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How emerging ingredients, innovative processes, and changing consumer preferences are shaping the alternative protein landscape

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An Ever-Changing Landscape

In the spring of 2020, Griffith Foods released a report called "From Movement to Mainstay: How Plant-Based Proteins are Changing the Game for Good." It detailed the changing consumer preferences that were bringing meatless options to the forefront, the misconceptions about plant-based food offerings across sectors, and the crucial actions processors must take to keep up in a changing industry.

Much has changed since then. We've undergone a global pandemic, turning the industry on its head and bringing the need for new and innovative food systems front and center. And today, even more protein options are popping up — with many even looking beyond plants to derive their ingredients.

While the methods for processing and creating alternative protein are constantly evolving, what hasn't changed is the need to prepare for feeding a growing world population, while conserving resources to protect our planet. It's predicted that the world will have nearly 10 billion mouths to feed by 2050 — and traditional livestock- and emissions-heavy operations won't cut it.

In this paper, we take a "Now, Next, Future" approach to surveying the alternative protein landscape, calling on insights from culinary technologists, food scientists, nutrition specialists, and global business development experts alike. From novel ingredients and innovative processes to lab-grown protein at scale, we'll explore how the area of alternative protein is heating up around the world — and what processors and food development innovators can do to play their part.

"It's an exciting time — one of the more exciting I've seen in the food industry."

JACKIE SCHULZ, MS, RD

GLOBAL NUTRITION DIRECTOR, GRIFFITH FOODS

The Driving Forces Behind Alternative Protein Innovation

Just 10 years ago, the alternative protein shelf was low on options and high on price. Today, it has grown tremendously, influenced by consumer preferences for healthier, more sustainable food; meat shortages driven by COVID-19; and planning for a more populous future. In addition, the industry has been hard at work to provide more alternative protein options and variety, as well as higher quality products.

• Consumer Demand

Plant-based protein has been hot on the minds of consumers in just the past five years, influenced by new meatless fast food innovations, social media, celebrity chefs, and a surge of niche cooking shows. But it's not just vegetarians who are interested. The biggest opportunities for alternative protein are in a new category of "flexitarians" who take a balanced, "half and half" approach to incorporating plant-based offerings into their typically meat-focused diet. For these consumers, alternative proteins offer the perception of better health and nutrition, a way to support sustainability, and a break from the monotony of traditional meat. The easiest way to sway them? By replicating the products they already know and love.

• COVID-19

In the midst of meat shortages caused by COVID-19 outbreaks in processing plants, as well as obstacles across the global supply chain, the start of the pandemic saw retail sales of alternative meat jump in addition to greater dependence on stable and accessible mediums like tofu. Not only were beef, chicken, and pork not as readily available, but quarantining forced consumers to cook for themselves, reassessing their nutritional intake. And because those who are overweight or diabetic were at a higher risk of severe illness from COVID-19, the desire to look beyond traditional fatty meats was even greater.

Thankfully, more meat processors are dipping their toes in the alternative protein space — but the majority of them have little experience in the field. While early innovators are ahead on market presence and addressing the health and sustainability goals of alternative protein consumers, traditional meat processors are playing catch-up, scrambling to understand the sector and retroactively address market needs. Will their size and access to resources allow them to catch up? Or are they merely players in a space dominated by companies focused solely on alternative protein innovation?

Now

Novel ingredients and plant protein innovation

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NOW

New Processes

The current landscape of the alternative protein space is teeming with innovators, start-ups, and scientists, all experimenting with new options for food that's healthier for the body and planet.

Not only have novel protein sources like algae and duckweed become more viable, but new processes are emerging that make plant-based meat more palatable, juicy, and flavorful. This includes everything from a natural smoke process that eliminates carcinogens and acrylic taste to repurposing pet food machines for plant-based food by infusing air pockets in substrates to better melt fat and spread flavor.

One of the most promising developments remains extrusion processing. While plant-based burger and chicken patties have been commercially sold since the 1990s, these processes are making it easier to replicate whole muscle products by turning vegetable protein into a more fibrous, animal-like texture — opening up the possibilities for new mediums. The process of dry extrusion includes pre-combined ingredients with low moisture and does not typically include fats. Wet extrusion, however, uses more water during processing and incorporates fats alongside dry ingredients. First popular in Russia and parts of Europe, extrusion processing is now popping up in the U.S. But these processes are by no means perfect. Replicated chicken muscle is often too tan in color compared to the real thing, turning off customers who are used to the paler look of cooked muscle.

