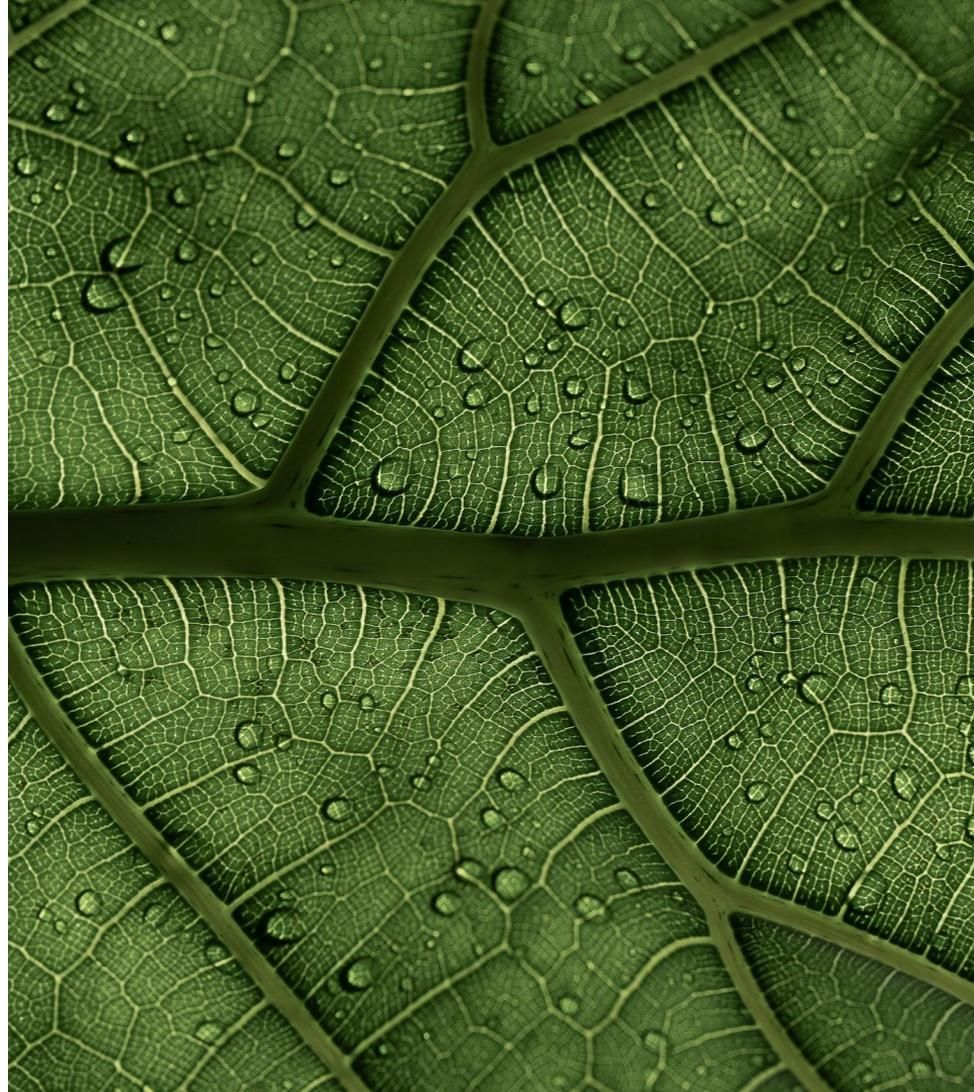


10 Trends

# Shaping the Future of Food in 2022

s2g<sup>o</sup>ventures



# Introduction

We believe that we are entering into a global food transition, much like the global energy transition, fueled by changing consumer preferences, climate change and shifts in the capital market landscape.

The energy transition was a multi-decade effort of over \$4 trillion of capital formation, the birth of new industries and the destruction of equity value and stranded assets across the value chain. But the transition has scaled and is almost mainstream in the energy industry.

Food is still in its infancy but is being propelled by seismic tailwinds: massive demographic change spurring new consumer demand, significant advancements in the biology, chemistry and physics of food production to create new choices and capital markets anchored by ESG that want to fund high growth, disruptive companies.

**This report explores ten trends that are driving the transition to a climate smart, healthy food system.**



# The 4th Industrial Revolution Comes to the Farm

01 | Robots • 02 | Digitization • 03 | FinTech • 04 | RNA



## Supply Chain Disruption Accelerates Food Innovation

05 | Fermentation • 06 | Cellular Agriculture • 07 | Post Harvest Innovation



## Consumers Demand Better Food Choices and Experiences

08 | Discovery Platforms • 09 | The Convergence of Food and Health • 10 | Personalization



# The 4th Industrial Revolution Comes to the Farm

## 01 | Robots

Robots will increase efficiency while reducing labor needs across the food system.

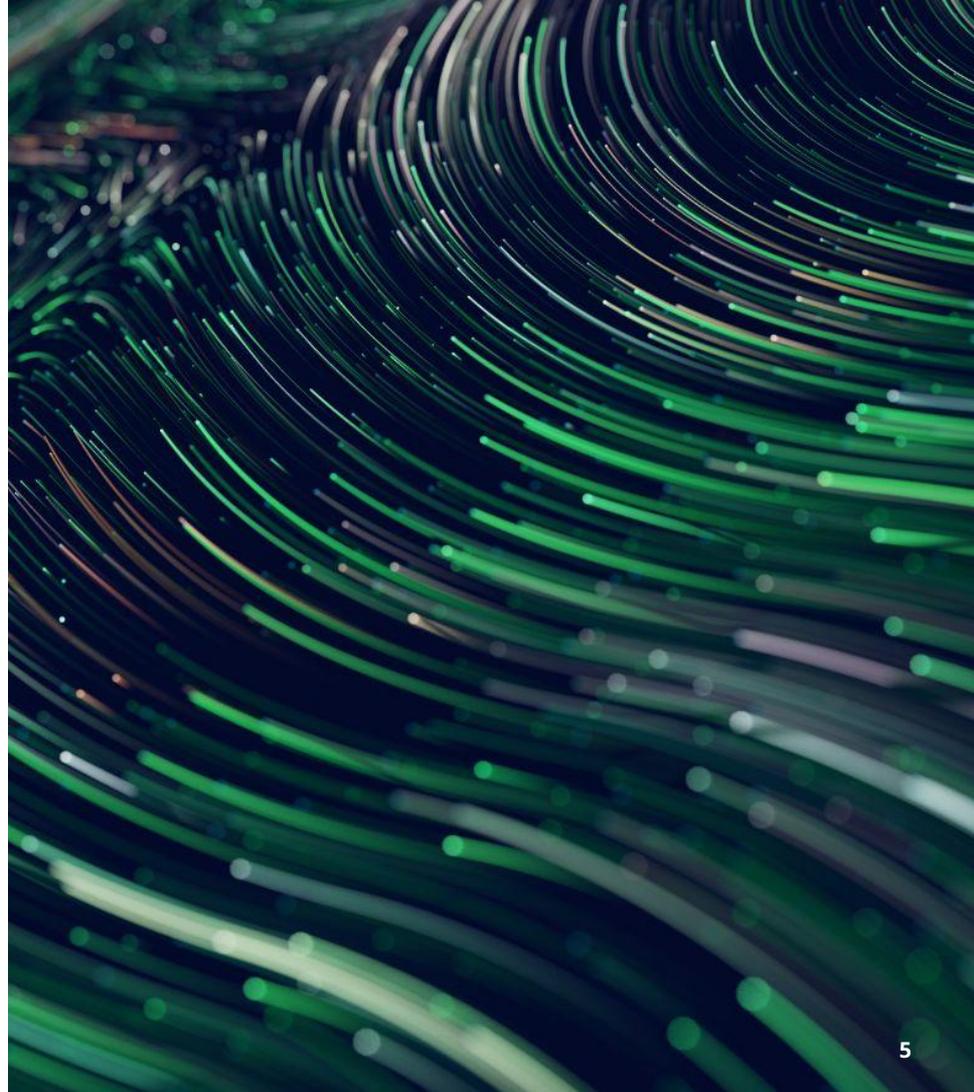




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## What's Driving Change

The Great Resignation is impacting virtually every industry with [4.3 million](#) Americans or 2.9 percent of the entire workforce quitting their jobs in August alone, according to the Bureau of Labor Statistics. The farm sector has been experiencing a dwindling workforce for some time now with the average age of farm producers at [57.5 years](#) and the number of people working as farmers, ranchers and other ag professionals expected to drop [6 percent by 2029](#). But due to the pandemic this trend is accelerating rapidly and is impacting the entire food sector.

