

Creating plant-based fish alternatives:

Flavor formulations, texture mimicking and nutritional highlights

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Why do we need alternatives to fish?

When will fish go extinct?

2048

“Fisheries have rarely been 'sustainable'.”

“Rather, fishing has induced serial depletions, long masked by improved technology, geographic expansion and exploitation of previously spurned species lowering the food web. With global catches declining since the late 1980s continuation of present trends will lead to supply shortfall, for which aquaculture cannot be expected to compensate, and may well exacerbate.”

Pauly, D. et al. (2002). Towards sustainability in world fisheries. *Nature*, 418, 689-695.



Development of plant-based fish alternatives

1 Flavor formulations



Novel Flavor Agents

These include compounds derived from seaweed, algae, and yeast extracts that can mimic the umami taste and briny notes characteristic of seafood.



Fermentation

Development of rich, savory flavors that closely resemble those found in fish, by using specific bacterial cultures and controlled fermentation techniques.



Ingredient combos

By using a mix of protein sources like soy, pea protein, and unique seasonings, it is possible to create a balanced flavor profile that resonates with consumers.

2 Protein structuring techniques

Protein Extrusion

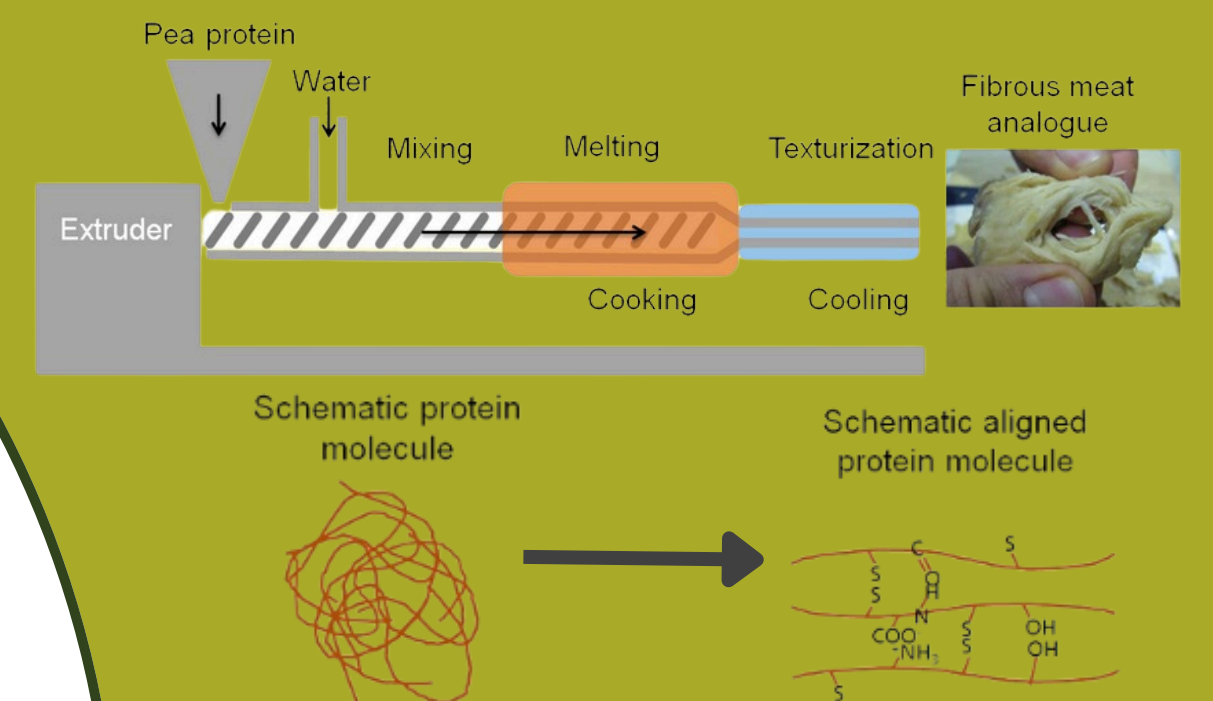


Figure 1: Process of Protein Texturization in Plant-Based Meat Alternatives

Most common technique to transform proteins, plant-based proteins in particular, into fibrillar structure, resembling the one of whole-muscle meat or restructured meat products

Electrospinning

Creates ultra-fine fibers from plant proteins by applying a high-voltage electric field. These fibers can be collected and aligned to mimic the fibrous texture of meat.