"Clean Label" Foods

Consumers are seeking foods with shorter ingredient lists and less processed additives. But no regulations currently exist for defining or monitoring "clean label" foods in the U.S. or U.K., holding stores, brands, and restaurants accountable instead. This is primarily because regulators already play an instrumental role in ensuring the ingredients are safe to consume. While there are ongoing discussions about changes in policies surrounding hydrogenated oils or "ultra-processed foods" (loosely defined as "formulations made from substances derived from foods and additives"), regulations remain focused instead on foods that are high in fat, sugar, and salt (HFSS) as opposed to those with "unclean" ingredients.

"Consumers want to see ingredients on the label that they recognize instead of gums and binders that sound very chemical," said Danielle Franchetti, Senior Food Scientist at Griffith Foods. It's important to remember that everyone's nutrition needs are different, and there's no silver bullet to meet them all. That's why flexible food development is so important, producing food that is nutritious and accessible for all types of consumers.

NOW

Reinterpretation of "Center of Plate"

Today's alternative protein landscape is also experiencing a mindset shift in terms of what a nutritious meal consists of.

American standards for a full plate have traditionally included a "centerpiece" of meat with smaller side dishes of vegetables and starches around it. But this thinking is changing, led by the example of some European and Asian cultures, where pieces of meat and fish are smaller and vegetables are served as more than garnish. Instead of prioritizing one food group over another, more emphasis will be placed on food combinations of equal weight. This shift is already occurring in more urban restaurants and households, whereas rural areas continue to prepare meals with meat front and center. Emerging innovations are even making side items more prevalent in the space with the creation of plant-based snacks, drinks, and dishes like mac and "cheese" or vegan charcuterie.

Still to Solve: Sustainable Production

Despite the resurgence and new growth of the alternative protein space, there's still plenty of work to do.

For instance, these products still take a toll on the earth to produce despite not requiring an animal. And many new alternative proteins are being grown on the other side of the world, limiting accessibility and spiking transportation costs for some. Achieving greater sustainability will require processors to create more energy-efficient equipment, while seeking out more local ingredient sourcing.

Now

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Sources that are less dependent on land and water

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Fermented Proteins

Fermented foods contain beneficial bacteria and enzymes that help keep the digestive tract balanced and responsive to absorbing the best nutrients.

These foods have become trendy in western culture over the past several years with the introduction and popularity of items like kimchi, fermented vegetables, and kombucha. Now, we're seeing the introduction of fermented chilis, chili paste, sugar fibers, soy/bean pastes, and proteins, bringing added variety and culinary applications to these foods that promote a healthy and balanced gut.

What's still to come is the ability to scale fermentation, as it requires large fermenter tanks and a complex process. But will consumers widely accept fermented products? Thus far, processors and supermarkets have been hesitant to launch them, unsure of consumer response.

"Although natural, I think people may see it as 'Frankenfood' because the process to extract the protein could be seen as very industrial," said Mark Serice, VP of Global Culinary at Griffith Foods.

NEXT

Mushrooms & Fungi

Humans have collected and eaten fungi for thousands of years. In addition to being used as ingredients, mushrooms are now gaining popularity and showing tremendous applications in food production. In fact, global mushroom and truffle production has reportedly grown 500% between 1980 and 2011.

Mycoprotein (which is made by fermenting fungi spores along with glucose and other nutrients) has also become a widely accepted food product in the form of burgers and chicken patties under the brand name Quorn since 1985. In 2019, Quorn was positioned as the meat-free market leader in the UK, later experiencing food shortages due to a surge in popularity at the start of the COVID-19 pandemic.

Going forward, it's expected that fungi will pair with the fermentation process to produce new types of meatless products. Aspergillus oryzae (or koji) has been used for centuries in the form of soy sauce, miso, sake, and more. But new start-ups like Prime Roots are using fermentation to collect the biomass of the fungus itself and turn it into animal-free meat like vegan bacon and even seafood.

NEXT

Potato Proteins

Potatoes are known for their large starch content, but they also contain many nutritionally beneficial components like fibers, vitamins, organic acids, and proteins.