Beyond farm operators, there is simply not enough reliable labor to fill both indoor and outdoor farm worker and food processor roles. Food-related industries tend to rely on low-wage immigrant workers, including undocumented workers. The labor shortage is due to a number of factors including rural population decline, immigration crackdowns (undocumented immigrants make up nearly half of farmworkers), policies that have cut legal immigration in half, H-2A visa program inefficiencies, climate change, and pandemic exacerbated worker safety issues and rising wages.

The global worker shortage and labor inefficiencies across the supply chain, including in grocery stores and restaurants, is partially responsible for increasing food prices. Supply chain inefficiencies have been a major contributor to food loss and waste in the industry which amounts to a cost of more than [\\$1T annually](#).

## The Technology

From robotics in the field to vertical farms, processing plants and restaurants, automation is improving efficiency and environmental outcomes while freeing people from monotonous, backbreaking tasks that few laborers want to do. Innovation in AI, machine learning, computing speed, and data storage have enabled a new wave of lower cost automation and potentially true autonomy. In the field and in CEA operations, robots can collect data and interact with other computer systems to make critical decisions. Companies are tackling everything from direct harvesting to precision management of nutrients, pests, weeds and diseases. Further downstream, robots have the potential to mitigate human error on the production floor to reduce food waste, revolutionize grocery order fulfillment by enabling quicker, more efficient order prep, and enable restaurants to speed up service and perform tasks that are repetitive and sometimes even dangerous.



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Robotics  
that are easy to use  
and have proven value  
will be adopted at scale  
in agriculture.

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## The Opportunity

In an industry that has long been attached to manual, labor intensive processes, the challenges of Covid-19 have opened doors and increased the appetite for automation and advanced robotics across the food sector. Automation brings the potential to improve operational efficiencies, increase output and grow revenues throughout the food supply chain. Many of these robots will work collaboratively alongside their human counterparts. Automated processes will also enable farms and food companies to prove provenance with a recorded chain of custody thereby improving traceability. The incorporation of robots into the workflow will also allow companies to redeploy people to more value-added work, resulting in higher paid, more technical jobs in these industries. Lastly, robots will also be able to collect vital data out in the field and in CEA operations, which will be essential for improving supply chain digitization.

“While accounting for every edge case to enable a robot to truly think like a human is difficult, there has been a very steep improvement curve over the last three years with companies getting closer and closer to true autonomy,” says Arthur Chow, Vice President at S2G.

## 02 | Digitization

The rise of ESG will  
help to digitize the farm.



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## What's Driving Change

The agriculture sector has one of the lowest levels of digitization relative to every other sector of the economy. CPGs, consumers and participants across the supply chain currently have little insight into the environmental impacts of production practices. But an increasing interest in the origin of food products and production practices is making traceability a necessity for food companies.

Companies in the food sector and in numerous other industries, such as Microsoft, General Mills, Blackrock and Unilever, are making aggressive ESG commitments with the number of corporations that made science-based ESG commitments in 2020 equaling the previous [five years combined](#). Food companies that are committing to better sourcing practices are creating opportunities and financial incentives for farmers to adopt sustainable methods if they can record data-backed outcomes.

More broadly, many companies are pledging to reduce their carbon footprints, essentially committing to purchasing offsets, which has spurred the rise of agricultural carbon markets. ESG commitments and carbon markets require extensive and high quality data to give claims, labels and offsets validity.

## The Technology

Data is collected from the field using satellites, smart sensors, high precision positioning systems and a range of computer applications. The growing availability, reduced cost and increased interoperability and use of digital technologies such as IoT, blockchain, big-data analytics, artificial intelligence and related communication and information technologies can provide the analytics required to ensure that ESG commitments and ecosystem services markets have integrity and truly contribute to climate change mitigation.

Data collection and analysis can also give farmers granular insights into soils, weather conditions, nutrients and pests, and prescribe farming practices to maximize soil health and yield while minimizing inputs.



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In 2022, we will see  
the business case for  
sustainable farm practices  
be more clearly defined.

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## The Opportunity

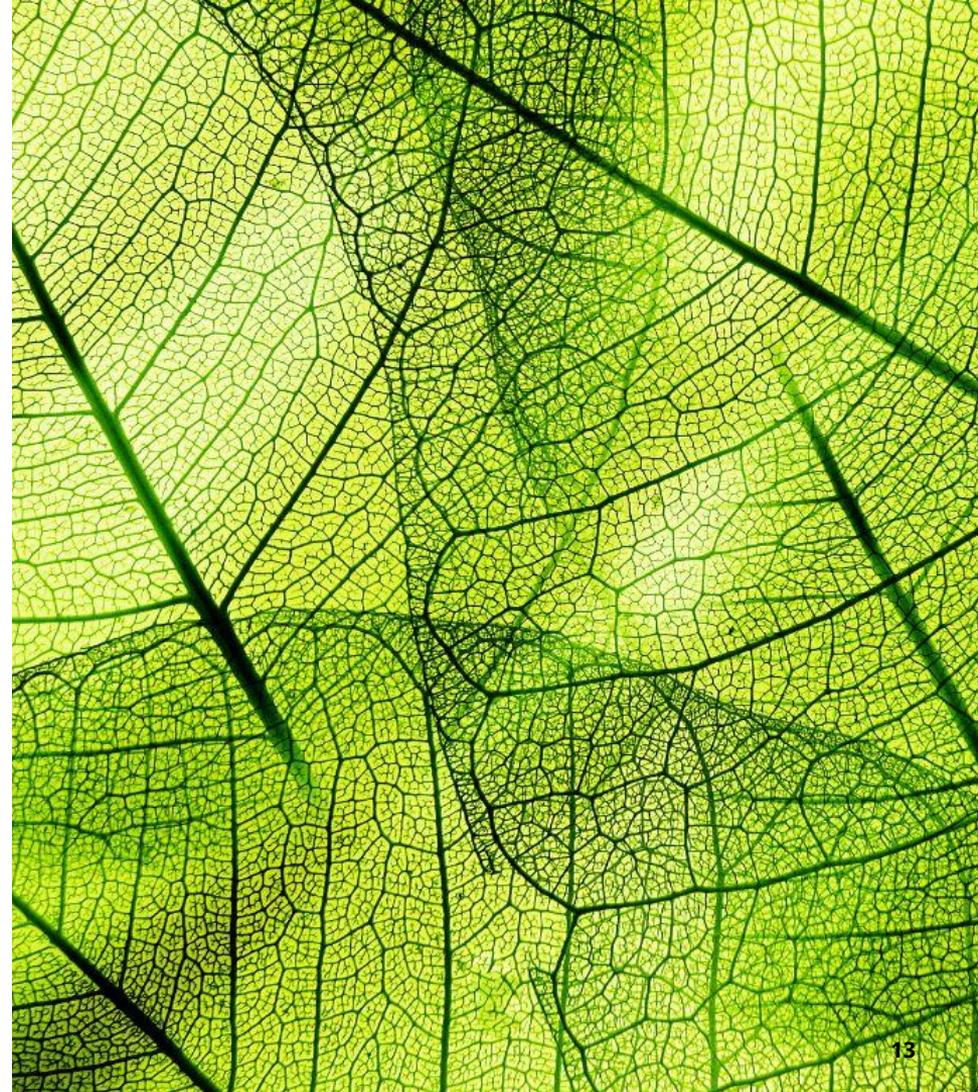
Digital technologies are enabling farmers and food companies to use resources more efficiently, collect and share data, and report on inputs and outcomes in ways that can allow for more transparency and assessment of their environmental and social activities as well as verifiable labeling. For example, data collection and analysis in CEA operations can capture reductions in water use and other input efficiencies that can be related to the consumer.

