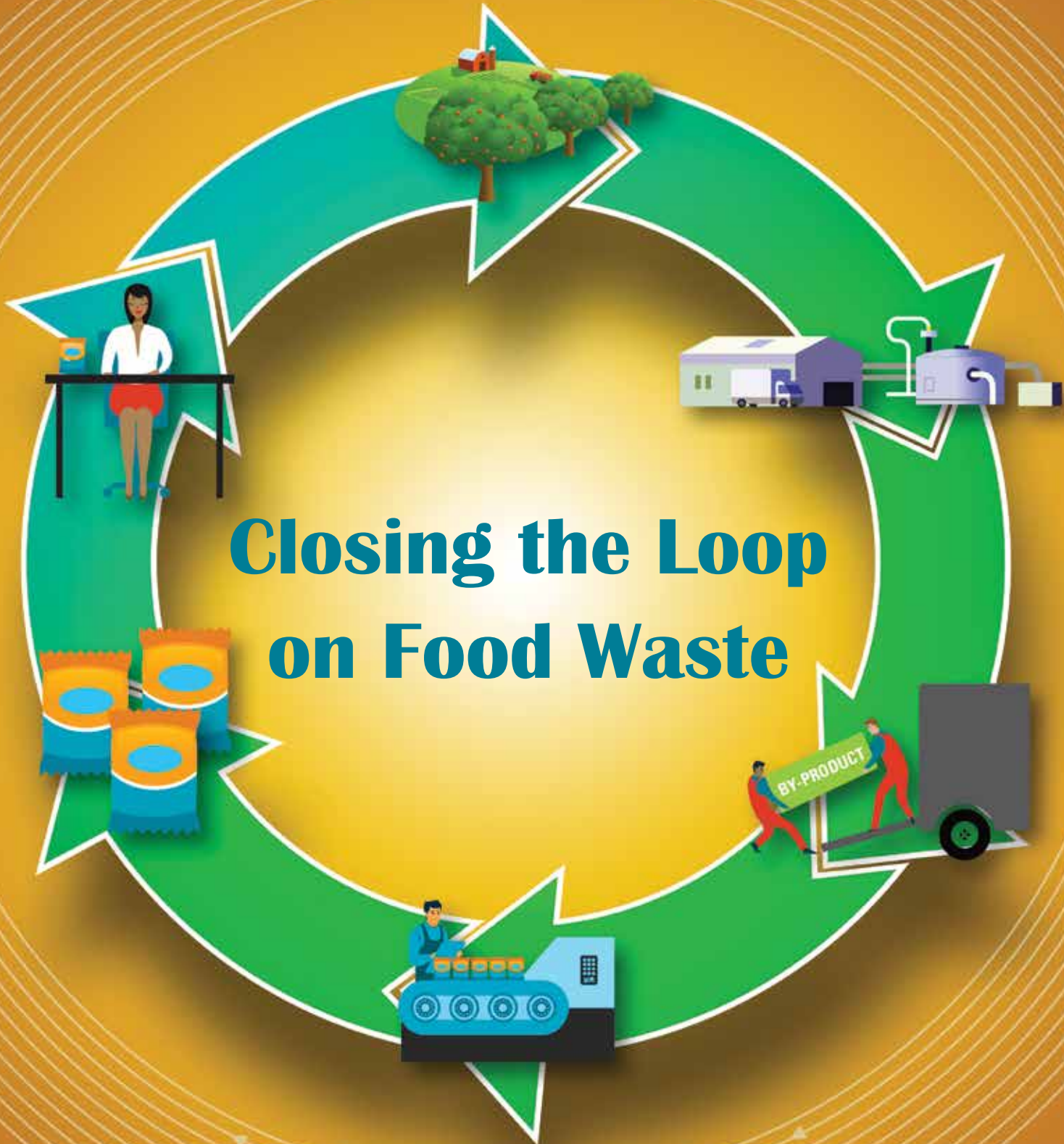


Closing the Loop on Food Waste



Pioneering start-ups as well as established food companies are applying circular economy principles as they strive to operate more sustainably, responsibly, and creatively.

Up to 40% of food that is grown or processed globally ends up being wasted. And as the global food system begins to rally around advancing a “circular economy” to address the problem, that statistic drops from the lips of nearly everybody who’s motivated to do something about it.

