

August 2020

Taking advantage during the pandemic: Patents and innovation behind the boosting of the meat substitute sector

In the US many facilities in the meat industry closed or slowed down their operations as a direct result of the Coronavirus pandemic. By the end of April 2020, 32% of US pork production capacity was offline, while beef production capacity was down by 14%. The US was not a unique case, this impacted global meat production given that the nature of the work in slaughterhouses and meat packing facilities makes social distancing difficult.

In contrast, the meat substitutes market has seen a completely different landscape. In the US, the sales of plant-based meat analogues surged by 265% over the eight-week period ending on April 18th, according to data provided by Nielsen. The production of plant-based proteins is more automated therefore less exposed to staffing shortages and supply chain disruptions.

Meat substitutes today account for only a small portion of the protein market worldwide but continue to capture increasing market share. Market research suggests an incremental market growth of US\$3bn from 2020 to 2024. Evidence of new investment includes the launch by Beyond Meat, the US plant-based company, of its first European manufacturing facility in June in the Netherlands. The facility is owned and operated by Zandbergen, its distribution partner. Beyond Meat has also announced the acquisition of its first self-owned European plant based in the Netherlands.

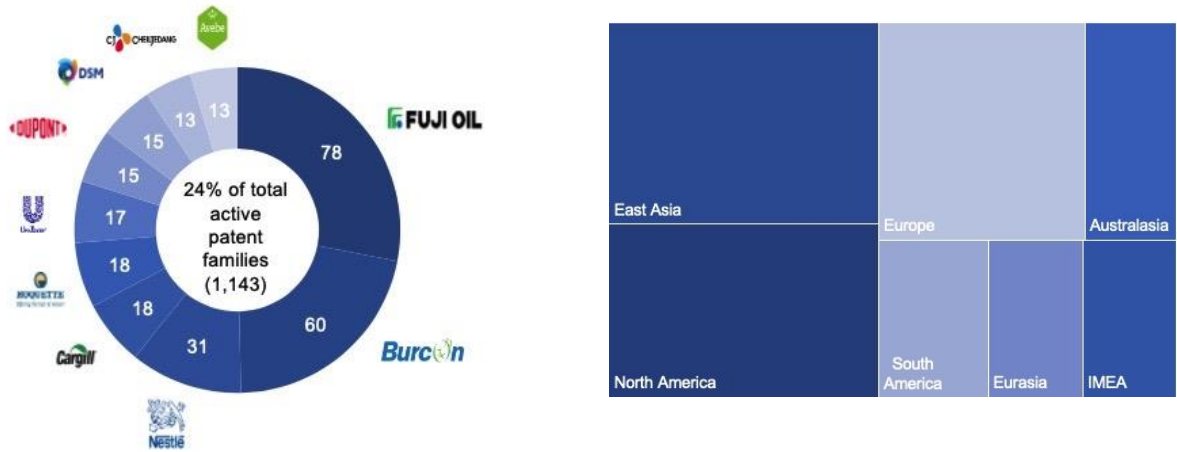
As with all industries exposed to new and innovative high-growth technologies, understanding the patent landscape is essential to understand who owns what and where. Using CIPHER, we have looked at patented inventions across meat substitutes, identifying the top innovators and the new technologies covered.

COVID-19 seemingly acting as catalyst for shifting consumer preferences

The COVID-19 pandemic has acted as a catalyst of sorts for shifting consumer preferences. In reality, the move towards plant-based alternatives is a longer-term global trend driven by a demand for healthier choices and increasing awareness of the environmental impact of meat-based diets. This is evident in a recent report published by Mintel which shows that health, ethics and the environment are still the main factors driving consumers towards meat alternatives in many regions.