While the regulatory environment for carbon markets is evolving, companies that can capture and evaluate data will be essential players when carbon markets reach maturity. We are currently on the cusp of several companies figuring out their business models, access to markets and adoption when it comes to farm digitization. Technologies that are transparent, easy to use and can prove meaningful savings will be the ones that are adopted. It is also essential that we connect as much data as possible to produce the most accurate models. This will require unprecedented levels of cooperation between companies, universities and government bodies to aggregate high quality data and make it widely accessible.

“In 2022, we will see the business case for sustainable farm practices be more clearly defined,” according to Cristina Rohr, Managing Director at S2G. “This will accelerate the digital and algorithmic transformation of agriculture. The result will be incredible efficiency gains and changes to the role humans play in the industry, much like what has happened in finance and health.”

## 03 | FinTech

Fintech will transform opportunities in agriculture just as it did for the student loan and mortgage markets.





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## What's Driving Change

For many farmers, the decision to invest in more efficient farming methods, purchase new equipment, or scale sustainable practices relies on their access to funding and risk management. The complexity of agriculture requires that farmers and their investors understand and are able to accurately manage a variety of risks, including environmental and climatic risks that are inherent to the sector but becoming increasingly volatile due to climate change.

Over the last decade there has been increasing recognition that sustainable practices enable farming operations to be more resilient and offer financial upside opportunities for growers. While the benefits of sustainable farming models have been recognized, implementation remains varied and returns are typically delayed several years from the start of transition. Lenders in the traditional agrifinance system are beginning to conceptualize how to account for more innovative financing solutions to support more sustainable farming practices but we are in the early stages of this market developing. As the industry recognizes the need for more flexible lending, capital, creative risk structuring, and data are flowing into the sector to enable the development of new financial products.

## The Technology

As new technologies are offered at increasingly competitive price points and compelling value propositions, agtech adoption is expected to increase and expand the digitization of the agricultural sector. Expanded adoption of agtech enables the creation of a richer dataset with which new products and value streams become available. Data enables the introduction of new products and channels that have the potential to business models and realign incentives between different stakeholders in the agrifood system - including ag input providers, ag retailers, lenders, growers and processors. The wealth of data that is coming online combined with new technologies and growing sophistication of predictive models are enabling the development of risk management and lending models that are much more flexible and adaptable to different farming operations.



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Ultimately fintech  
can be used as a tool to  
bend the adoption curve  
for new technologies.

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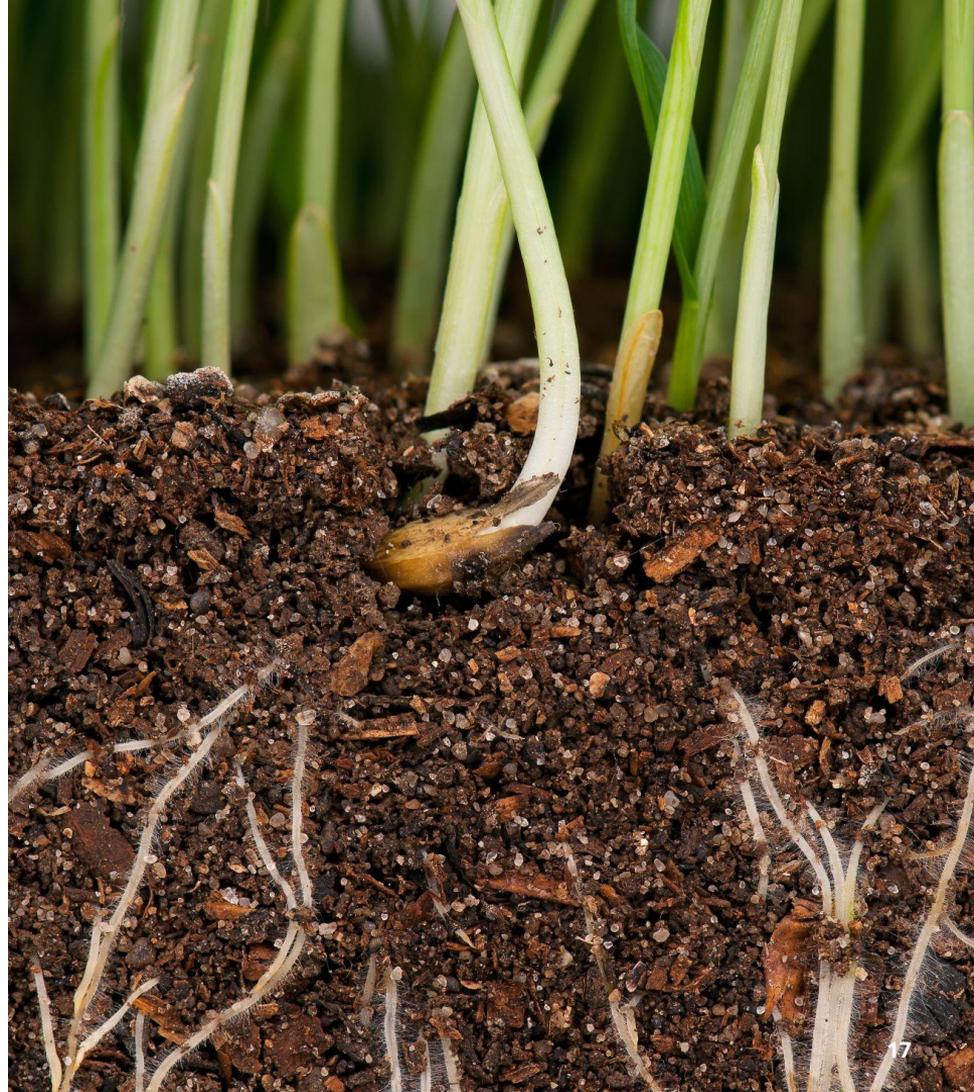
## The Opportunity

Fintech has a wide range of applications in the ag finance industry from automated loan decision making to moving from asset-based to cash-flow based lending. By integrating new data sets, the industry has the opportunity to better manage climate variability, offer better financial products to land operators (renters) and align incentives. A number of fintech products offer white label solutions that could pair well with traditional lenders who are interested in exploring these opportunities further.

According to Audre Kapacinskas, Principal at S2G, “Ultimately fintech can be used as a tool to bend the adoption curve for new technologies. It can enable farmers to invest in sustainable farm practices and infrastructure that will improve financial viability and environmental outcomes.”

## 04 | RNA

RNA technology that saved lives during Covid-19 will be applied to farms to save soils.





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Image courtesy of Greenlight

## What's Driving Change

Forty percent of global crop production is currently lost to pests. But traditional chemical pesticides are increasingly insufficient to protect crops as pest resistance is building with companies struggling to modify chemicals to keep up. Additionally, supply chain disruptions have caused input prices to soar, making chemicals that farmers rely on increasingly price prohibitive. Glyphosate prices have gone up anywhere from 100 to 300 percent this year.