If true, that estimate—first hatched by the National Resources Defense Council (NRDC) environmental group in 2012—is a mammoth indictment of many things: food producers and manufacturers, policymakers, educators, and consumers. Even if the number is apocryphal or just inflated (see sidebar on page 22), food waste of anywhere near that magnitude comprises both a call to action and an opportunity for food and beverage producers worldwide. And that is why many farmers, food processors, packagers, distributors, and retailers are embracing the cause of cutting food waste with long overdue determination.

“The whole notion of a regenerative, circular food economy is capturing nutrient value and closing the nutrient loop and thinking about opportunities where waste is occurring throughout the supply chain, where we can meet social and environmental objectives that also have huge market potential,” explains Renske Lynde, CEO and co-founder of Food System 6 (FS6), an anti-waste incubator based in Berkeley, Calif.

So now there’s “upcycling” as well as recycling, discussion of “food insecurity” in addition to sustainability, coddling of “imperfect” produce, and redemption of suboptimized processing. Anti-food waste has become a business model, a marketing meme, a social cause, and an opportunity and a challenge that now is drawing investments from big consumer packaged goods (CPG) companies, retailers, and start-ups alike as well as continuing prods by activists.

Advocates quite easily have been able to tie the issue of food waste to that of hunger, some postulating that about one-eighth of Americans still “go to bed hungry” even amid the current economic boom and historic low levels of joblessness. Yet cutting food waste is a somewhat separate challenge from reducing plastic cups, straws, and packaging: Clearly they are interrelated, but

cutting food waste is an end to itself regardless of packaging issues.

“In many ways, food waste is inefficiency masquerading as resources,” says Elizabeth Balkan, food waste director for NRDC. “Pinpointing the problem of food waste highlighted the fact that even sophisticated companies have inefficiencies in their supply chains and opportunities to improve entire operations that not only shrink the amount of food waste being generated but also save businesses money.”

So companies are now joining nongovernmental organizations such as NRDC, and activists such as the television star Joel Gamoran, national chef of Sur La Table, in promising to make the planet better by not wasting materials—and by turning waste materials into ingredients.

In fact, about two dozen CPGs and food retailers are working with the U.S. Environmental Protection Agency as U.S. Food and Waste 2030 Champions, setting a target to cut food waste in half by 2030. They include major producers Campbell Soup, Conagra, General Mills, Kellogg, PepsiCo, and Unilever and many prominent food retailers, such as Walmart, Kroger, Wegman’s, and Ahold Delhaize USA.

Another initiative has partnered NRDC with the Ad Council to create a public service announcement campaign inspiring Americans to “Save the Food” by showcasing the life cycle of food and

Morton Salt marketing officer Denise Lauer says the company is committed to starting a meaningful conversation around food waste. Photo courtesy of Morton Salt



Quantifying the Scope of Food Waste

The campaign to cut food waste has gained traction for at least two big reasons: The goal is difficult for anyone to disagree with, and the National Resources Defense Council (NRDC) has done a great job of providing foundational research that gave tangible dimensions to the problem.

Slashing food waste is an objective that “cuts across political lines and philosophical perspectives,” says Renske Lynde of Food System 6. “You can approach it as pure market efficiency and say, ‘Just fix it.’ Or you can come at it from bigger-picture issues around climate and the environment.”

Elizabeth Balkan, who joined the NRDC as food waste director in 2018, notes, “We were instrumental in doing the foundational research. That basically [wrapped in] the people who we saw as the main change agents: policy-makers, government, corporate stakeholders, and consumers.

“With each of those pillars, we identified underlying reasons for food waste and identified the practices that different stakeholders and change agents could take to address and eliminate food waste at each phase.”

Ideology and politics aside, credit NRDC and its allies for a highly effective effort to plant in the public consciousness the notion that 40% of all food goes to waste in America. The number is so huge that it demands attention.

Indeed, apocryphal or not, it has become gospel since the organization released that estimate in 2012. So successful was the NRDC’s education effort that, by 2015, 45% of Americans could regurgitate that statistic back to surveyors. In a 2016 poll of more than 6,700 adults, 74% reported that the issue of food waste was personally important or very important to them.

