



Byte-Sized Revolution

How cutting-edge tech is transforming the way we eat

A 2024 ADM Global Consumer Trend Series

Episode 3

What's For Dinner? Data.



Understanding the impact that technology is having on consumer trends is essential for modern businesses to thrive.

From increased connectivity and information access to advancements in artificial intelligence and hyper-personalization, new technologies are accelerating change and heightening expectations among consumers. A deep understanding of consumer wants, needs, attitudes and behaviors related to technology's impact on food and wellness products allows businesses to keep pace with current consumer-driven trends and anticipate where they are headed in the future.

As an industry leader in global consumer trends, ADM can help you apply this knowledge to innovation, in order to create products and services that resonate with consumers' ever-changing considerations and aspirations.



**Technology is rapidly altering the way consumers engage with food.
Is your brand ready for this byte-sized revolution?**

Technological acceleration is a macro force changing how global consumer trends are expressed in the marketplace

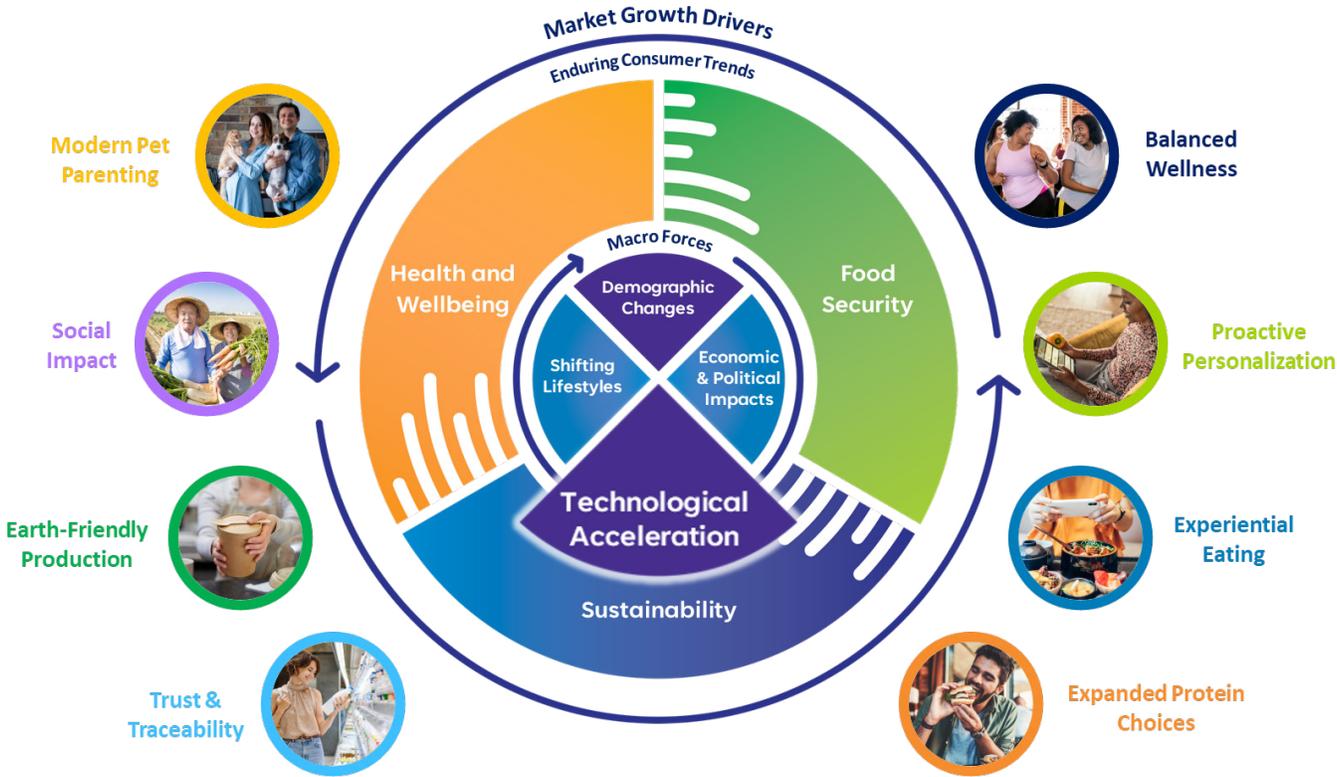
Based on in-depth proprietary research and a network of TrendXplorers around the world, each layer of the framework is key to understanding consumer behavior:

Macro forces: broad cultural shifts that impact across societies, markets and industries.