Environmental risks of pesticide use are also becoming clearer and many of these chemicals have been shown to be toxic to organisms far beyond their targets, including beneficial insects and animals, as well as the humans spraying these pesticides and living in the vicinity of fields. This is making pesticides increasingly unpopular with regulators and domestic and international policy makers are looking to regulate chemical inputs.

While biologics, or pesticides derived from such natural materials as animals, plants, bacteria and certain minerals, offer a promising alternative to chemical pesticides, there is a lot we don't understand about their pest control mechanisms and farmers can't always guarantee they will work for their particular circumstances.

## The Technology

If you hadn't heard the term RNA before this year you definitely have by now. But while RNA technology is having a moment because of its centrality to Covid vaccine development, we are just scratching the surface of the capabilities for RNA technology across numerous sectors.

One extremely promising application of RNA technology is in agricultural pest control. RNA interference is a process in which transcript expression is reduced in a sequence specific manner and can be co-opted for the control of pests and pathogens in a topical application system (or can be encapsulated and included in animal feed as an oral vaccine).

As opposed to chemical pesticides, RNA technologies enable incredible accuracy and specificity, essentially the difference between taking a hammer vs a tweezer to the problem. RNA pesticides are as precise as a biological application but are similar to chemical solutions in that we clearly understand the mode of action. Farmers can use RNA-based pesticides in the same way they have been using chemicals but without the harmful side effects.



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The next wave of pest management is all about working with nature and understanding biology in a way that considers humanity and the environment but still works within the current agricultural system.

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## The Opportunity

RNA for pest management is currently on the cusp of becoming a scalable reality. With EPA approval on the horizon, the first RNA pest control products will hit the market in 2022. These products are effective, price competitive and much less environmentally problematic, making them poised to fill the void of the contracting chemical pesticide industry.

The global crop protection chemicals market was estimated to be valued at [\\$63.7B in 2020](#). Once it is clear there are other effective options we could see increasing pressure to ban some of these chemicals, creating more opportunity for RNA solutions to capture market value.

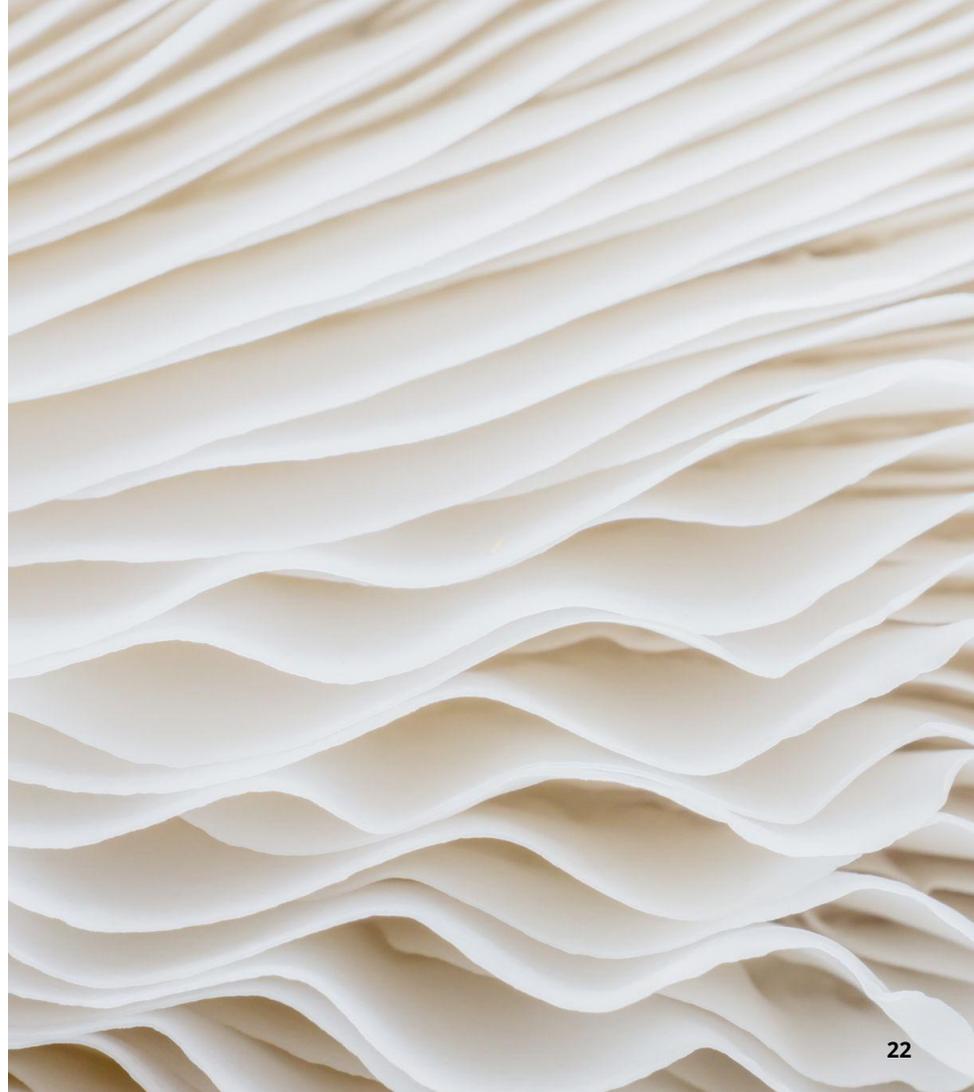
According to Matthew Walker, Managing Director at S2G Ventures, “The next wave of pest management is all about working with nature and understanding biology in a way that considers humanity and the environment but still works within the current agricultural system. Biologicals are moving in to fill that vacuum.”



# Supply Chain Disruption Accelerates Food Innovation

## 05 | Fermentation

Fermentation will power  
the next generation of  
alternative protein products.





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## What's Driving Change

Conventional animal agriculture requires large amounts of land, energy and water and contributes to emissions, soil and water degradation, and deforestation. Additionally, consolidation within the meat industry has increasingly concentrated power and profits in the hands of a few companies, at the expense of farmers, communities and consumers. This consolidation also makes meat production very vulnerable to supply chains disruptions as we witnessed over the course of the pandemic. The environmental impacts associated with wild caught and inefficient fish farming operations commercially are having negative impacts on our oceans and communities around the world. Conventional land and sea-based farming cannot sustainably scale with the growing population.

These factors have sparked interest, innovation and investment in alternative proteins. While there has been great progress in plant based alternatives to meat, dairy, seafood and eggs, these products still face a number of formulation challenges. Many are still struggling to offer the the taste, sight, smell, and touch that consumers associate with animal proteins and some products are receiving mounting criticism due to their long ingredient list and nutritional content. And while the last decade has seen incredible advances in alternative protein development, a number of obstacles still remain including high raw material costs and limited manufacturing scale.

## The Technology

The [Good Food Institute states](#) that “In 2020, fermentation joined plant-based and cultivated proteins as the third technological pillar of the alternative protein revolution.”

The combination of the indigenous wisdom of traditional food fermentation, the lessons of scale taken from biofuels, the precision honed by pharmaceuticals, and the recent success of the plant-based meat industry has made fermentation a leading tool for using microorganisms to produce alternative proteins, fats and other components. The adaptability and versatility of fermentation enables it to be utilized across the whole alternative protein landscape forging new product categories while enabling plant-based and cell-cultivated approaches to meet consumer expectations for taste and price.

