americans most GMO-resistant

■ Under 35 ■ 35-49 ■ 50-64

I only eat organic foods.



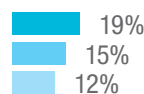
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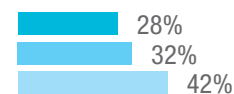
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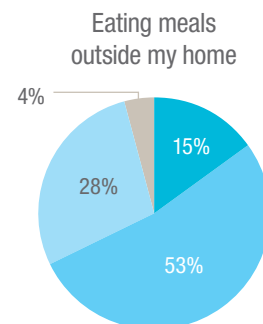
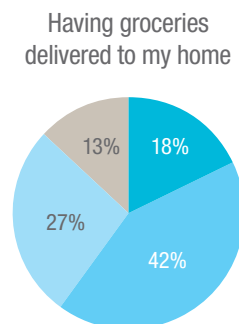
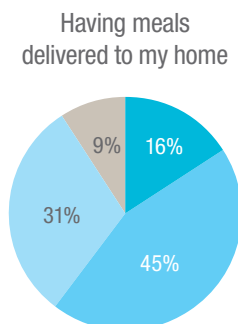
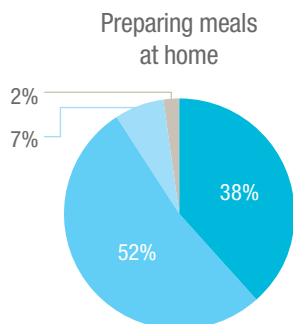


I would never eat a genetically modified food.



How do you think the following will change over the next year?

■ More frequently ■ About the same ■ Less frequently ■ I don't know



(Source: Ipsos Global Advisor survey conducted between August 24 and September 7, 2018 among 20,788 adults across 30 countries.) For the full dataset including results for all 30 countries, please visit [ipsos.com/en-us](https://www.ipsos.com/en-us)

Question:

What is the future of sweet?



Robert Long

**Chief innovation officer,
The Coca-Cola Company**

Around the globe, people are becoming more aware of their sugar intake. When Robert Long, senior vice president and chief innovation officer of The Coca-Cola Company asks **What the Future**, he is thinking about how to create new drinks to meet changing consumer tastes.

11.2 MILLION

Number of metric tons of sugar consumed in the U.S. in 2017-2018, ranking the nation as the fourth largest consumer in the world.

(Source: U.S. Department of Agriculture)



“ I can’t think of a market where there’s not some segment concerned about sugar consumption.”

GenPop: Our data shows, and certainly this is a broad consumer trend, that people are interested in lowering their sugar intake. How is The Coca-Cola Company seeing this manifest in terms of changing consumer demands?

Robert Long: We’re doing our best to make available reduced sugar products and that would be through reformulation. We’ve reformulated more than 500 products around the world. We’re also making our zero sugar products better and promoting them more. We also have a strategy of reducing the pack size so portion control is part of the strategy as well. As we take these actions, consumers are responding positively in the sense that they are accepting sugar-reduced products at a good rate. We also see growth in our zero-sugar portfolio as well as in their smaller pack sizes.

GenPop: Could you give us a quick layman’s definition of reformulation.

Long: If you maintain sweetness or stay close to the same sweetness, you can reduce [sugars] up to 10 percent in some products. If you go beyond that you typically have to compensate with low/no calorie sweeteners. We’ve also seen success with products like Honest Kids which is a juice drink with no added sugar. So, people are accepting less sweetness.

GenPop: The beverage industry is taking a lead role in exploring ways to reduce sugar with the Balance US program.

Long: This is an industry effort where we have collaborated [with PepsiCo., Dr. Pepper and the American Beverage Association] to understand how we can make consumers more aware of reduced sugar options and then make those options more appealing to consumers. That includes making sure there’s enough visibility of products with reduced sugar on the shelf and promoting those products in a way that makes trial more likely. The company across markets is trying to make sure that low- and no-calorie options are more prominently featured, all the way up to and including some markets where the zero sugar variants of a product is at a discount versus a full sugar product.

GenPop: Is the trend to reduce sugar playing out in other markets as well as the U.S.?

