

Solving the mainstream adoption of alternative meats on a molecular level

By **Lorna De Leoz**

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Agilent Technologies global food segment director Lorna De Leoz explores the future of alternative proteins and how new advances in analytical tools can boost mainstream adoption of plant-based and cultured protein.

Step into any supermarket today and you're likely to see a plethora of alternative meat options that didn't exist ten years ago. While innovative plant-based and cultured protein sources have made remarkable strides in imitating the taste, texture, and aroma of traditional meats, fully replicating the complex flavor profiles of their animal counterparts remains a challenge.

However, advanced analytical tools, particularly Liquid Chromatography with Mass Spectrometry (LC/MS), can help overcome these obstacles and continue to advance consumer uptake.

LC/MS plays a pivotal role in accelerating the widespread adoption of alternative meat proteins in the global food market. The instruments are able to analyze the molecular components of alternative meat products to provide insights into flavor, aroma, nutrition, contaminants, and even unknown components.

By comparing alternative meat proteins against their conventional counterparts, such as cultivated chicken, beef, and pork, researchers can garner details that inform formulation modifications, enabling alternative protein meats to be comparable with traditional meats in terms of taste and sensory experience. Specifically, alternative meat developers can embrace LC/MS to overcome two primary hurdles – fully replicating the complex flavor profiles of their animal counterparts and improving the nutritional profile.



When engineered properly, the resulting product can be truly appetizing and satisfying. LC/MS can also unravel detailed information around the five basic tastes — sweet, salty, sour, bitter, and umami.

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By identifying and comparing the compounds responsible for these tastes, LC/MS offers an unbiased approach to flavor analysis. This highly technical and precise approach enables a deeper understanding of the different molecules contributing to various taste profiles, their relative intensities, and abundance in each protein.

With LC/MS, food manufacturers can take an analytical approach to refine their product ingredients to more faithfully replicate the tastes found in animal-derived meats. Creating a more palatable product will promote consumer acceptance, potentially shift market demand and push the food industry towards a more sustainable and environmentally friendly future.

Elevating Nutritional Profiles of Alternative Proteins

The nutritional profile of alternative protein meats is another critical aspect of their adoption. By analyzing alternative protein sources at a molecular level, LC/MS can identify and quantify essential nutrients, amino acids, vitamins, and minerals present in the formulations.

Additionally, LC/MS helps identify any potential contaminants or undesired components, ensuring the highest quality and safety standards for these alternative protein products. In this way, LC/MS can play a role in building consumer confidence in the nutritional profile and promote food safety.

LC/MS technology supports the alternative protein industry by unlocking the full potential of these products and driving their adoption. Through a combination of flavor and nutritional optimization, alternative meat proteins will continue to gain acceptance in our supermarkets. More importantly, LC/MS will play an important role alongside other key technologies to create a future in which plant-based and cultured meats are more mainstream and contribute to a more sustainable food ecosystem.

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