Potato protein offers superior functional properties like emulsification, gelling, water solubility, fat absorption, and foaming, which can be beneficial in baked goods. These properties make potato proteins viable substitutes for whey protein isolate, gelatine, egg white and egg yolk, and allow for a number of vegan applications across confectionary products, meat analogues, non-dairy cheese, egg-free dressings, and much more.

NEXT

Algae & Seaweed

Algae and seaweed present a very viable protein source for the alternative space because of their tremendous growth speed, nutrition, and low cost to manufacture.

Used for centuries in Asian cultures, seaweed has high functionality in seasonings, BBQs, and even pastries. Going forward, however, it could be elevated from a flavor enhancer to a main ingredient.

One of the main challenges of incorporating seaweed and algae is masking its sea-like taste, which can be off-putting to some. “It has the possibility to taste amazing, but you have to blend it with the right herbs and spices,” said Berten Bos. Plus, accessibility in places like the U.S. may be limited, causing costs to skyrocket.

NEXT

Upcycling

In addition to new ingredients, we'll also see new processes emerge in the next decade, making plant-based alternatives easier to produce, while boosting sustainability.

This includes upcycling food waste streams, which involves extracting or repurposing nutrients that would otherwise be lost in the food supply chain. It also involves using every part of food, including peels, seeds, and leaves to develop a new product (also known as food loss commercialization).

At Griffith Foods, we work with partners around the world to help fortify foods with minerals such as iron, potassium, and micronutrients — usually from ingredients that would otherwise be discarded. For instance, Mexico has faced micronutrient deficiencies among children and women for many years. In response, we were able to take a food waste stream of vegetable scraps from manufacturers and repurpose it into a nutrient-rich soup concentrate that helps more of the population reach its dietary needs at lower cost.

"The innovation comes from start-ups who are taking the risk to launch some of these products. Griffith Foods is staying close to these start-ups, acting as a product development partner to help them create craveable solutions in a fast and efficient way."

SUBRA BALAKRISHNAN

DIRECTOR OF GLOBAL BUSINESS DEVELOPMENT, NOURISH VENTURES

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Lab grown protein at scale

FUTURE

Cell-Based (or Lab-Grown) Meats

Though practically non-existent just five years ago, cell-based meat research has become a hot topic in the alternative protein space in the last year, accelerated even more by meat shortages during the global pandemic.

And while less popular in Europe, American interest in lab-grown meat has definitely piqued. But today, start-ups are taking the first steps toward commercially available cultured chicken and seafood. This includes Griffith Foods partner BlueNalu, a pioneer in creating whole muscle, cell-cultured seafood products in which living cells are isolated from fish tissue, placed into culture media for proliferation, and then assembled into great-tasting fresh and frozen seafood products.

The challenge is the high cost of this new meat and the mediums on which they grow. According to analysis by the Good Food Institute, growth mediums currently make up the bulk of total production costs for cultivated meat, with proteins known as growth factors as the most expensive ingredient. But costs are beginning to come down as more start-ups dedicate time and research to creating more efficient methods.

Plus, once more widely available, lab-grown meat also faces regulatory considerations and even confusion of jurisdiction between food and drug administrations versus departments that preside over traditional animal meat.

"As chefs, we know how a pork or beef filet looks. But we don't have that experience with how plant-based meats are made, so we have to do tests in plants to see how it's produced, how it's formed, and how we add value."

BRAM BUIJKS

Culinary Food Technologist, Griffith Foods

FUTURE

Insect Protein

Insects are still not widely accepted as a possible protein source in the U.S., U.K., or South America. But greater acceptance may be on the horizon as the need for more sustainable, accessible food sources emerges.

Some countries, however, have historical and cultural ties to insect-based dishes, including Mexico and parts of Asia.

If accepted, insect protein has tremendous advantages in nutrition. Researchers generally agree that insects are extremely rich in protein, fat, and vitamins and on average, the protein content of edible insects ranges 35-60% dry weight or 10-25% fresh weight, which are higher than plant protein sources, including cereal, soybeans, and lentils.

But the most likely applications for insect protein are not in whole consumption. Instead, consumers would be more likely to use it as a ground powder blended into other mediums.

FUTURE

Personalized Nutrition

Everything from cars to clothes is personalized in modern culture, and in the future, nutrition will be as well.