Interestingly, in its 2017 update of the original report, NRDC said that “America has clearly made progress” by wasting less food but declined to update its 2012 estimate of 40%. The group conceded that the new estimate would be that just 37% of food is wasted, based on a new update of research by the U.S. National Institutes of Health, on which NRDC’s original estimate was based.

But NRDC insists that the 40% figure still “accurately reflects available research” if one also includes irregularities in how measurements of waste reflect the supply chain.

“Given the inexact nature of all [the] numbers and the lack of specific data to document actual reductions at the national level, we continued to feel that 40% is a reasonable estimate of how much food goes uneaten across the U.S. system,” NRDC said in its 2017 update.

Of course, the apparent lack of progress shown by no budging of the estimate in five years helps keep food waste on the front burner of public concern.



Celebrity chef Joel Gamoran is an enthusiastic advocate of converting leftover food into appealing meals. Photo courtesy of Scraps

the loss of resources when it goes unconsumed.

Morton Salt came up with its own #EraseFoodWaste meme in 2017 and produced a series of videos as well as posters that were literally made, 100%, from food waste.

“We focused on stepping up and making a difference in the world,” says Denise Lauer, chief marketing officer for the Chicago-based company. “We wanted to be a brand that starts the conversation around food waste in a different and meaningful way, because the very nature of salt is to preserve food.”

Many of the initial efforts by these companies and others simply have taken advantage of low-hanging ugly fruit, if you will. Most major CPGs have yet to significantly step up on food waste. “They’re all looking at it,” Balkan says, “but we have yet to see a really public commitment being made to [reuse] a certain percentage of reclaimed ingredients.”

CPGs ID Opportunities

Yet now, some CPG producers are moving into what Balkan calls “second-order” opportunities “by taking something that would have

been wasted by another process and putting it back into manufacturing.”

Tyson Foods is a pioneer in this regard. It has introduced *yAppah!*, a new brand of “chicken crisps” snacks that are made from upcycled trimmings of chicken breasts, tapioca flour, vegetable purees “rescued” from juicing, and malted barley that is a by-product of beer brewing.

The first product out of the chute for Tyson’s intrapreneurial Innovation Lab (see sidebar on page 29), *yAppah!*, sprinted from concept to finished product on the shelf in only six months.

“It’s very important because we believe that, hopefully through this launch, we can help create awareness with action to fight food waste,” says Rizal Hamdallah, head of Innovation Lab. “It’s unbelievable to see how many companies talk about it but don’t act on it. What’s important for us as a leader is to show that we can start doing something about it.”

Hamdallah notes statistics such as other NRDC figures which show that Americans throw out an average of \$218 billion in food each year, which amounts to about \$2,200 per household. “As a

company, we'd like to do something about it," he says. "That's why we are driving innovation and new growth and products to market within six months, to tackle this space."

Entrepreneurs at the Forefront

But as in so many other areas that are revolutionizing the food business, entrepreneurs comprise most of the vanguard in cutting food waste.

Barnana is one of the most prominent such start-ups. Co-founder Caue Suplicy and his partners have built a \$15 million-plus start-up in just six years, selling banana "bites" in several varieties. *Barnana Bites* are partially dehydrated bananas based on a family recipe that leaves just the right amount of moisture inside—about 20%—to create a healthy, satisfying snack. "They're very different" from freeze-dried bananas, the Barnana CEO says. "We remove 80% of the water, while freeze-drying removes it all."

Bananas that would otherwise be wasted are the primary ingredient in Barnana Bites. Photo courtesy of Barnana

Sourcing was important for Barnana because the founders wanted the company to rise on a sustainability ethos from the start. It was all the better that this value-based priority jibed well with the requirements for the product.

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Because Barnana's ideal raw material was bananas that were a bit ripe, there was a vast supply of the fruit in Central and South America that would be available in the form of waste bananas.

"When I went to farms, I ended up learning that a big percentage of the production of bananas doesn't qualify as exports," Suplicy says. "Usually they are too big or too small or aren't green enough. When they start to ripen, they're thrown away. We figured we could buy those bananas that otherwise would be wasted and also provide a second

income stream for farmers."

Lately, Barnana has extended its product line to banana brittle, made from banana puree, and even to another fruit, making chips out of plantain, and is broadening distribution as the start-up stokes what

co-founder Nik Ingersoll calls "meteoric" growth.