Long: Yes. It’s pretty much everywhere. There are markets that value sugar but even those markets it’s more a dichotomy. Some people want the calories for energy but others are concerned about obesity and diabetes. I can’t think of a market where there’s not some segment concerned about sugar consumption.

GenPop: How do you see sweeteners and sweetened products evolving in the next five or 10 years?

Long: We will see a lot more choice of products with different kinds of sweeteners and amount of sweetness. But I also see people being able to choose and customize their products with sweeteners of their

preference sort of like we do today with coffee when we have a choice of white pack, the pink pack, the yellow pack and the green pack. I think the color spectrum will expand and consumers will be able to control what they put in more beverages than they can control today.

GenPop: Are there other flavor profiles that might trend upwards if sweets trend down.

Long: I used to work in Japan so I got to experience something as a North American that I didn’t anticipate, which is a lot of that market is unsweetened products that tend to be teas— very complex green teas and blended teas. You really can acquire a taste for drinking things with no sweetness at all because they have rich tea flavor. Similarly, people can drink black coffee and develop ways of processing coffee make it more acceptable without sweetness. I would say we’ve also seen high acceptance of flavored waters with no sweetness at all.

GenPop: Are there trends we should be watching in terms of natural and non-sugar sweeteners such as monk fruit and agave?

Long: I think what you’re going to see is that those plants have a multitude of components and some are better than others. We’re in the process of trying to isolate those best-tasting components and as we do that we often have challenges in getting sufficient

quantities at cost. You're going to see a lot of innovation in discovering the better parts of these fruits or these plants and then develop supply chains that are leveraging different kinds of capability to scale them up so that they are affordable.

GenPop: What did you learn with your sweetener challenge?

Long: You're referring to the HeroX campaign from 2017 where The Coca-Cola Company issued a challenge to find a natural, safe, low- or no-calorie compound that generates the taste sensation of sugar in beverages and foods. We received over 400 submissions from 48 countries, and while we didn't learn anything new in terms of what new potential sweeteners from nature might be out there, it did confirm much of our own insights into how consumer expectations are shifting. I hope if nothing else we stimulate

more curiosity among people and they have the capability to actually discover new things.

GenPop: Will we see biotechnology helping these discoveries?

Long: I think we are seeing ways to leverage biotechnology to recreate what nature has already given us.

GenPop: Will they be created in a healthier way that the body is able to absorb better?

Long: I think it will be more about finding economically feasible ways of scaling up things that are already considered safe and good tasting. You can breed plants for decades and not get enough quantity at the right cost that make them broadly available. With biotechnology, the approach is to allow you to scale new sweeteners more cost effectively.

Americans and Canadians are concerned about sugar in their diets...

Overall, how concerned are you about the amount of sugar in your diet?

■ U.S. ■ Canada

27%/26%

Very concerned

43%/45%

Somewhat concerned

23%/23%

Not very concerned

7%/6%

Not at all concerned

...across a broad range of food and beverages.

How concerned are you about the sugar content of each of the following products?
(Concerned net)

69%/73%

Candy

71%/74%

Juices

65%/66%

Canned fruit

50%/55%

Flavored coffee

76%/78%

Soda, pop and other carbonated beverages

59%/57%

Sauces and condiments such as BBQ sauce and ketchup

69%/74%

Deserts and other sweets

(Source: Ipsos survey conducted between Oct. 10 and 12, 2018 among 2,010 adults in the U.S. and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)



Rethinking **sweet**

Rising concerns about obesity and diet-related illnesses have prompted regulatory pressure on food manufacturers to cut sugar from their products.

Slightly more than half of Americans say they consume more sugar than the recommended limit, according to the Ipsos Global Trends report. The Canadian Food Service Monitor study by Ipsos showed that reducing sugar is a top concern for diners who are generally trying to reduce processed and unhealthy ingredients and replace them with more natural choices. But people do still like their sweets. So how can brands lower sugar content without alienating consumers or forcing them to change their behaviors to benefit from less sugar? Should companies go stealth when tweaking their formulas or be up front about it?

For brands to have successful reformulations means understanding the three product characteristics that drive consumer preference: physical attributes and variables, sensory components and consumer response. Based on extensive statistical modeling of this data, Ipsos created a simulator to dial up or down these characteristics against current recipes. That helps companies understand how ingredient changes influence other existing product attributes. By judging how people like the sweetness, texture, and emotional and sensory satisfaction of new formulas, these simulations can shape potential new recipes.