Retailers and QSRs have already made big strides to personalizing orders in recent years, positively affecting the customer experience. Now, vitamin providers are offering nutrient packs tailored to the individual as a precursor to a broader movement toward personalized nutrition. With varying nutrition needs across genders, age groups, and cultures, there is great opportunity for processors to add specific fortification to common foods — especially those nutrients lost in the manufacturing process.

FUTURE

Farming Practices

As more plant-based options begin to take up market share, there will be a growing cut in animal meat sales.

To compete, animal farmers will have to determine improved farming and feed practices (for both sustainability and animal welfare), which could also impact traditional protein taste. In response, processors will have to address the higher cost of traditional proteins with value-added flavor. While it's not going away any time in the near future, these traditional protein sources must adapt to meet changing consumer nutritional needs, cost concerns, and ethical preferences.

Alternative Protein Around the World

While alternative protein innovation is heating up globally, interest, acceptance, and accessibility of it is by no means the same across the world.

Asia

For centuries, Asian cultures have worked with alternatives like tofu, tempeh, and seitan as a way to add protein while animal meat was unavailable. Today, the new types of substrates being produced are considered more westernized.

Brazil

While there is interest in plant-based foods, Brazilian cuisine remains largely meat-based. Available plant-based options are still in burger, patty, and nugget forms.

Germany

Recent studies have shown that vegetarian options are outpacing traditional meat options, despite the country having a historically animal-based cuisine.

Israel

Despite its smaller size, Israel has made tremendous strides in cultured meat and is home to the world's first industrial production facility for the medium. The Future Meat Technologies plant has the ability to produce 1,100 lbs of cultured chicken, pork, and lamb each day.

United Kingdom

The U.K. has been a world leader in the adoption of plant-based diets for some time, starting with its high affinity for vegetarian Indian cuisine. Today, vegan butcher shops have even started popping up in London, showcasing the area's growing acceptance of alternative protein options. In addition, Burger King's U.K. arm has pledged 50% of its menu will be plant-based in the region by 2031.

United States

While the U.S. has made great strides in bringing plant-based protein to the mainstream (e.g. Burger King's Impossible™ Whopper® and Beyond Meat in grocery stores), innovation for other meat replication like alternative seafood is still to come.

"Many of these cultures for centuries have had their own type of plant-based options as a way to add protein while animal meat was unavailable. There, plant-based protein is just 'dinner.' To them, the substrates being produced are very much westernized."

MARK SERICE

VP of Global Culinary, Griffith Foods

The Role of Griffith Foods in the Future of Alternative Protein Development

Griffith Foods is devoted to gathering global insights and partnering with early innovators in the alternative protein space to help pioneer the future of food. We've launched an alternative-protein-focused business unit, Nourish Ventures, to take action on emerging food science and develop new products and processes to meet the changing needs of the planet. And we focus on all facets of taste and texture to help our partners throughout the transition to plant-based offerings, reducing their risk in entering a new space.

Most of all, we're dedicated to making an impact on our changing planet. Alternative proteins have already demonstrated positive change on the environment and animal welfare. Plus, they represent an environmentally friendly and more sustainable way to feed the world's growing population.

We intentionally partner with purpose-aligned companies looking to create and scale positive change. During 2020, we've been partnering with customers across the world to support new plant-based product lines.

From the largest global meat and seafood protein processors to the newest innovators within the alternative protein landscape, we have the product development expertise required to deliver taste and texture superiority. For example, in Thailand, we developed seasonings and coatings for a line of plant-based ready meals, and in China, we developed flavors for a new line of plant-based protein snacks for one of the largest meat processors in the world. In the US, we co-developed a vegan protein snack box with a leading retailer and their protein processing partner, while also helping an entrepreneurial start-up extend their line of plant-based offerings with tenders, patties and nuggets using our coatings and seasonings.

Our functional innovations are designed to optimize everything from flavor and color to binding capabilities and preservations. In addition to our product portfolio, our collaborative process integrates in-depth industry and market insight, culinary artistry, and technical expertise to ensure our partners' products are developed to succeed in the marketplace.

With a century of industry expertise, comprehensive global insights, collaborative partnership, and purpose-driven passion, we offer the innovation and guidance to create products that meet the varied needs of consumers. Together, we can deliver the most delicious, nutritious, and sustainable food systems to nourish our growing planet.

Griffith FOODS™

Creating Better Together™

Join us as we help pioneer the next generation of culinary innovation.

Learn more at griffithfoods.com.