Plant-based products can be improved through traditional fermentation which can optimize their taste, texture, sensory, digestibility and nutrient content. Biomass or precision fermentation ingredients can be combined with plant based ingredients to create superior products. For cultivated proteins, precision fermentation can help efficiently and precisely grow large biomass and high quality functional ingredients, an essential element for making cultivated products economically viable.



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We are witnessing the reinvention of fermentation - to a future that will push the boundaries of biology by creating new foods and medicines that will be more precise, healthy and more sustainable.

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## The Opportunity

The vast biological diversity of microbial species combined with virtually limitless capabilities in biological synthesis translates to essentially infinite opportunities for novel alternative protein products to emerge from fermentation-based approaches. [Over \\$1B](#) in investment capital has already been raised by alternative protein-dedicated fermentation companies. [\\$587 million](#) was invested in fermentation companies in 2020 alone, with 2021 breaking that benchmark.

We are going to see fermentation companies become sought after targets for big food and ingredient companies, manifested through partnerships and M&A. Many flashy business-to-consumer startups have taken root in the biomass fermentation realm while much of the activity in traditional fermentation and precision fermentation is happening in B2B, propelled by partnerships between innovators and established companies to rapidly commercialize and scale ingredient-based solutions. The opportunity for fermentation technology is completely untapped and fermentation will power the next generation of alternative protein products.

According to Sanjeev Krishnan, S2G Ventures Managing Director and Chief Investment Officer, "We are witnessing the reinvention of fermentation - to a future that will push the boundaries of biology by creating new foods and medicines that will be more precise, healthy and more sustainable."

## 06 | Cellular Agriculture

Cellular agriculture will provide consumers around the world with safe, sustainable food.

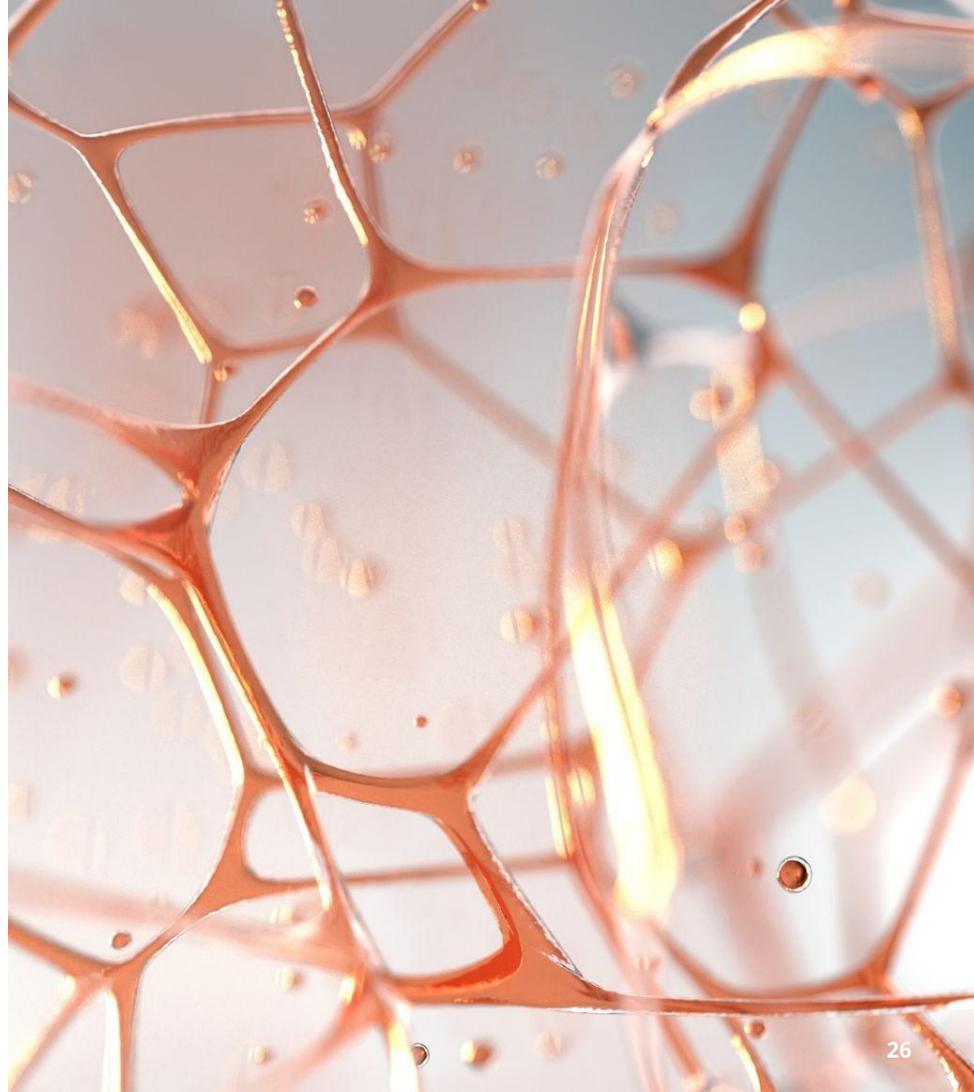




Image courtesy of Getty



Image courtesy of Getty

## What's Driving Change

One of the greatest challenges we currently face is the need to provide food for a growing population while reducing negative environmental impacts of conventional food production. Global fish consumption is projected to increase [nearly 80 percent](#) and global demand for animal protein [will double](#) by midcentury.

Raising animals for meat is an inherently inefficient process. More than [three-quarters](#) of agricultural land is used to support cows, pigs, and chickens but animal products provide only 18 percent of global food calories and 37 percent of protein. Livestock alone makes up around [14.5 percent](#) of global greenhouse gas emissions.

Additionally, the pandemic brought to the fore many of the weaknesses of our current food system with animal agriculture being one of the most hard hit sectors from supply chain disruptions. As national food sovereignty becomes more of a priority around the world, countries that don't have ample ranchland or access to abundant fisheries are looking for ways to improve access to animal products.

It has become clear that we must find alternative protein sources. While making great strides, plant based substitutes still can't offer the same sensory experience as a whole meat cut, which accounts for about [40 percent](#) of beef consumption and most of the chicken people eat.

## The Technology

Cellular agriculture is the production of agricultural products using cell cultures. The process of cultivating meat or seafood uses the same biological process that happens inside an animal and is therefore identical to meat at the cellular level. Cellular agriculture has a low feed conversion ratio, meets high standards of consistency and safety, provides the meat industry with independence from climatic and seasonal changes, avoids animal antibiotics, reduces the threat of emerging zoonotic diseases, and allows for selection of cell lines from animals with the best traits, all while delivering similar or identical taste, feel and nutrition profiles to animal proteins.

Prospective life cycle assessments indicate that cultivated meat will use substantially less land and water, emit fewer greenhouse gases and reduce agriculture related pollution. Additionally, it is a much quicker production timeline than animal agriculture. In the seven weeks it takes a farmer to raise a flock of 20,000 chickens, a meat cultivation facility could theoretically produce a million times as much meat from a starter culture the size of a single egg. While the cost of production is currently high, a well designed bioprocess has the potential to create sustainable affordable cultured meat.



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Economically viable cellular agriculture technology will be ready to come to market in 2022.

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## The Opportunity

The first cultivated meat burger was unveiled on live TV in 2013. Two years later, the first four cultivated meat companies were founded. The industry has now grown to more than [70 companies](#) that received more than [\\$360M](#) in investments in 2020. The cultured meat market size was valued at [\\$1.64 million in 2021](#) and is estimated to reach \$2.8 billion by 2030, growing at a CAGR of 95.8 percent from 2022 to 2030.

Cellular agriculture could constitute 35 percent of global meat consumption by 2040, according to the consulting firm, Kearney. It could create a decentralized and more personalized meat production system and have substantial implications for food security around the world by enabling meat and seafood products to be produced anywhere.