"We've upcycled more than 13 million kilos of bananas so far, and we've barely even scratched the surface of global banana waste," says Ingersoll, who is also Barnana's chief marketing officer. "About 20% of all bananas produced go to waste. It's astronomical how many there are, and we continue to use them every day."

Benefiting From By-Products

Recycling the waste from brewing beer has become another favorite opportunity area for entrepreneurs. A four-year-old San Francisco-based company called ReGrained, for example, made snack bars out of spent grain and other simple, organic ingredients in beer-themed flavors: *Honey Almond IPA* and *Chocolate Coffee Stout*. Then co-founders Dan Kurzrock and Jordan Schwartz reformulated the bars to use a flour made out of spent grain and planned to branch out into savory snacks such as chips.

What's left in spent grain is all the fiber and proteins and also micronutrients that don't make it into beer, says Kurzrock, who is ReGrained's "chief grain officer." "It's not just dietary fiber, but it's also prebiotic fiber, and the protein, of course, is plant-based protein."

U.S. beer brewers annually use about 6 billion pounds of grain, which is soaked in water to extract the sugar and make liquid wort, a key ingredient of beer. What's left is free for the taking.



The two recognized that they could tell a sustainability story for any product they came up with that employed brewers' grain: rescuing the stuff for a good purpose from its alternate destiny in a landfill.

"What we're trying to do for beer is what the users of whey did for cheese," Kurzrock says. "We 'upcycle' it and find the highest use for it. So there's a sustainability story as well as a nutrition story to be told."

On the opposite coast, Bertha Jimenez has a slightly different take on the same idea. Rise Products, her New York City-based start-up, works with local brewers to turn

Renewal Mill helps reduce food waste by creating a versatile flour ingredient from the pulp of soybeans used in soy milk processing. The company was the winner of the 2018 IFTNEXT Food Disruption Challenge™ competition. Photo courtesy of Renewal Mill



barley mash into high-fiber flours and flakes that the company sells for private label purposes to chefs, bakers, and food manufacturers.

Now she's excited about how a "big food manufacturer," which she declined to identify, is using Rise flour as a one-third ingredient in its dough for frozen pizzas. "I thought it wouldn't taste good, but it's actually really tasty," Jimenez says. "It'll be out in another few months."

Claire Schlemme targeted okara, the pulp left behind by processing soybeans for "milk," as the first product of her start-up, Renewal Mill. Boston-based Schlemme already had established a juice brand when she heard the owner of a California tofu factory talk with despair about the lack of satisfactory options to handle okara.

"About one-third of the protein in soybeans is left in the okara, and lots of fiber," Schlemme says. "That actually leaves behind a very nutritious substance. But soy milk has been considered the ingredient, and okara the waste, just because we have such an industrialized food system and we lose the ability to think holistically about these inputs."

Her company, she says, "is a bridge builder. I figured this could be a really interesting solution to food waste and also for better affordable nutrition, and keeping 'waste' in our supply chain," Schlemme says. "So I found a local tofu maker and got a bag of okara and spent about a week playing around with it."

Schlemme knew there were culinary possibilities for okara in part because it is an ingredient in East Asian cooking. But that is okara in its unaltered form; she quickly concluded that "an important piece of upcycling by-products at scale is dehydration. Fibrous products tend to be very wet, which leads to two problems: They spoil very quickly, and they're heavy. As soon as you need to move them, you can quickly lose cost savings of a low- or no-cost

Jerky From the Sea

Nick Mendoza's fish jerky brand, *One for Neptune*, is formulated out of a species that commercial fishermen consider a "junk" fish, yellowtail rockfish.

Mendoza is a former marine scientist who called his company One For Neptune after the ancient seafarers' practice of giving thanks to the god of the sea at a journey's end by pouring the first ritual toast into the ocean.

He decided to build it on three planks: a high-end, top-quality product; a raw material coming from an under-appreciated species of whitefish that wasn't being over-fished from the ocean; and an ethos devoted to converting or averting waste of any sort whenever possible.

Yellowtail rockfish "is one of the 20 or more ground fishes that are coming up in fishermen's nets, where the populations are thriving but there isn't the market for them that there should be," he says. "There isn't the familiarity. So it's undervalued and underutilized."