Communication is another make-or-break factor. Consumers are especially tuned in to the flavor changes from sugar reductions or replacements with alternative sweeteners. Ipsos can test risk levels to determine which changes can be introduced quietly, transparently or in stages, and benchmark consumer validation of those changes.

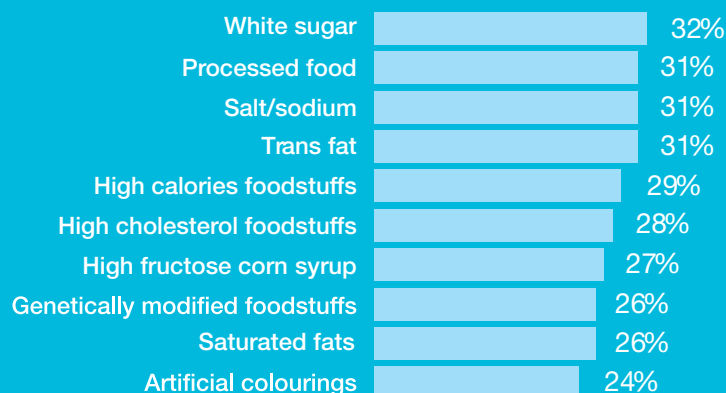


Asad Amin is a vice president with Ipsos and the resident Canadian consumption expert. He leads the syndicated Foodservice Monitor and the FIVE tracking studies.

Consumers' changing eating habits

Health and nutrition are top of mind, as consumers adjust their intake of sugar, salt, processed food and other perceived unhealthy items.

TOP 10 ITEMS PEOPLE WANT TO EXCLUDE FROM THEIR DIET Percentage of Individuals

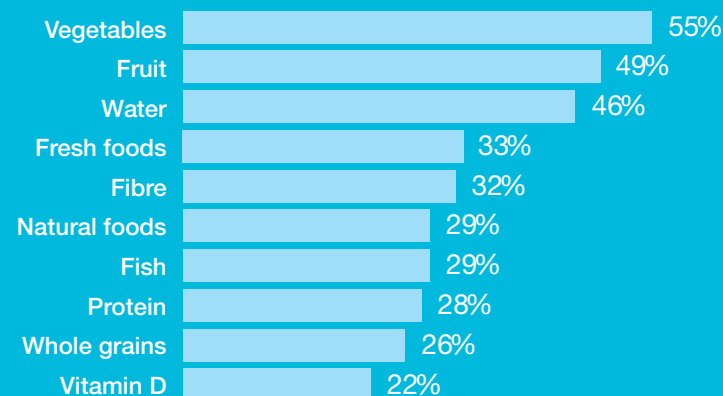


(Source: Ipsos Canadian Foodservice Monitor 12ME Dec 2017)


People are looking for healthier menu options

Consumers make healthier choices when ordering their meals: vegetables, fruit, water, fibre, fish and whole grains.

TOP 10 ITEMS PEOPLE WANT TO INCLUDE IN THEIR DIET Percentage of Individuals



(Source: Ipsos Canadian Foodservice Monitor 12ME Dec 2017)



Question: Who needs cows (or chickens or fish or pigs...)



Jessica Almy

**Director of policy,
the Good Food Institute**

14%

Share of total greenhouse gases
emitted by the meat and dairy industry

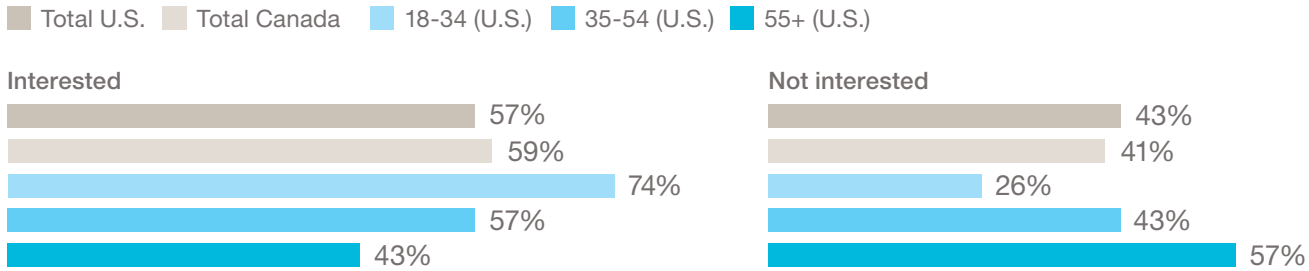
(Source: GRAIN)