According to S2G Managing Director, Matthew Walker, “Economically viable cellular agriculture technology will be ready to come to market in 2022. Cellular agriculture could be a black swan event in our food systems given how much of our resources are devoted to animal and seafood products and the role they play in our diets.”

07 | Post Harvest Innovation

Adoption of  
food waste solutions  
will be recognized as both  
a good business practice  
and an essential tool for  
feeding the world.





Joaquin Corbalan - stock.adobe.com



Paul Mansfield Photography/Getty Images

## What's Driving Change

Feeding a growing world population with limited resources will come down to our ability to reduce food waste. [One third](#) of all food produced globally goes to waste at a cost of roughly \$1 trillion annually. [Up to 40 percent](#) of food in the US is never eaten while [1 in 8 Americans](#) struggle to put food on the table. Overproduction, bad weather, distribution issues, processing problems and unstable markets cause food loss before it arrives at the grocery store, while overbuying and confusion over labels contribute to food waste in stores and homes.

An enormous amount of resources and energy go into growing, processing, transporting and eventually disposing of all that food waste. This includes greenhouse gas emissions at every stage of the food system, plus water, fertilizer, labor, packaging and more. If food waste were a country its GHG emissions would rank third in the world after the US and China. Limiting food waste would conserve these resources. Reducing food waste by [just 15 percent](#) in the US could provide enough sustenance to feed more than 25 million people annually.

## The Technology

Since food waste involves a complex set of inefficiencies, we need a whole suite of innovations to address it. Companies focused on reducing food waste are working with everything from machine learning and image recognition to sensors and hyperspectral imaging. Chemical and biological sensors can be used for food monitoring and smart packaging to extend shelf life and improve overall food quality. AI and blockchain technologies can track waste, help retailers forecast demand more precisely and predict the freshness of harvest from the field through the supply chain. Apps and databases are enabling grocery stores and consumers to keep track of what they have in stock and connect with shoppers or donation opportunities if food is going to go to waste.



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Standards will be set  
and brands will be built that offer  
the customer a clear choice  
to support upcycling and  
the reduction of food waste.

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## The Opportunity

Bio-based coatings for crops, antimicrobials in active packaging, and digital tools to optimize supply chain management will become more common in the next few years. Upcycling, or using low valued foods or food processing byproducts to generate new food products, will also grow in popularity and consumers will be seeing more upcycled products in grocery stores. Upcycling turns wasted food into a goldmine and can add important characteristics like dietary fiber and antioxidant capacity to foods. As companies continue to realize the business need of reducing food waste there will be increasing investment and interest in technologies that help track inventory, preserve food, and connect to efficient donation opportunities. Public-private partnerships will also play an important role in accelerating food waste reduction technologies and programs.

"Technologies are being developed and applied to increase both productivity and full use of food in manufacturing and distribution," says Walter Robb, former co-CEO of Whole Foods and S2G Ventures Executive-in-Residence, "Standards will be set and brands will be built that offer the customer a clear choice to support upcycling and the reduction of food waste."



# Consumers Demand Better Food Choices and Experiences

08 | Discovery Platforms

AI and ML platforms will  
unlock greater understanding  
of and use cases for  
plants and fungi.





Image courtesy of Getty



Image courtesy of Getty

## What's Driving Change

Consumers are more and more educated about the connections between eating habits, health and environmental outcomes and are more open to eating different foods than they have ever been. They are looking for healthier, more nutrient dense and climate friendly foods as well as new and exciting food experiences. But the CPG industry spends dramatically less on R&D than other sectors.

Innovation in the food sector is not easy. Bringing novel ingredients and food experiences to market is hard at scale. The process involves long fragmented supply chains. Companies have to formulate the product, procure ingredients, do consumer tests, get the product to retailers, follow strict food safety guidelines and then market a low margin, low price point, highly competitive category product to consumers. Companies focused on bringing a single ingredient to market are vulnerable to the many friction points along that way that could bring down their entire business model.

## The Technology

Acquiring, managing and extracting insights from data has become easier for companies in recent years and the rise of technologies like AI and machine learning which have developed in other industries are now being applied to food, allowing companies to discover new solutions ranging from novel phytonutrients, functional and biomass proteins and low glycemic sugar substitute derived from mycelia fermentation. Decreasing costs and increasing efficiency of high throughput systems has further facilitated the use of computational platforms that can make rapid discoveries. These discovery platforms allow for faster, cheaper and more holistic analysis of big data to find previously undiscovered solutions for numerous applications accelerating product innovation. By analyzing massive amounts of data on plant and fungi components, these platforms can pinpoint new ingredients for specific functionalities and support the development of foods that have better health, environmental and culinary outcomes.



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Successful businesses will have  
platforms that can produce  
multiple revenue streams.

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## The Opportunity

AI and ML powered predictive platforms will enable us to dive deep into the biology and chemistry of the plant and fungi world to discover ingredients and interactions that can express specific traits in food and be used for new product development. This will allow us to create plant based foods that are better from a health or environmental perspective but have the same look, taste, touch and feel of foods that we are familiar with. It could also enable us to create entirely novel culinary products and expand the boundaries of how we experience food.

Companies building single product applications are being outflanked by the flexibility and breadth of discovery platforms. A single product is not enough anymore to build a company in the food space. Successful companies will have many opportunities or paths to commercialization which spreads the risk, accelerates the go to market, makes companies less vulnerable and reduces the amount of capital they need to raise if done right because certain products can subsidize other products. Many CPGs are also looking to work with companies that have the tools to support them in product development.

“In the past, multiple revenue lines in a startup was more of a concern,” says Chuck Templeton, MD at S2G. “But now, especially in the ingredient space, having multiple revenue opportunities has to be the norm both from a functional and health perspective.”

09 | Convergence of Food and Health

Food will become  
central to the effort to  
prevent chronic disease and  
improve health outcomes.