Mendoza aimed to provide a new market for the yellowtail rockfish that boats were bringing in reluctantly despite their best efforts, or just throwing back into the Pacific. "We can get a great price and prevent these fish from being used as waste or fertilizer or 'bycatch,' which is when fish get dumped back into the sea dead," he explained. "Dealing with bycatch is a big global problem."

Mendoza came up with a combination of dehydrated rockfish, soy sauce, liquid aminos, and other ingredients and gave it to a friend, who said, "That's phenomenal!" Mendoza says. "'Is it beef, or what?' I was elated that I'd gotten to the point that it tasted delicious and it passed off as beef."

stream of nutrition."

Creating okara flour made sense to her, especially because American consumers already had demonstrated an appetite for other non-wheat flours. Plus, okara flour has a neutral flavor and light color so it blends well into products without significantly changing their look or taste—while boosting nutrition at the same time.

Already, Renewal Mill is partnering with a small meal kit maker called Local Crate; okara is an

ingredient for coating the chicken in an orange chicken and broccoli bowl the company offers. And Schlemme says she's talking with "large CPG companies that just have a longer time frame."

In the produce arena, Matt Weiss started a company called Rind Snacks that dries fruit pieces with the rinds and skins still on and sells them as an antioxidant-packed snack that also helps reduce food waste. Expect to see *Rind Skin-On Superfruit Snacks*, now available only



Former marine scientist Nick Mendoza created a nutritious jerky product using an underutilized species of whitefish.

Photo courtesy of One for Neptune

One For Neptune entered a seafood product pitch competition at Stanford University amid 200 competitors and garnered second place in the audience vote on favorite products, as attendees quickly gobbled up the 500 samples Mendoza had brought.

And in June, One For Neptune got its most important bit of validation: Celebrity chef Massimo Bottura raved about the product after sampling the fish jerky at the Fancy Food Show in New York City. And now One For Neptune is thriving in e-commerce and looking for retail outlets.



Rind Skin-On Superfruit Snacks allow consumers to reap the benefits of the nutrition packed in the peels and rinds of fruit. Photo courtesy of Rind Snacks

online, in a major U.S. retailer this year.

Rinds, of course, pack the most nutritional punch of any component of nearly any fruit because the bright and deep colors there indicate the presence of high concentrations of vitamins, and of flavonoids and other antioxidants. They also contain a lot of dietary fiber.

The trick is getting Americans to consume something that, except for the peels of apples and the skins of grapes and berries and a few other fruits, they've always seen as scrap.

Weiss's answer was to render fruit pieces with the skins and rinds still on as another form of dried fruit and to give the products on-trend taste profiles that are more piquant than most dried fruits.

"It was a big opportunity to take the taste profile of dried fruit—which has been the domain of raisins and prunes and apricots—and make it interesting and sexy and

use taste profiles that are more tangy and bittersweet," says Weiss, who's still in the investment industry and is a part-time entrepreneur.

Circular Thinking at Kroger

At the same time, even given the trailblazing contributions of food and beverage start-ups, arguably retailers are showing more collective progress on the food waste issue than packaged goods companies.

Kroger, for example, has entered the fray in some big ways. Early this year, the Cincinnati-based chain plans to introduce an "ugly produce" brand called *Pickuliar Picks*. Its tagline will be "imperfect but perfectly delicious," and it will comprise tomatoes, bell peppers, limes, yellow onions, gala apples, and other items that may be too small, too bumpy, or too freckly on the outside but are just fine on the inside.

The new brand is part of an effort Kroger launched in 2017 called "Zero Hunger/Zero Waste," which conflated hunger elimination with food waste elimination. The

platform also includes achieving Kroger's own waste-reduction goals, which range from expanding composting behind its stores to achieving "zero food waste as a company" by 2025 and establishing a \$10 million "innovation fund" within Kroger's foundation to "address hunger, food waste, and the paradoxical relationship between the two."

But in distribution, just as in food production, mostly it's entrepreneurs who are pushing the envelope on the waste issue.

Imperfect Produce is a four-year-old San Francisco-based start-up that "finds a home for ugly produce," as content manager Reilly Brock puts it, with an e-commerce and home-delivery business model that ends up being about 30% less expensive than the prices for regular produce in stores.

The company gleans fruits and vegetables from farmers' fields that previously would have been written off as a loss because of cosmetic imperfections or as surplus amid fluctuating commodities' markets.