In Douglas Adams' sci-fi classic, "The Hitchhiker's Guide to the Galaxy," diners are invited to meet the meat. The main course introduces itself before the meal: "I am the main Dish of the Day. May I interest you in the parts of my body? Something off the shoulder perhaps? Braised in a white wine sauce..."

It's a vision of the future, sure, but it misses a key point. Raising animals requires a lot of precious land and water, and contributes mightily to greenhouse gases and other pollution. Our future here on Earth requires a different approach. What if we skip raising animals and instead create plant-protein-based meat, or actual animal meat engineered in a lab? Jessica Almy is the policy director for the Good Food Institute, an industry organization representing producers of these new meat and meat alternatives. When she thinks **What the Future**, she's wondering how best to bring these products to us. It's not overstating it to say our future might depend on the answers.

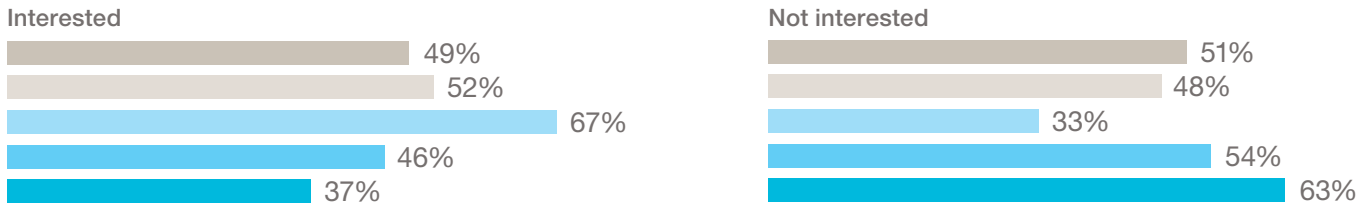
Most are interested in trying clean meat (see glossary page 26)

Imagine clean meat has become widely available at grocery stores, restaurants, butchers, and markets. How interested are you in trying clean meat?



Millennials are most interested in plant-based meat

Imagine plant-based meat has become widely available at grocery stores, restaurants, butchers, and markets. How interested are you in trying plant-based meat?



(Source: Ipsos survey conducted between Oct. 5 and 10, 2018 among 2,010 adults in the U.S. and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)

GenPop: In our survey you wanted to know how ready people are to accept these products. Why is that important to ask?

Jessica Almy: Plant-based and clean meat will be available options that will be appealing to people and easily accessible. And so understanding whether people know what the products are is critical in terms of how we bring them to market.

GenPop: What does a future look like where we don't have these products?

Almy: Ultimately there's not enough land on the planet and fresh water to feed a growing population the way we're eating now. So either the world is going to have to cut back dramatically or we are going to have to find a way to produce meat.

GenPop: What would a meat-cow or meat-chicken-free world look like?

Almy: I don't think we're going to get rid of them, but we are envisioning a world where, when consumers go to

the drive-through window or order at a cafeteria or shop in the supermarket, there's an option that tastes just as good, is cheaper and has less of an environmental footprint.

GenPop: In the survey, we asked about both plant-based and "clean" meat. What are some of the differences in the products and how they are produced?

Almy: Plant-based meat is on the market and has been for a long time, depending on how you define it. There was tofu and tempeh, and then there were veggie burgers that were brown rice or lentils, and now there are very realistic plant-based meats that have the same texture and taste, like the Beyond Burger and Impossible Foods. In contrast is what we call clean meat, which is still made out of animal muscle and that connective tissue, but it is grown outside of the animal. We know that it is absolutely possible, but it is not yet on the market.

GenPop: But we already have veggie burgers...

Almy: Traditional veggie burgers are great, and so are rice and beans. The issue is that meat consumption is deeply personal and cultural, and many people aren't ready to give up the taste and texture of meat. Products like Beyond Meat and the Impossible burger have attracted investment because they give people the experience of meat but are made entirely from plants.