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Christine - stock.adobe.com

## What's Driving Change

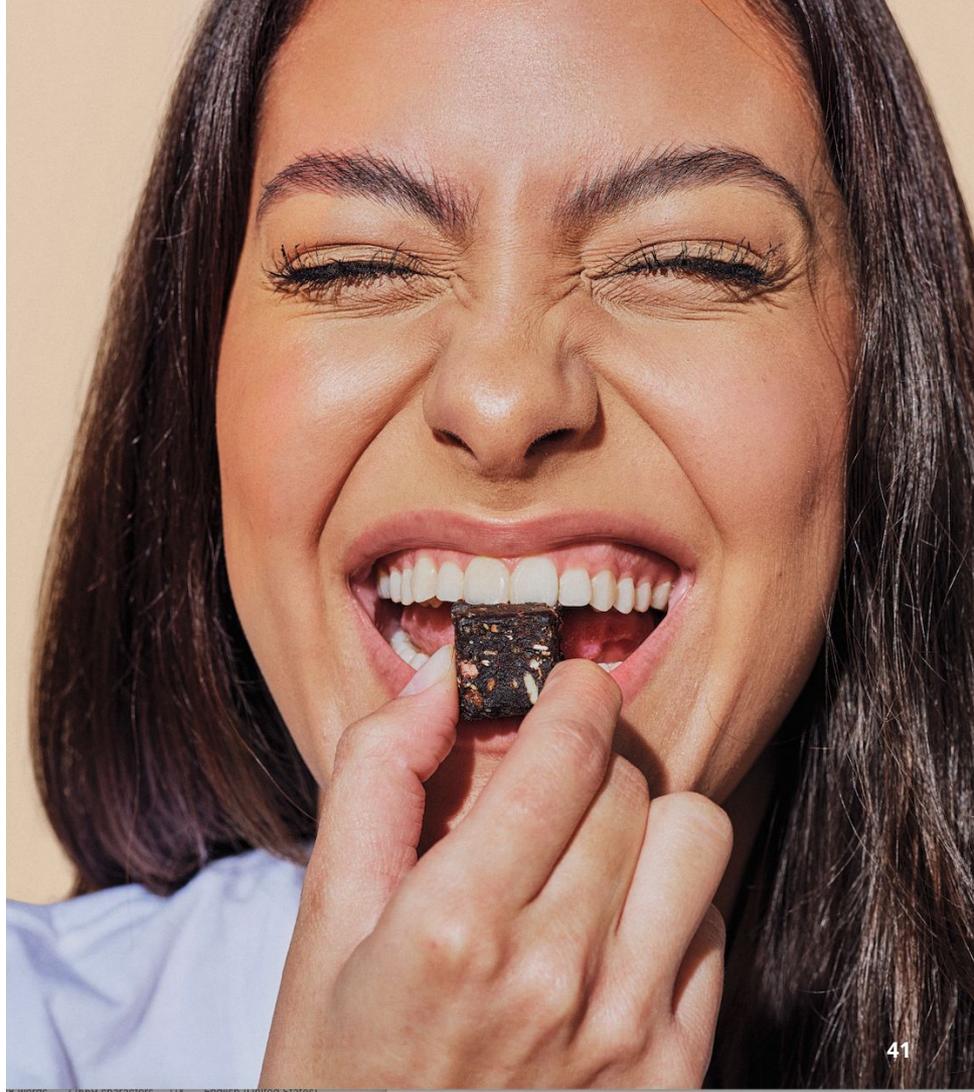
We are currently in the midst of a national health crisis. [121.5 million](#) or 48 percent of adults in the US have cardiovascular disease which is the leading cause of death in the US. In the last 30 years, obesity rates have [doubled](#) in adults, tripled in children and quadrupled in adolescents. Obesity is the underlying cause for many diseases such as type 2 diabetes, heart disease and stroke. A study conducted by the Milken Institute found that chronic diseases driven by obesity and overweight risk factors accounted for \$480.7 billion in direct health care costs in the US with an additional \$1.24 trillion in indirect costs due to lost economic productivity.

At the same time, consumer awareness of nutrition and how it influences physical, mental and emotional well-being has been growing and has only been heightened by the pandemic. Covid-19 has spurred a shift to more time spent living, working, eating and cooking at home. According to research from CPG marketing and sales firm Acosta, 92 percent of families plan to eat together at home more often post pandemic than they did before. As a result, people are more in touch with what they are eating, how to prepare it and how central food is to family time and connection. Consumers are embracing a more holistic understanding of food and are looking for foods that will help them prevent, manage or treat a wide array of conditions.

## The Innovation

Modern nutrition science and technology is providing us with an increasingly nuanced understanding of the functions and mechanisms of specific food components in health promotion and disease prevention. Food and nutrition technology solutions can offer evidence based guidance to combat poor eating habits, obesity and chronic health conditions and enable companies to produce nutrient or functional ingredients for specific desired outcomes.

Personalized nutrition uses machine learning and “omics” sciences to analyze what people eat and predict how they will respond to it. Scientists, nutritionists and health care professionals can take this data, analyze it and use it for a variety of purposes such as identifying diet and lifestyle interventions to treat disease, promote healthy lifestyles and enhance athletic performance. Personalized nutrition interventions, as well as companies improving healthy food access and good for you brands will become increasingly relevant as we continue to unlock the connections between diets and health outcomes and understand the specific healing and preventative capabilities of food.



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The convergence  
of food and healthcare explores the  
clinical and pharmacological impact  
of food and food derivatives.

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## The Opportunity

Our current healthcare system is incentivized to treat disease and cancer instead of focusing on prevention or management through non-pharmacological means. A more recent trend towards value-based care is incentivizing federally-backed programs and self-insured plans to improve the overall health of members and aim to prevent acute adverse health events. We think this means greater attention and more capital allocated to preventative measures, such as food and other lifestyle factors. As food and healthcare converge, we expect a deepening understanding of the correlation and causation of food and its impact on human health.

According to Dan Ripma, Vice President at S2G, “The convergence of food and healthcare is still nascent, and a widely undefined sector. Our view is that it goes beyond better-for-you products and really explores the clinical and pharmacological impact of food and food derivatives. We see early opportunities in this sector and see a highly complementary addition to the existing healthcare system.”

10 | Personalization

Food brands and grocers  
will have to  
“personalize or perish”.





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Sundry Photography - stock.adobe.com

## What's Driving Change

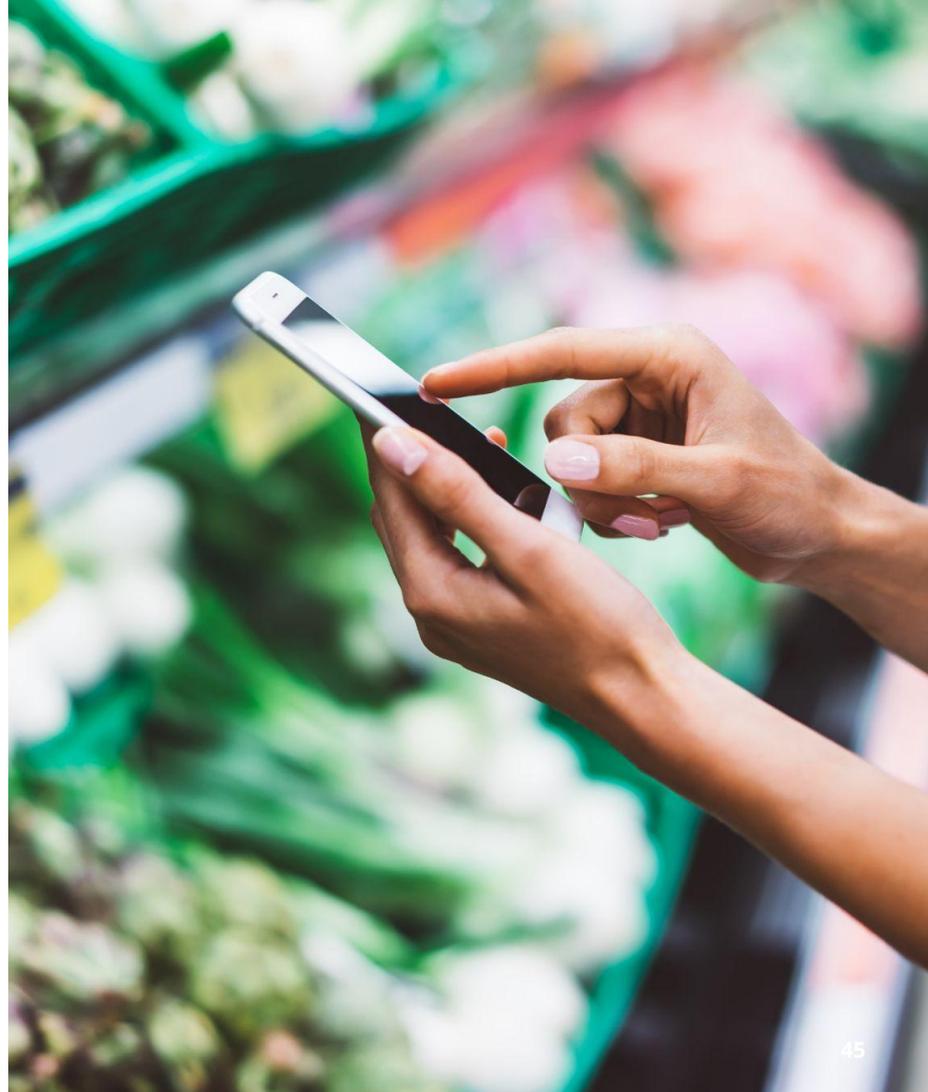
A survey conducted by Epsilon and GBH Insights found that 80 percent of respondents want personalization from retailers. This trend was already occurring with customers growing accustomed to digital experiences offered by companies like Amazon and Netflix. But the pandemic progressed the demand for personalization dramatically by shifting shopping habits. The rise of food delivery and last mile solutions as created viable new shopping options for a wide range of consumers. Participation in online grocery skyrocketed in 2020, transforming expectations to the point where customers demand a highly personalized experience across the board.