Enduring Consumer Trends: unifying principles that shape consumer demand for products and services.

Market Growth Drivers: A dissection of larger trends that highlight consumer attitudes, expectations, and behaviors which serve as starting points for brands to prioritize opportunities for innovation.

Global Consumer Trends Framework



[Learn more about global trends @ ADM.com/trends](https://ADM.com/trends)

Harnessing the power of the framework, ADM's Global Consumer Trend Series delves into 4 key areas that are rapidly transforming due to technology

These areas represent emergent shifts in consumer and industry behavior where technology is playing a transformative role.

This is Episode 3: What's For Dinner? Data.



Unapologetic Flavor & Color Experiences.

Multisensorial eating like never before



Replacement Isn't the Future. Variety Is.

Expanding food choices to meet lifestyle goals



What's For Dinner? Data.

Optimizing everyday personal performance through data



The Next Big Tech Boom? It's on the Farm.

Transforming agriculture with next gen technology

Episode 3

What's For Dinner? Data.

Growing interest in hyper-personalization, for both consumers and their pets, is being facilitated by smarter and more accurate technologies that involve listening to the physical, mental and emotional aspects of the body, and tailoring food and beverage choices to meet those needs.

From discovering insights around personal health to helping us decide what and even how we eat, technology is being used to create personalized food and beverage solutions to empower consumers to achieve their goals, cater to specific taste, flavor and texture preferences, and enjoy unique dining experiences.

“I think technology has played a big part in our day-to-day food lives, and I’m happy for it. There was not much information 20 or 30 years ago. The only information you could really have obtained from a product would have been on the box itself. Now, you can read up on certain things. Like, we’re more health-conscious. We can pretty much analyze what we’re eating, things that were pretty much overlooked in previous years.”

—Yamil M., 46, U.S.

Enhancing Health Monitoring

Wearables, apps and other digital devices provide personal health insights which influences food, beverage and supplement choices.

Promoting Smarter Shopping

Tech-based innovations are utilized for personalized shopping and meal planning.

Personalizing Nutrition

Ultimately, consumers are creating personalized approaches to eating to find out what foods and beverages make them “feel good” physically and mentally.

Humanizing Pet Care

Consumer interest in personalization extends to pets for longer, happier lives.

Elevating Multi-Sensory Dining

Technologies allow consumers to participate in engaging experiences in and out of the home.



#1: Enhancing health monitoring

Artificial intelligence and machine learning are increasingly powering devices and apps that track all aspects of health and wellness, helping consumers learn more about their own bodies to develop healthy habits and lifestyles.

Wearables: While most wearable devices to date —whether oriented around exercise, meditation, or sleep—have focused on measurement, the new generation of these devices will be differentiated by real time insights as well as functions that act directly on the body. For example,

- The Dexcom G7 glucose monitor provides in-the-moment insight into how the body responds to different foods and activities and claims to be the only continuous glucose monitor to predict when insulin levels will be low.
- Apollo Neuro is a wearable that emits vibration patterns intended to stimulate the nervous system in various ways, to encourage better sleep, enhanced focus, comfort in social settings, and more.
- Unlike traditional wrist-worn wearables, the Oura Ring is a smart ring that tracks sleep, activity, stress and heart health, focusing on providing insights into sleep quality and recovery.

Apps & other non-wearables: As AI continues to improve apps and other non-wearables that track mental health, weight and other aspects of nutrition, they will require less manual input from consumers and be more predictive in nature:

- Nuvilab uses AI and 3-D food scanning technology to determine the nutritional value of a meal without weight measurement.
- Smart toilets from Withings and Vivoo monitor for disease, hydration and vitamin levels.
- Sony's REON POCKET 5 is a wearable climate controller that helps users augment how they feel in any conditions, accelerating either cooling or warming, for optimal comfort.

So what?

Wearables, apps and other tracking devices not only provide personalized insights to consumers, but in turn, influence how and what they eat and the supplements they take.