GenPop: Can it be engineered without cholesterol?

Almy: The initial products will not be any different than conventional meat, but yes, there are players in the industry working to replace the saturated fat within omega-3s, for example, so you have the same burger, but it's actually good for your heart as opposed to hurting your heart.

GenPop: I would like a cheeseburger that does not kill me.

Almy: There could be a cheeseburger of the future that is potentially kosher. There has been a lot of interest among halal certification agencies, too.

GenPop: What are some of the hurdles facing this industry?

Almy: With plant-based meat, some conventional producers don't like the product calling itself "meat," even if it's clear to the consumer what they're buying. On the clean meat side, the obstacles are that the regulators are still figuring out how this is going to come to market, what kind of safety reviews will take place, and who will inspect the facilities. There's a lot going [on], and the decisions that we make right now are going to impact the future of what consumers see in the market. I want to make sure they have all the options they can.

GenPop: Is this a political issue at all?

Almy: We've got at least bipartisan support in the U.S. Congress. Two of our biggest champions are Sen. Mike Lee of Utah and Sen. Cory Booker of New Jersey, a Republican and a Democrat.

GenPop: How does engineering meat work in terms of cuts of meat?

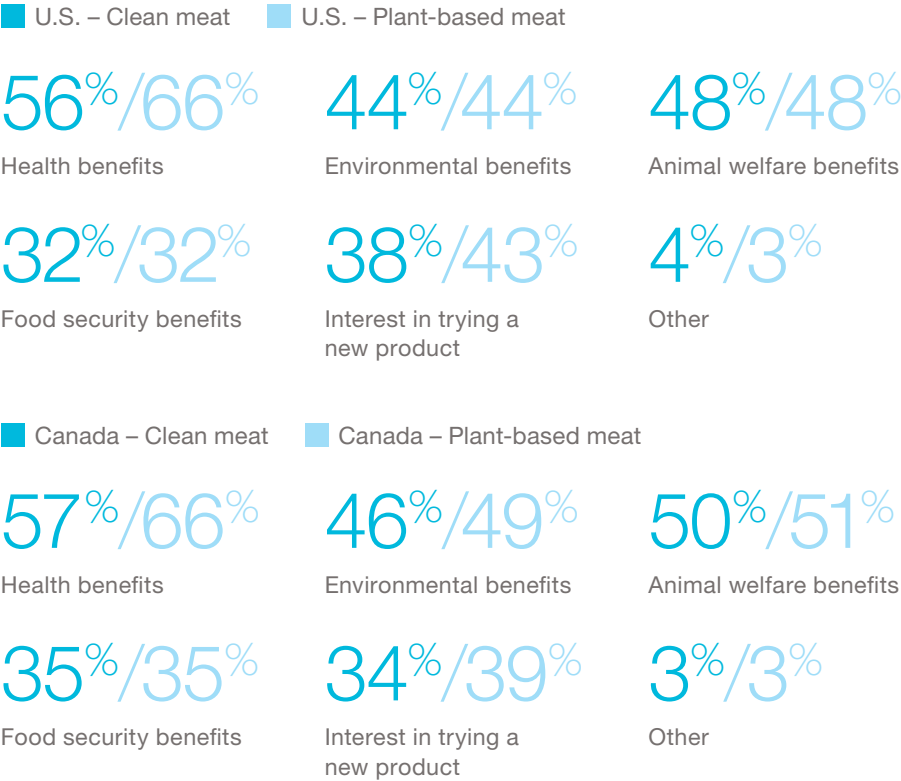
Almy: I don't think the first products on the market are going to be a rib-eye steak. That's a pretty complicated thing to make relative to, say, a meatball. I think you're going to see meatballs and chicken nuggets and fish sticks, and over time we're going to see more sophisticated products.

GenPop: What other kinds of meats will we see engineered like this? Boar? Alligator? Ostrich?

Almy: We have a number of companies in the clean meat space focused on seafood. I think we're going to have an incredible impact on the ocean. There is a lot of attention recently about reducing the use of plastic straws. And that's really important, but the vast majority of plastic in the oceans comes from fishing nets.

Personal health trumps environmental health in perceived benefits.