Today's households are eating in increasingly personalized ways as they pursue different aspirations for eating well. But with ever increasing options available, choosing between brands and types of foods has become almost debilitating. Consumers want to make good choices but don't have the time to research all the options.

## The Technology

While personalization in retail grocery has traditionally referred to the targeted use of marketing dollars, data insights are pouring into every area of grocery retail from private label development to internet strategies and customer acquisition. Many B2C companies are trying to collect vast amounts of data from different sources to build recommendation engines and serve individual customers.

For this to happen, access to high quality, reliable and trustworthy customer data is essential. Today, companies can unlock insights from all sources—web, app, CRM, payments and more—to get to know their customers and create continuous, unique customer experiences to meet their needs. One of the advantages of emerging AI technologies is the ability to process massive amounts of data with incredible detail, enabling companies to perform customer segmentation with enough granularity to achieve one-to-one relevancy. Businesses have not only developed the capabilities to measure specifically what each customer wants but they have the ability to link their processes and resources to provide it through flexible manufacturing and distribution technologies.



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The new frontier in food retail is a deeper understanding of the customer journey, including 'personal personalization', which will unlock immense growth for relationships with consumers, as well as innovation in products and services necessary to serve them.

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## The Opportunity

Brands will need to rethink how they collect and manage data, process data meaningfully in real-time, build seamless cross-channel experiences and let customers know that they understand them in a way that resonates. The move from segmentation to personalization is still in its infancy in the food sector but will progress and allow for multi-objective optimization where companies can optimize for the consumer by factoring in their budget needs and health objectives while also optimizing for themselves by making sure they are meeting their gross margin targets and building loyalty.

Businesses that embrace personalization have an opportunity to create a differentiated proposition that may receive a price premium and improve consumer traffic and conversion. Personalization could also help companies become more efficient and reduce costs, thereby offering a path for sustainable growth.

"Personalization is rapidly becoming table stakes for a successful relationship with the customer, says Walter Robb, former co-CEO of Whole Foods and S2G Ventures Executive-in-Residence, "The new frontier now emerging is a deeper understanding of the customer journey, including 'personal personalization', which will be the unlock for the growth of both business and relationship with the customer, as well as the innovation in product and service necessary to serve it."

2022 is here, and with it comes new changes and challenges arriving at a faster pace than ever before.

We believe the ten trends covered in this report represent a deeper underlying shift - an acceleration, awakening and realization - that food and agriculture represent meaningful and powerful investment opportunities to improve the environmental and social health of individuals, communities and our planet.

A vertical bar of ten hexagonal icons, each with a different color and orientation. The colors transition from light brown at the top to dark blue at the bottom. The icons are arranged in a vertical line, with the top one pointing up and the bottom one pointing down.

01 | Robots

02 | Digitization

03 | FinTech

04 | RNA

05 | Fermentation

06 | Cellular Agriculture

07 | Post Harvest Innovation

08 | Discovery Platforms

09 | Convergence of Food and Health

10 | Personalization



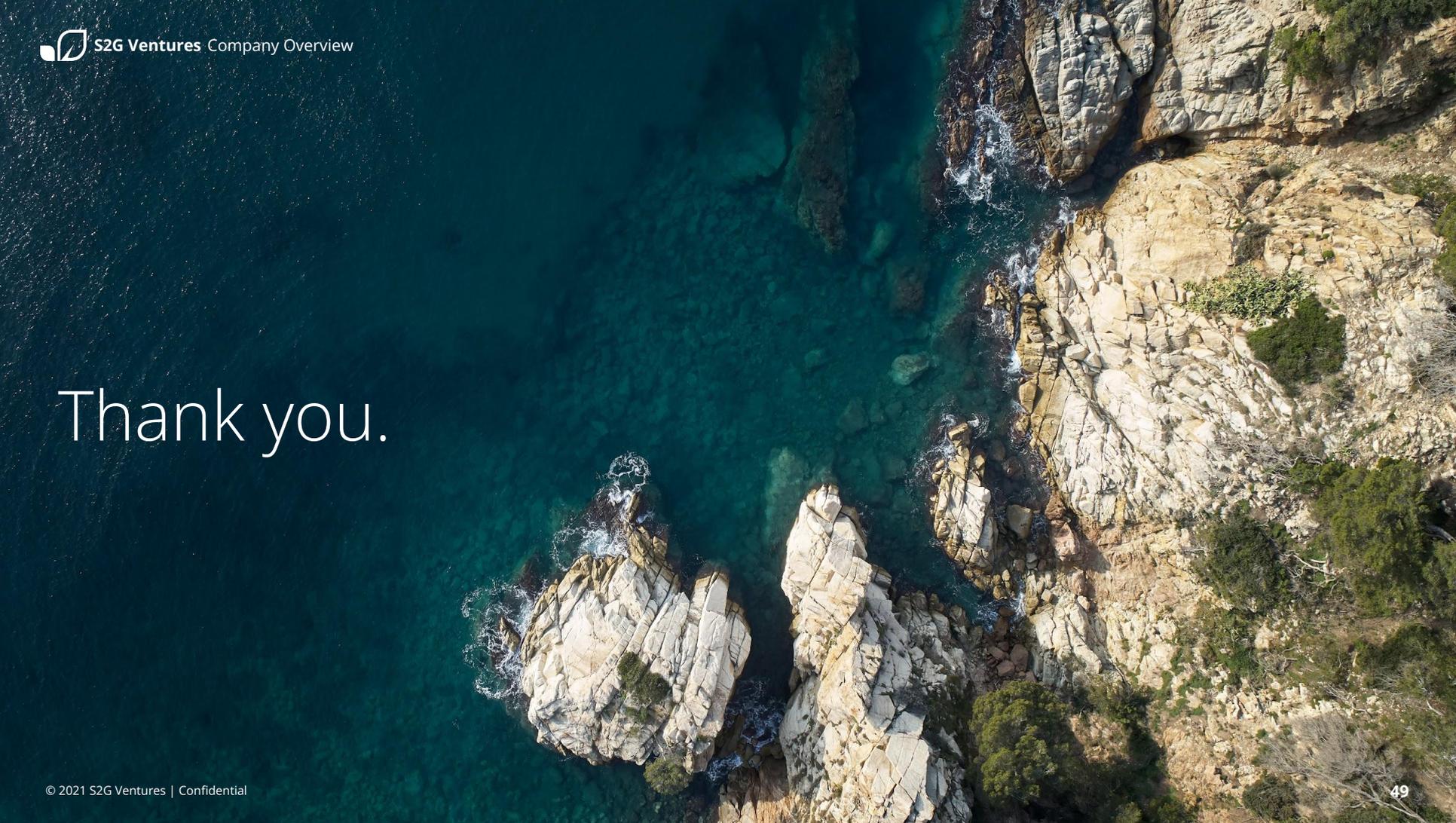
# Connect with us

We want to work with you. Implementing more sustainable technologies and business models from soil to shelf, we're working toward healthier people and a healthier planet driven by a healthier food system.

We hope you'll join us.



## Where We Grow From Here



Thank you.