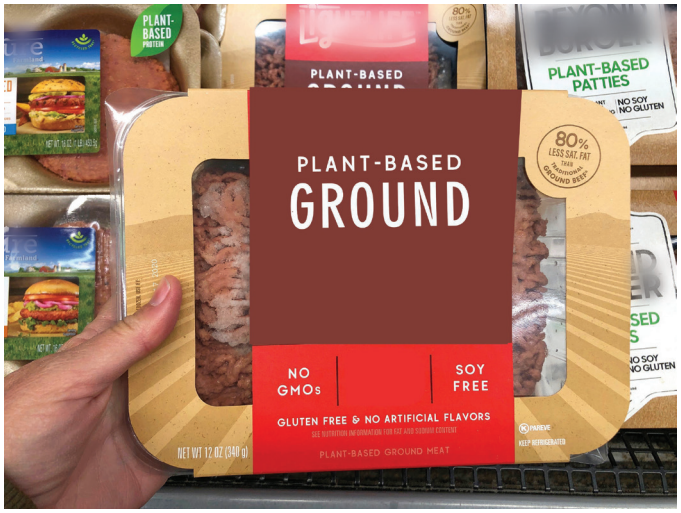
Plant-based proteins: rising to meet the challenges of innovation and food safety

Product quality and safety are paramount to food manufacturers. For decades, food manufacturers have employed specialized product inspection equipment to ensure that foods are free from foreign objects. The source of these potential hazards can occur at any stage of the process, commonly referred to as from 'farm to fork."

The journey of an ingredient to the dinner table is long, regardless of whether the product is heavily processed or freshly picked. There are tools used to grow foods, harvest them, transport them, intake at the food plant. Then there are processing steps including forming, mixing, cooking and packaging that require machinery from which parts could inadvertently fall or shave into a mixer, belt or utensil.



Manufacturers need a keen understanding of where the greatest hazards are likely in their process and consequently where inspection equipment is most needed so they can develop a specific, tailored food safety approach. Physical contaminant prevention is important and therefore is part of every food safety plan; that is not likely to change.

But what is continuously changing is the addition of new, innovative food products that require consideration of the most appropriate food safety inspection solutions. Innovation is the lifeblood of large food processors to protect their market share and ensure a strong presence on the grocery store shelf – whether that be in a brick and mortar store or virtual. Ensuring the safety and quality of new products is therefore important to ensure that they can grow through introduction of new products and formulations.

Plant-based protein inspection needs

One of the fastest growing areas of innovation is plant-based proteins. Plant-based meats aren't actually "meat" or animal protein; they are food products created to imitate the flavor and texture of traditional meat products but using alternative protein sources. They are but one segment among the alternative proteins that have gained traction in recent years. Some products are vegetable and animal product blends while others 100% plant based. In either case, a method of extracting and concentrating protein from plants is necessary to create the product.

$3.1 billion

A record $3.1 billion was invested in alternative proteins in 2020 signaling growing market momentum.

Source: Good Food Institute

Fueling the trend is increasing concern for the environment and consumers seeking a healthier diet. Food manufacturers are responding with rapid and broad innovation in alternative protein product formats. If the trend continues, it could ultimately help drive a more productive and efficient food supply with formulations including not only plant-based meat but also egg and dairy products. Consider that the speed with which food companies are experimenting, formulating and commercializing was $3.1 billion in 2020 according to the Good Food Institute; this is three times more than in 2019. Arguably, the shift could go beyond a trend to a disruption.

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$741m
was raised by U.S. plant-based meat, egg, and dairy companies in the first half of 2020—almost as much as in all of 2019.

$5b
was the value of the U.S. plant-based retail market in 2019.

9
of the 10 largest U.S. meat companies launched, bought, or collaborated on a plant-based meat brand by the end of 2019.