What are the most important reasons why you are interested in trying these products? (asked of those who expressed interest in trying these products)



(Source: Ipsos survey conducted between Oct. 5 and 10, 2018 among 2,010 adults in the U.S. and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)

Glossary: Food innovation allows for new ways of producing meat, clean meat and plant-based meat.

Clean meat, sometimes called *cell-based meat* is genuine animal meat, with the same taste and texture of conventionally produced meat. Clean meat is produced directly from cells, without the need to raise and slaughter animals.

Plant-based meat is made entirely from plants and has no animal ingredients. This meat is produced using plant ingredients like proteins, fats, and carbohydrates to mimic the taste, texture, and structure of conventional meat.

Where to **innovate**

Your competition just released a new product. It was starting to get buzz on social media and then a celebrity plugged it unprompted on Instagram and the mentions lit up. Is this the Next Big Thing, or is it the next Not a Thing Anymore? Will this have sustained scale? To put it another way, will this product “tip” from niche to mainstream and should you be developing an equivalent?

Ipsos can set up virtual communities of customers who provide a more qualitative look at the trends. These communities can quickly flag issues for marketers about their products and concepts. For instance, Ipsos research shows that people want to curate their diet and lifestyle, but social conversations show that turns out to be a very individualized process, and it's difficult to create messaging that scales. The communities are sometimes surprised (and not pleasantly) by food that seems to be vegetarian but isn't. Some community members think stevia is natural and some don't. These insights can prompt course corrections in both products and messaging.

As for the macro trends, the problem is that no two trends follow the same arc. But with Ipsos' Trend Radar, we have studied enough trends over the years that we can spot trends within the trend. Does coconut water's search trajectory look more like almond milk's or LaCroix's? Does a new food product appeal to the customer's sense of health and wellness? And what does that mean to the specific consumer?

Combining these two tools gives a nuanced look at how a product is being perceived today and how that brand conversation might grow (or not) as the product and the market mature.

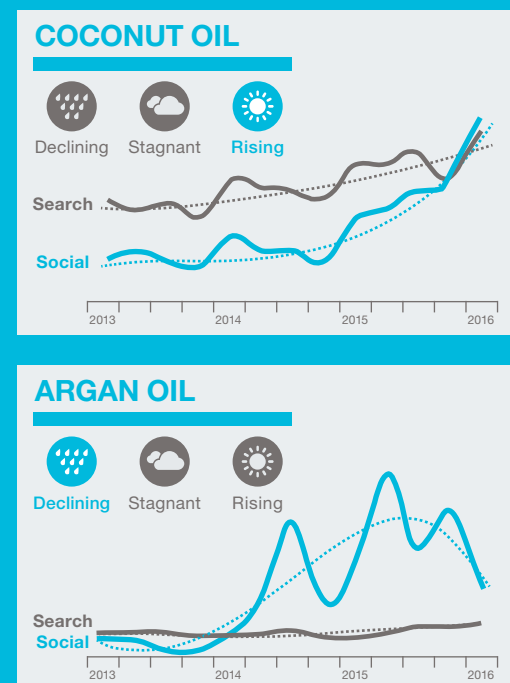


Christie Moorman is a senior vice president in Ipsos' Online Communities practice where she helps Fortune 500 clients grow their brands through a better understanding of their consumers and markets.



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Example of Trend Evolution Benchmarking



(Source: Ipsos Trend Radar)

Question:

Can humans survive without genome technology?



Pamela Ronald, Ph.D.

Founding faculty director of the Institute for Food and Agricultural Literacy, University of California, Davis; investigator, Innovative Genomics Institute, University of California, Berkeley

50%

of the total calories consumed globally come from rice, maize and wheat

(Source: International Rice Research Institute)

