

# How healthy and safe are processed plant-based meat alternatives?

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A plant-based burger. Credit: Pixabay/Lysindiamond

Processed meat alternatives like plant-based burger patties, sausages and nuggets are being marketed as a more sustainable, healthy alternative to meat, but are they all safe or nutritious?

Replacing meat with foods like legumes, beans and grains is nothing new—in fact, societies around the world have opted for plant-based diets for millennia.

However, in recent years plant-based diets have moved beyond incorporating a wide array of vegetable products, with a boom in commercially manufactured and processed plant-based [meat alternatives](#), created specifically to mimic the taste and texture of meat. The industry is already dominated by commercial heavyweights like Beyond Meat, Impossible Food, Nestle, V2 and Vitasoy, who manufacture a variety of alternatives, ranging from plant-based mince to dairy-free milk.

In a recent piece published in [Food Safety](#) researchers from the University of Sydney and University of Massachusetts analyzed the nutritional and safety profile of plant-based meat alternatives, such as burgers, sausages and nuggets. The authors said there were several potential challenges associated with [food safety](#) and nutrition, including the chemical and microbial contamination of ingredients and food adulteration issues.

"Adopting a plant-based diet is among one of the most powerful things a person can do for the climate," said the paper's lead researcher, Dr. Diana Bogueva, who researches in the School of Chemical and Biomolecular Engineering.

"It has been estimated that if highest-income nations adopted a more plant-centric diet, it could cut [greenhouse emissions](#) by around 61 percent—potentially freeing up land currently used for livestock for [carbon sequestration](#), and saving huge swathes of forest at risk of land clearing," said Dr. Bogueva.

However, plant-based meat alternatives often contain high levels of food additives, salt, genetically modified ingredients and new sources of

allergens. There are also concerns about mislabeling (for example, suggesting that the product is healthier than real meat), changes in protein quality, as well as vitamin or mineral deficiencies.

"Plant-based meat alternatives are a large and growing commercial industry. It's important that issues like food additives, the introduction of new allergens, as well as potential reductions in food quality, are all considered when designing the next generation of plant-based foods. Plant-based diets need to be safe and nutritious, while also being good for the environment," said Dr. Bogueva.

While the researchers believe that plant-based alternatives are the right direction for minimizing [climate change](#), carbon footprints and [land clearing](#), there is an onus on commercial manufacturers to develop alternatives that don't compromise nutrition.

Dr. Julian McClements from the University of Massachusetts said: "Many manufacturers in the plant-based food industry are currently working on improving the healthiness and safety of their products using modern food science approaches."

How plant-based meat alternatives are made:

1. Protein isolated and functionalized: Proteins are extracted from plants and purified to produce flours, concentrates, or isolates. In some cases, they may be further processed to enhance their functionality.
2. Product formulation: Plant proteins are combined with other ingredients (like carbohydrates, lipids, salts, flavors, and colors) to form a plant-based product that has the required appearance, texture, chewiness, flavor, and cookability of a real meat product. In addition, nutrients may be added to match or exceed the nutrient profile of real meat.

3. Processing: The mixture of ingredients undergoes a series of processing operations that promotes the formation of meat-like structures and properties. These operations may include mixing, extrusion, shearing, molding, and trimming.
4. Storage: The product, packaging materials, and [environmental conditions](#) must be designed so that the plant-based meat alternative remains safe and of high quality during storage, transportation, and distribution. This requires consideration and control of microbiological, chemical, and physical deterioration mechanisms.

Provided by University of Sydney

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