Source: Good Food Institute

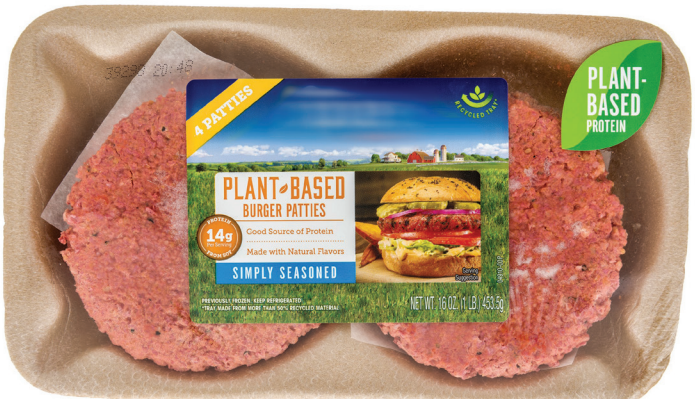
Meat substitutes are made from treated vegetable proteins.[1] Common base proteins include soybeans, peas, lentils and chickpeas. The vegetable proteins are condensed and textured through extrusion and forming. Methods can be customized to create a specific texture profile of the finished meat-like product. Often colors, flavors and texturizers are added to imitate a specific meat product as closely as possible.

A trailblazer in the plant-based meat sector, Impossible Foods, has even added vegan-friendly heme to give their patties the characteristic pink-red color that is seen in beef burgers. This innovative ingredient has garnered much attention for Impossible, which has since expanded its portfolio to include many other plant-based meat alternatives. Impossible may be one of the most recognized meat-alternative brands, but others like Gardein and MorningStar Farms have been in the plant-based frozen section for well over a decade, since 2003 and 1975, respectivel. They have plant-based burger patties and chicken nuggets on the market.

Brands like Impossible, Beyond Meat, Gardein, and MorningStar Farms have loyal consumers and an ever-growing product offering. It is expected that they will be joined by other venture groups as the plant-based protein segment continues to expand at a rapid pace. While most meat alternatives in the United States are formed products like burger patties, chicken nuggets and breakfast sausages, products using newer technology like wet extrusion are slowly being introduced to U.S. grocery stores. A recent example of this is LiveKindly's LikeMeat imitation chicken product, soon to be in Sprouts Farmers Markets grocery stores[2]. The LikeMeat chicken product is intended to very closely resemble the texture, pull and overall eating experience of chicken breast chunks.

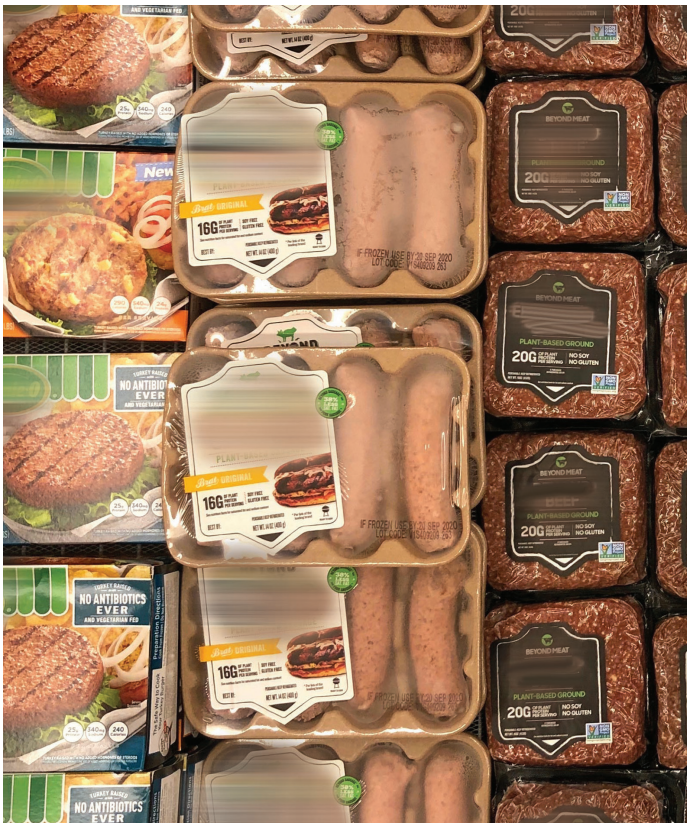
Are consumers biting?