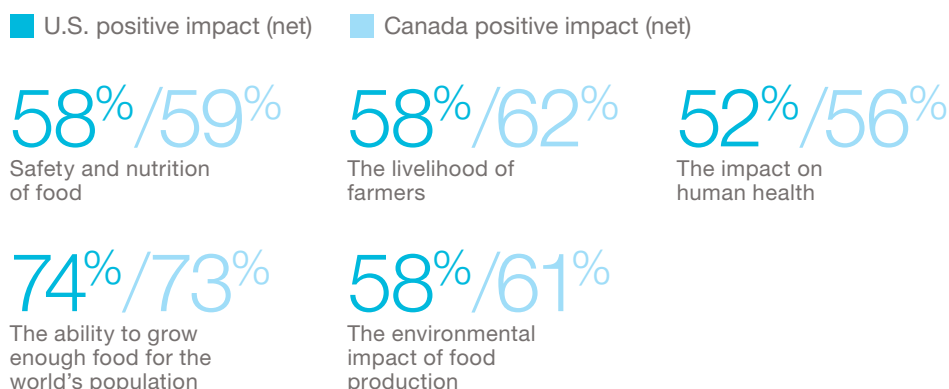
Each year enough rice to feed 30 million people is lost to flooding. Pam Ronald and her lab have been working to change that, using genome-editing technology and tools such as CRISPR to create strains of rice that are heartier and have better yields.

As populations expand and the effects of climate change grow in severity, nothing short of our ability to feed the world's people is at stake. Ronald's book, "Tomorrow's Table: Organic Farming, Genetics, and the Future of Food," co-authored with Raoul W. Adamchak, her husband and an organic farmer, seeks to bridge a divide between her community of scientists and his of organic farmers. Each group must work together to create a more sustainable landscape for farming. When Ronald thinks **What the Future**, she's wondering if people realize what's at stake and understand the benefits of genome-editing technologies such as CRISPR.



Most see a range of positive impacts for genome editing.

For each of the following, please indicate the impact you believe plant genome editing will have on agriculture in the future.



(Source: Ipsos survey conducted between Oct. 5 and 10, 2018 among 2,010 adults in the U.S. and between Oct. 26 and 29, 2018 among 1,004 adults in Canada.)

GenPop: Your questions dealt with what we should be doing with genome-editing technology. Why is that important to ask?

Pam Ronald: Everything we eat has been domesticated or genetically altered in some manner. Farmers at least in the United States generally buy their seed for improved characteristics. Farmers need to buy seed that's reliable to produce traits that consumers want and grows well on the farm. And farmers don't just rely on seed alone, and they also have agronomic practices that are really important for fostering soil fertility and trying to control pests and disease, and using land and water efficiently.

GenPop: Right, we've been manipulating breeding forever.

Ronald: Ten thousand years ago farmers did what's called primitive domestication where they just collected seed and replanted and selected for traits that they wanted. And over time that's changed,

obviously, quite a bit. Now, another technique is genome editing, and that allows the farmer to plant seeds that have been genetically altered in some way. These techniques are very important because we need to have plants that can survive under diverse conditions and are productive and taste good, and that are resistant to pests and disease.

GenPop: Your book talks about the dichotomy between genetic engineering and organic farming, and how the two points of view could exist side by side. But why do some people see these two groups as being in conflict in the first place?

Ronald: If you talk to an organic farmer or a conventional farmer, they essentially have the same goals: How do you produce food that's tasty, [and] minimize harm to their farm, and foster soil fertility. What we are advocating for in the book is sustainable agriculture. That's different than organic

farming, for example, because the concept of sustainable agriculture takes into account the effect on the environment and economy, and the social impact.

GenPop: Given climate change and expanding populations — especially in areas that aren't necessarily the greatest for farming — can we as a race survive without these technologies?

Ronald: I think we need an "all of the above" strategy, and we really need to focus on that goal. The discussion of genetics is really a distraction from these really important goals of sustainable agriculture: How do we produce enough nutritious food that people can afford; how can we farm so we reduce toxic compounds in the environment; how can we conserve land and water; how can we be sure that farmers and rural economies can survive.

GenPop: What does a hopeful vision of the future of our food supply look like and how can we achieve that goal?

“If you talk to an organic farmer or a conventional farmer, they essentially have the same goals.”

Nutrition and disease resistance are key priorities.

Please rank how important you find each of the following uses of plant genome editing,

1

Plants with higher nutritional value

2

Disease-resistant plants

3

Crops with greater yields/output

4

Crops that need less fertilizer

5

Non-allergenic or less allergenic plants

6

Plants with “designer” characteristics (e.g. indigo roses)

(Source: Ipsos survey conducted between Oct. 5 and 10, 2018 among 2,010 adults in the U.S.)