Supplying consumers with perfectly good but visually 'imperfect' produce is the business model for start-up Imperfect Produce. Photo courtesy of Imperfect Produce



Its most popular products include small avocados, which a lot of retail outlets won't buy, "but they're perfectly portioned for garnishment" and curved carrots (about 2% of the crop), says Brock.

"We're not as picky as stores," Brock continues. "We'll buy smaller quantities. All we care about is getting people to eat it. We don't care how it would look in a display."

Nevertheless, among the remaining obstacles to cutting food waste is public skepticism regarding uncustomary products such as mottled fruit and chips made from poultry scraps. While American consumers are eager to back the fight against food waste, Balkan says, "There still exists a big branding or marketing challenge: When you call something 'waste,' it makes things seem less appealing."

That is why, according to Lynde, there's a "move to not talk about 'food waste' but about 'wasted food.' All the polling data we've seen shows a dramatic positive reaction to the notion of 'wasted food,'" she says, "and to consumers' ability to do something that has a positive environmental impact that they can do easily."

And this is where influential advocates such as celebrity chefs come in. The biggest impact may already have been made by Anthony Bourdain, who in 2017 produced a widely watched documentary called *Wasted: The Story of Food Waste*. It was one of Bourdain's last big projects before his suicide in June of last year.

Gamoran, the New York-based star of *Scraps* on the A&E network, is a happy warrior for the issue who barnstorms the country in a refurbished 1963 Volkswagen van in search of "waste" foods to rescue. He found a new use for broccoli stems (many of which get composted because consumers prefer to eat the florets) by grating them into stir-fry, and goat meat (which gets thrown into landfills because no one wants to eat it, preferring goat

cheese) by making it into sausage.

"If I can somehow take spent grain from beer and grind that into flour and make the most amazing scone with it, people will want it," he says. "If I describe it on camera as 'nutty' and having a 'different flavor profile, almost like baking with beer,' I've done my job."

"My responsibility as a chef is to

make this movement cool and on trend." **FT**

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From Poultry Scraps to Snacks

With its *jYappah!* chicken crisps, Tyson Foods enjoys the pioneering position of being an animal protein company that's trying to harness waste from its processing of meat and poultry rather than only trying to reduce waste using by-products of somebody else's processing.

"We don't have waste in the way we process," says Rizal Hamdallah, head of the company's Innovation Lab. "We're very efficient. And at the same time, we believe animals have provided their lives to us, so we optimize everything upstream from the meat itself."

Therefore, *jYappah!* isn't just one product or a one-off initiative of Innovation Lab, Hamdallah says. "It's our brand for sustainability," he says. "It's a future sustainability platform, and we will add more products."

Innovation Lab tested a variety of concepts with consumers before winding up with chicken crisps as the first *jYappah!* product. "We wanted something within snacking products that delivers the nutrition that people are looking for," he says.

And it was sensible for the product to be based on chicken. "As a protein company, chicken will provide the protein need that we like to deliver to our consumer," Hamdallah says. "Based on feedback from consumers, chicken crisps are the most appealing to create an impact from tackling the food waste problem. That's the entry point."

Tyson hired a chef trained at Michelin-starred restaurants to see what he could do with the chicken breast trimmings from its boneless strips and other products, from chickens raised without antibiotics, and to "compose ingredient-driven snacks with the flavor nuance usually found in meals," as company materials put it.

jYappah! came together in about 20% of the



Tyson Foods developed an innovative snack brand by upcycling poultry waste products. Photo courtesy of Tyson Foods

time of a standard new product, Hamdallah says.

"This was important for *jYappah!* and is important for the industry because the CPG industry is very slow," he says. "Launching it this fast was critical. It allows the team to think differently and allows [for] creating new and different tools within the innovation process. That will help us to live within the agility that we're looking for."

The company also brought other major packaged goods players into the *jYappah!* project. Tyson product developers targeted as a raw ingredient vegetable purees that are near expiration dates or left over from juicing, in partnership with ingredient supplier Naturex, and grains spent by the brewing process, supplied by Molson Coors.

jYappah! will be available in 1.25-ounce, fully recyclable aluminum cans by early 2019 in Chicago as well as New York City.

jYappah! "isn't going to solve the problem" of food waste, Hamdallah concedes. "But we have a starting point, and we would like to have a platform."