23%

of global consumers monitor their diet using mobile apps

[22% NA - 23% Europe - 22% Aipac - 28% Latam]

Source: FMCG Gurus, Personalized Nutrition Report, 2024

21%

of US consumers use apps or devices that help them with their mental health.

[e.g., Moodkit, Headscape, Calm; 35% among Gen Z]

Source: Hartman Group, Food & Technology Report, 2023

76%

of Chinese consumers agree that health tech products can prompt users to adopt a healthier lifestyle

Source: Mintel, Health Tech China, 2023

22%

of German consumers say that they would be comfortable following AI recommendations on medical issues

[e.g., AI giving diagnoses or suggesting treatment]

Source: Mintel, Digital Lives of Consumers, 2024

40%

of US adults monitor their blood glucose level regularly at home with a device

Source: ADM OUTSIDE VOICESM, Blood Glucose Control Study, 2023

#2: Promoting smarter shopping

Retailers and brands are utilizing technologies such as AI and advanced algorithms to more accurately target consumers' highly personalized needs and preferences while shopping and meal planning.

Retail offerings, personalized: AI is driving a vast array of personalized services, ranging from coupons and digital ads to recommendations based on taste and dietary preferences. Examples include:

- Online retailer Hungryroot utilizes AI to predict shoppers' preferences, including auto-filling shoppers' carts with ingredients, claiming that 72% of all items purchased are chosen by the algorithm¹; Halla's "taste" intelligence technology can recommend food items.
- Humane's AI Pin is a wearable multi-modal device that acts as your personal assistant, allowing you to seek answers, take notes, send messages and even entertain you with music and other features.
- In-store or at-home, QR codes from brands such as Ovo Farms can provide insight into the products' nutritional value and/or supply chain for enhanced traceability and trust.

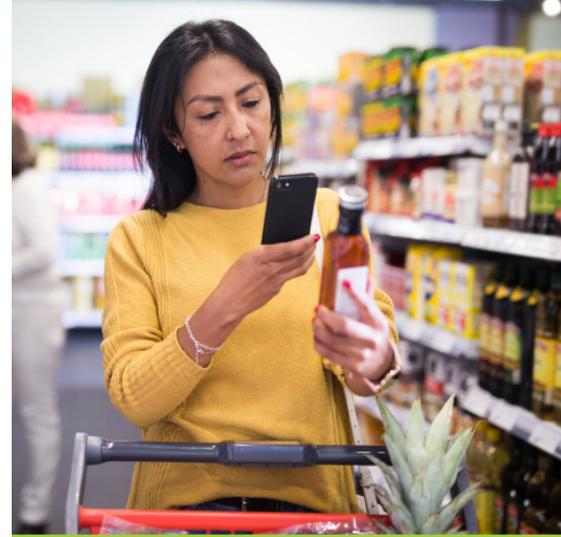
Tailored and convenient: Consumers are turning to personalized food and supplement solutions delivered straight to their door.

- Meal kit companies such as HelloFresh use AI to predict which menu options will be most appealing (both by eating approach and taste), based on previous menu selections.
- Nourished uses 3D printing to create personalized gummies designed for individual health and lifestyle needs.
- Kroger & GE Appliances are partnering to offer consumers a way to discover recipes and swiftly shop for ingredients and cook through a new feature for select WiFi connected appliances.

So what?

While data privacy is a concern, many consumers understand they need to share some information in exchange for personalized benefits and services or cost savings on groceries — and are willing to do so as long as they find the exchange valuable.

¹Nielsen IQ's The Future of Retail Webinar, 2024.



51%

of global consumers would be willing to use AI to help customize their diet if they felt it could positively contribute to their health

[48% NA - 49% Europe - 50% Aipac - 69% Latam]

Source: FMCG Gurus, Personalized Nutrition Report, 2024

51%

of German consumers use app-based loyalty schemes

[e.g., Lidl Plus, MyMcDonalds]

Source: Mintel, Digital Lives of Consumers, 2023

45%

of US grocery shoppers find very/extremely appealing the use of AI to get personalized rewards and recommendations, 58% among consumers under 45 years old

Source: Dunnhumby, What Grocery Shoppers Want Most From AI, 2023

66%

of Japanese consumers want offline stores to offer augmented reality (AR) experiences

Source: Threkit, 23 AR Statistics You Should Know, 2023

#3: Personalizing nutrition

Many consumers believe their bodies' unique needs should be met through a special or customized diet. They often experiment with a variety of tech and food options, learning what works for them and what doesn't, combining or adjusting approaches as they continue through their wellness journey.