Innovation for innovation's sake is rarely the goal. There must be consumer appetite – not just for the first purchase but if there's a seventh, eighth or nineth purchase which would validate that the repeat purchases were part of a shift in preferences among mainstream consumers (2-3% of the population since 2012). With the proportion of self-proclaimed vegans (5-6% of the population since 1999) and vegetarians in the U.S remaining consistently low compared to meat-eaters[3], the preference among a broader audience will sustain growth momentum.



Changing demographics could also play a role. Veganism and vegetarianism are more popular among Millennial and Generation Z consumers, which will likely impact growth among these segments in the future[4]. Additionally, a growing portion of the broader population is cognizant of the impact their meat consumption has on the environment, sustainability and their personal health. Often called "flexitarians" by the food industry, these consumers don't necessarily commit to a vegan or vegetarian diet, but they intentionally choose to reduce overall meat and animal product consumption.

With this growing segment of young vegan, vegetarian and flexitarian consumers, it's no surprise that meat and animal product alternatives are projected to grow at an average of 14.5% CAGR reaching $11.9



billion global market size by 2025[3]. Grocery sales of plant-based animal product replacements grew by 29% from 2017 to 2019[6], and growth in these sales continued in 2020. The leading plant-based products continue to be plant-based milk and dairy brands, valued at nearly $3.5 USD billion cumulatively in 2019, with plant-based meat not far behind [6].

With such growth and recognition of vegan and vegetarian preferences in the diet, both independent restaurants and mainstream restaurant chains like Burger King and Starbucks are expanding their protein offerings to include plant-based burger and sausage patties, making these meat alternatives available as a choice away from home as well.

Innovation-driven improvements will help draw in and retain consumers who were previously hesitant to buy plant-based meat products due to lack of texture and flavor profiles similar to their experience with meat products. As supply and demand for plant-based proteins increase, it's vital for food companies to ensure the safety and quality of these new foodstuffs for brand protection and to support a positive experience for consumers taking the leap and experimenting in a new category of food products.

Defending against foreign object contamination

A chief concern is to prevent against foreign object contamination at key points in the process where materials from processing equipment and other sources may become embedded in the product. This is similar to the need to remove foreign objects from animal-based proteins. For instance, in beef processing, metal detection is used as a first line of defense to detect metals like hooks or buckshot embedded in large, unprocessed chunks of beef. While plant-based meats don't utilize the slaughterhouse, and therefore won't face that same risk, the products are still highly processed, and each processing step introduces a risk of contamination from the equipment in use.

Metal detection is a proven, trustworthy defender against metal contamination that may be introduced mid-process. It can be beneficially employed before or after the extrusion process. Like any HACCP-based food safety plan, risks must be identified and preventive controls put in place. Once food is in its final packaging form, X-ray inspection makes a great choice to defend from both metal and dense, non-metal contaminants.

X-ray works best for relatively flat packaged foods like vacuum-sealed patties. In any case, it's important for emerging foods and manufacturers to maintain upmost food safety measures to prevent contamination and avoid costly recalls. The last thing an emerging food brand needs is to damage its reputation with a contamination escape, and subsequent product recall, while the product is beginning to gain traction.

Checkweighing for accurate weight control

Similarly, it is important when building a good brand and product reputation to ensure that consumers are receiving what they expect. Inline checkweighing is used to ensure that the right amount of product is in each package; too little product and the contents does not comply with the weight indicated on the package, shortchanging the consumer. From the manufacturer's perspective overfilling can also be an issue; adding too much product increases material costs and can disrupt packaging processes, both impacting on efficiency and profitability.

Summary

The plant-based protein sector offers huge upside potential for food processors. Food companies from large traditional food manufacturers to niche players are innovating to meet rapidly growing consumer curiosity and demand. A modern product inspection program is integral to plant-based food product growth, and as producers try to take increasing share of flexitarian consumer spend it is vital that the quality of their products equal or exceed those of the meat products they are trying to replace. Protecting brand reputation by having the right product inspection solutions is in place is one step that can help manufacturers ensure success for any of their products in this hot category.

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