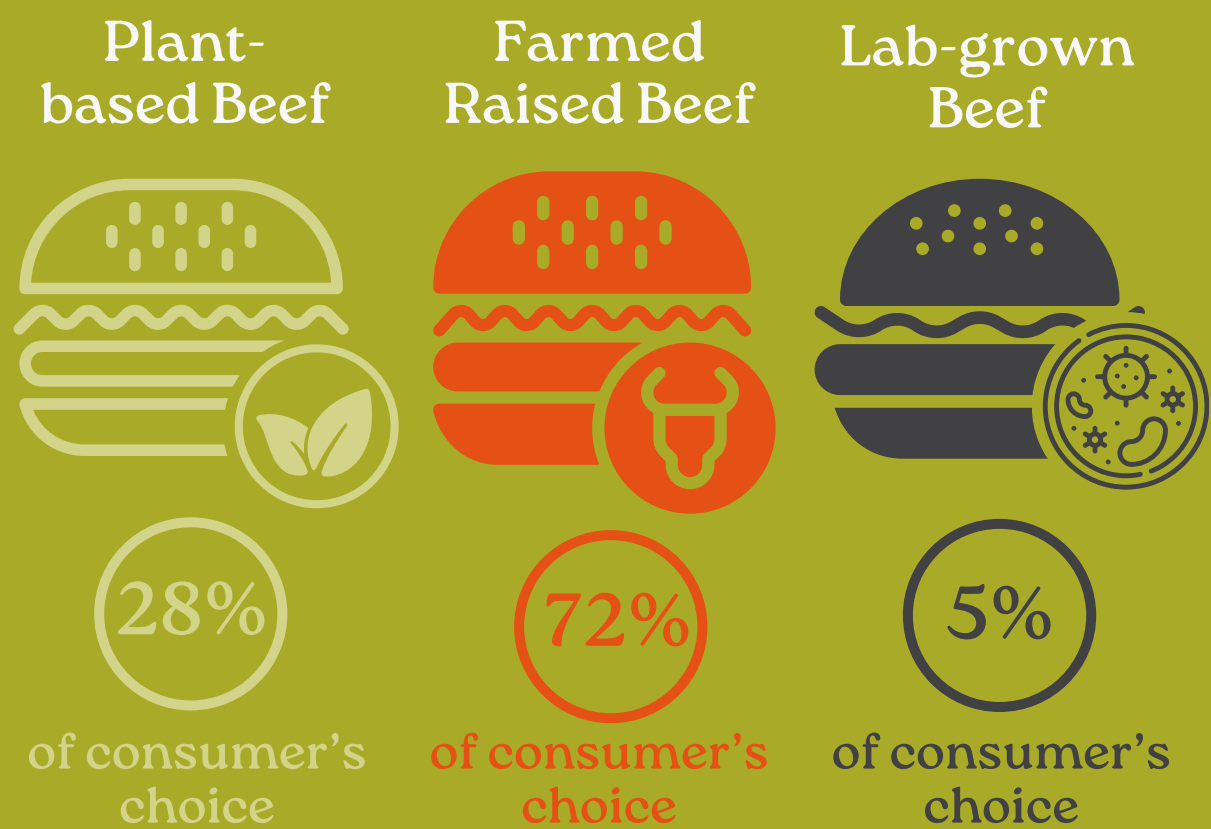
Wet Spinning

Involves dissolving plant proteins in a solvent and then extruding them through a spinneret into a coagulation bath, where the protein solidifies into fibers which can be aligned and bundled

3D Printing

Involves depositing layers of plant-based material to build a structured food product by controlling the composition and placement of these layers

Consumer Preferences



Loo, E., Caputo, V., & Lusk, J. (2020). Consumer preferences for farm-raised meat, lab-grown meat, and plant-based meat alternatives: Does information or brand matter?. *Food Policy*. <https://doi.org/10.1016/j.foodpol.2020.101931>.

Table 1: Plant-based fish and seafood alternatives on the market, or under development

Product type	Main ingredient	Company
Tuna Chunks, fish burgers, fish cakes and crab cakes	Six-legume blend	Good Catch®
Fish filler and Crab Cakes	Soy, wheat, potato	Gardein®
Caviar	Seaweeds	Plant-Based Foods®
Fish fingers, tuna pate, fish cakes, smoked salmon	Soy, potato, konjac, wheat	VBites®
Ahimi®- Raw tuna Unami®- Raw eel	Tomatoes / Eggplant	Ocean Hugger Foods®
Shrimp	Seaweed	New Wave Shrimp®



Figure 2: Ahimi®- Raw tuna by Ocean Hugger Foods



Figure 3: Good Catch® Tuna chunks



Figure 4: New Wave Shrimp®

Conclusion