Scientifically tailored options: Consumers are turning to customized food and beverages to meet specific needs related to health conditions (e.g., diabetes, heart health, performance, microbiome needs).

- WeightWatchers has launched a new membership to support members taking GLP-1 drugs, ensuring they get the nutrients needed and providing other services like insurance coordination and access to doctors.
- Tesco teamed up with the British Heart Foundation and Diabetes UK to create recipes that are heart and diabetes friendly.
- The hDrop Gen 2 sensor is capable of analyzing biomarkers in sweat to provide actionable hydration data.

Science- and tech-driven hyper-personalization:

Companies across the globe are using consumers' DNA and other biomarkers to create a customized meal or nutrition plan based on their genetics and personal goals. The analysis can help consumers better understand how their bodies process certain nutrients in order to make more informed choices.

- GenoPalate and Nutrigenomix both promote personalized nutrition plans crafted based on your DNA/Genetics.
- DNA 360 also includes personalized recommendations for supplements, exercise and mental health plans.
- Vita-Cam, an app developed by students at Ajman University, utilizes AI to diagnose potential vitamin deficiencies through photographic analysis.

So what?

Regardless of the technology used, feedback from consumers' own bodies is an essential source of information to evaluate how well an eating approach/diet is working (e.g., how do they "feel" physically and mentally). If the sensory experience (flavor, aroma, color and texture) is unappealing, consumers will be less likely to commit to the approach.



59%

of global consumers are interested in food & drink products that are customized to meet their individual nutritional needs

[55% NA - 57% Europ - 57% Aipac - 77% Latam]

Source: FMCG Gurus, Personalized Nutrition Report, 2024

58%

of Polish consumers agree that what a "healthy diet" looks like depends on a person's biology, such as DNA and gut microbiome

Source: Mintel, Attitudes Toward Healthy Eating, 2022

51%

of global consumers are open to having their DNA tested to develop a personalized nutrition plan

[37% NA - 43% Europe - 54% Aipac - 62% Latam]

Source: ADM OUTSIDE VOICE™, Global Lifestyle Research, 2023

54%

of Brazilian consumers believe that health & wellness (e.g., personalized diets, exercise plans) is one of the areas in which AI will be used more often in the coming years

Source: Mintel, Attitudes Toward Technology and the Digital World, 2023

#4: Elevating multi-sensory dining

Consumers want food to be more than sustenance; they want to participate in engaging experiences with brands and restaurants at home and dining out. Technologies are helping facilitate that.

In home: From social media to AI/ChatGPT, consumers are utilizing technology for recipes that help inspire creativity, enhance variety, address specific food restrictions/requirements, and reduce food waste by using on-hand ingredients/leftovers. Advancements in “smart” appliances are particularly useful when they align with their personal values and goals.

- Consumers can scan a QR code on Tovala’s meal kit to have their “smart” oven cook it to perfection.
- Samsung’s smart refrigerators can alert consumers when they are running low on a specific item or if an item is close to its expiration date.
- The Meal Reveal app helps users come up with creative methods to transform unused ingredients into enticing dishes that reduce waste and inspire fresh culinary experiences

Out of home: Whether it’s making the ordering process easier through the use of QR codes or creating an immersive experience through virtual reality, foodservice establishments across the globe are utilizing various technologies to make dining out more engaging.

- TikTok videos featuring chefs, such as those from pastry chef Magri Alberto, can create a more immersive “behind the scenes” experience for diners before they even enter a restaurant.
- Augmented and virtual reality provide virtual tours of restaurants’ origins, farm to table journeys and in the case of Spain’s Sublimotion, even imaginary worlds.
- The Fat Duck and Banquet of Hoshena use tabletop projection mapping that projects interactive images onto dining tables, creating an engaging dining experience with dynamic visuals.

So what?

Whether consumers are eating in or out of the home, advancements in technologies are enabling new types of food experiences, including those that enhance enjoyment or blur the lines between real and digital life.