Ronald: Well, I think we can get out and vote for politicians that are going to advance science-based policies. That’s what will allow farmers to grow food in ways that not only protect the environment but [also] help feed the world. We really need to stay focused on that if we can reach for the big goals and advance human ingenuity to achieve those goals. As a scientist and agricultural scientist, I’m very hopeful. But there are some other small details that are a little more difficult to predict in terms of government policies and leadership.

GenPop: That’s my next question: What are the barriers to that vision?

Ronald: I think there’s a big issue with misinformation. Most consumers live in cities and don’t have access to talking with farmers to understand the struggles of farmers, and are therefore losing sight of the need to advance sustainable agricultural practices. How can we get science-based information out to consumers so they can make choices when they’re shopping that actually advance sustainable agriculture? I think that there’s a lot of vulnerability to marketing practices that can be harmful to the environment [and] can be harmful to human health.

GenPop: Are there pros and cons to the idea that a company can own a gene or a seed?

Ronald: Yes, certainly. I don’t think anybody wants a single seed company to monopolize the production of seed because the structure in a capitalist system is, hopefully, to minimize monopolies. I think most breeders recognize that if you make a discovery and you’re in the seed-breeding business, you want to be able to bring in income. But most breeders like more open access patents that somebody can develop something and then somebody else can build on it and develop something new on top of that. So this open innovation idea, which is the Plant Variety Protection Act, most breeders think it works pretty well.

GenPop: We do a lot of research on polarization and how we all fit into our little tribes. In a previous issue we wrote about autonomous cars and some of the political rifts possible in that space. Is there a risk like that here, too?

Ronald: It’s a good comparison. It’s innovative. It’s new. What’s going to work, what’s not going to work? How is it going to reduce traffic jams and fuel usage? What are the risks of accidents? It’s not a yes or no answer. There are important questions that we all need to wrestle with, and you need to have a cool, focused mind to have a civil discussion sometimes.

On the Fringe With Amy Webb



The future of food is coming to a dinner table near you — perhaps even to your own kitchen. GenPop asked best-selling futurist Amy Webb to give us some ideas of things to watch.

1. Finless fish — Say goodbye to tofu imitations of traditional fish. Scientists are getting closer to culturing fish and meats in a lab. The clean protein movement is heading toward acellular agriculture, which doesn't even require starter cells from animals, and "brews" meat from microbes. This will allow researchers to someday cultivate milk, chicken and eggs. Impossible Burger, a meat patty grown using plant materials, is already on the market in high-end burger joints and even White Castle; consumers report that they really can't tell the difference between it and real meat. Finless Foods is working on a lab-grown fish product. It will be 10 to 15 years before producers are able to scale production to meet demand, but by that time we might be printing our own hamburgers at home.

2. Indoor microfarms kitchens — Japanese researchers are developing plant factories— indoor microfarms—that can grow enough hydroponic lettuce to feed local communities. The lettuce is grown without soil or sunlight and needs just 40 days to mature before it's shipped to supermarkets. At the Kansai Science City, one of 200 microfarms throughout Japan, much of the work is automated. Raising seedlings, replanting, watering, adjusting the light and harvesting is done using artificial intelligence and collaborative robots. Genomic editing techniques that are moving from the fringe to the mainstream, combined with AI and vertical staking techniques, could very well result in a future in which restaurants have both walk-in refrigerators and microfarms.

3. Food flashlights — You might have heard about the recent extra virgin olive oil scandal, which involved a ring of well-known Italian olive oil brands misrepresenting lesser-quality EVOO as the good stuff. Knowing exactly what's in your food won't be a problem in the future thanks to artificial intelligence. Deep learning will soon be used to help us learn what's in the food we eat—and where it came from. Computer models will be able to calculate the nutritional value of your meal before you take your first bite. Researchers at the University of Massachusetts are using deep learning for computer-assisted dietary assessments, while scientists at Microsoft have already incorporated prototypes for recognizing photos of popular Asian and Western foods into Bing's local search engine. At the Massachusetts Institute of Technology Media Lab, students are working on an organic barcode that's invisible to us but could be read by machines to help consumers more easily trace produce as it is transported around the world.

Amy Webb is the founder of the Future Today Institute, a professor at New York University Stern School of Business and author of "The Signals Are Talking."



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