78%

of global consumers believe that food is all about enjoying a multi-sensorial experience (taste, smell, texture, sounds, etc.)

[76% NA - 73% Europe - 77% Aipac - 83% Latam]

Source: ADM OUTSIDE VOICESM, Global Lifestyle Research, 2023

68%

of US consumers are interested in purchasing a smart device for the kitchen

[86% among Gen Z and 85% among Millennials]

Source: Hartman Group, Food & Technology report, 2023

67%

of Brazilian consumers are interested in using virtual reality (VR) technologies; 66% in augmented reality (AR) tools and 58% in having metaverse experiences

Source: Mintel, Attitudes Toward Technology & the Digital World, 2023

27%

of foodservice operators in the US agree that in time, AI will be better than humans at creating recipes and preparing food

Source: Datassential, AI: The Operator Perspective, 2023

#5: Humanizing pet care

Consumer interest in personalization also extends to their pets as owners increasingly strive to customize animals' health routines/diets to give their pets the healthiest and happiest lives possible.

Pet health tracking: Wearables, such as smart collars, can track pets' activity, sleep and current location, while AI and machine learning can help enable pet parents to determine a pet's mood – whether it's happy, sad or in pain – and track indicators of potential health issues. Examples include:

- AI enabled voice recognition technology (via a wearable collar) from Petpuls monitors dogs' barks and movement so owners can better understand what their pet needs.
- Using machine learning algorithms, Sylvester.ai helps owners better understand their cats' health by interpreting their facial cues, whether it's following a medical procedure or day-to-day wellness management.
- The Cudii smart dog bed provides an array of features tailored to enhance the pet's wellbeing, including health monitoring, sleep tracking and temperature adjustment.

Personalized eating: New pet foods, supplements and smart devices have emerged to help tailor wellness behaviors to the animal's breed, age, specific nutritional needs and underlying health conditions.

- Iams has partnered with Wisdom Panel DNA to identify needs for specialized or preventatively prescribed diets.
- FitBark helps pet owners track their pets' activity, sleep quality, calories burned and other health and behavior metrics used to adjust feeding amounts and dietary needs.
- Automated pet food dispensers, like the Feeder-Robot by Whisker, and accompanying apps can allow pet parents to feed their pets remotely. The Pet Piano Smart Feeder even rewards pets (and their pet parents) with some music.

So what?

Because pets often do not show symptoms until health issues have progressed, innovations that provide insights into how pets are feeling and functioning can enable owners to proactively identify health issues much earlier than they otherwise would have.



50%

of global pet owners are open to having their pet's DNA tested to develop a personalized nutrition plan

[41% NA - 38% Europe - 57% Aipac - 53% Latam]

Source: ADM OUTSIDE VOICESM, Global Lifestyle Research, 2023

46%

of UK pet parents are interested in using technology to help manage their pet's weight

[e.g., activity or nutrition trackers]

Source: Mintel, Pet Food Report, 2023

22%

of Colombian dog owners would be interested in purchasing smart beds to help monitor their pet's sleep activity

Source: FMCG Gurus, Dog Health Report, 2022

6%

of US cat litter users report having used health-monitoring litters

Source: MRI Simmons, Summer 2023 Survey, 2023

Personalization is the future, and ADM can help turn rapid technological advancements into growth opportunities.

Advancements in AI and technology are empowering consumers to make more informed decisions in their journey to personalized nutrition.

ADM has the tools to help you harness these advancements and create products that keep up with consumer demands:

- A direct line to consumer trends around the globe monitored via our team of TrendXplorers
- A robust supply chain that lays the foundation for unparalleled ingredient portfolios in human and animal nutrition
- Culinary ingenuity for a holistic, inspired approach to product development in an array of categories
- Technical expertise that unlocks breakthrough innovations and end-to-end capabilities
- Continuous investment in the technologies of tomorrow through ADM Ventures

Stay tuned for upcoming episodes...
this is a Byte-Sized revolution you won't want to miss!

Learn more @ADM.com/trends



1 Unapologetic Flavor & Color Experiences.



2 Replacement Isn't the Future. Variety Is.



3 What's For Dinner? Data.



4 The Next Big Tech Boom? It's on the Farm.