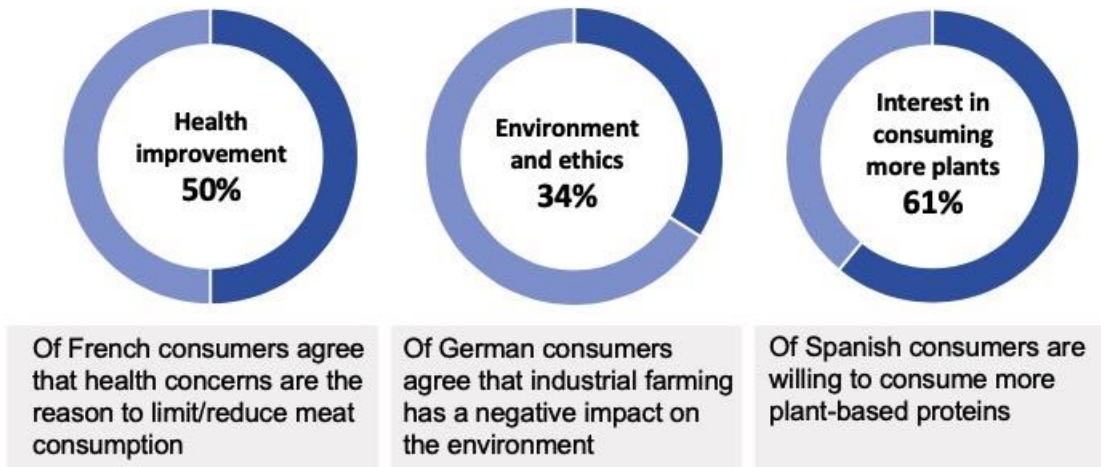
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Meat Substitutes: (Left) Top patent owners, (Right) Geographical Distribution of patented innovation



Source: CIPHER

Consumer interest and market opportunities are fueling innovation in the sector, and new plant protein-based product launches are on the rise especially in the Western markets, according to Mintel.

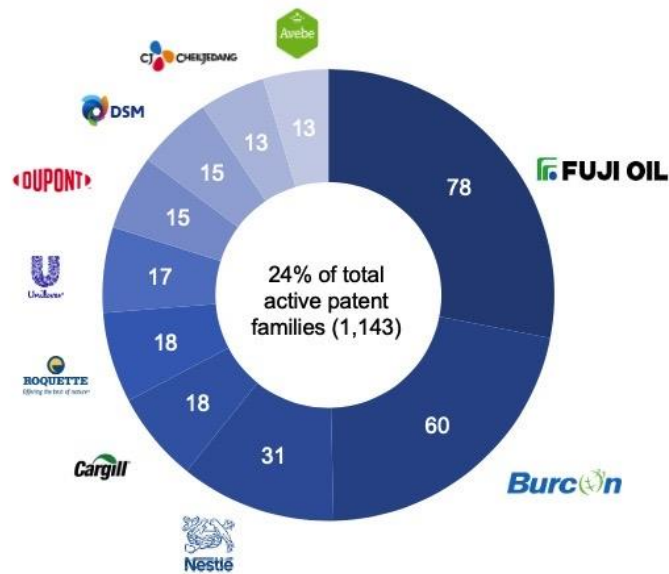


Source: Mintel

Patent filing has been growing constantly in the last 10 years. During 2019 there were 600 new patent family publications compared to just above 150 in 2010, equivalent to a 17% CAGR over the period. Looking at the active patent families, the top organisations are specialised ingredient suppliers and own relatively small portfolios compared to the total. This indicates a very fragmented landscape possibly heading towards some consolidation down the line.

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Meat Substitutes: Top 10 global innovators (active patent families)



Source: CIPHER

Burcon NutraScience, Roquette and Royal DSM are among the global technology leaders in the development of ingredients and their patent portfolios demonstrate interest in plant-based proteins.

Roquette has a series of inventions using peas as a source of proteins, but it is very well known that pea proteins have a low PDCAAS compared to soy and animal proteins. The term PDCAAS (Protein Digestibility Corrected Amino Acid Scoring or Corrected Amino Acid Score of Protein Digestibility) simply gives an indication of the quality of proteins, according to two criteria; the essential amino acids content and the protein digestibility. A nutritionally perfect protein must obtain a score of 1, also expressed as 100%. The factor responsible for the low quality of pea proteins is called anti-tryptic factors, a protein itself also contained in peas, which interferes with other proteins' digestion. Roquette has solved this issue targeting the elimination of the anti-tryptic factor.

The patented technology owned by Roquette concentrates specific proteins of the pea extract called globulins, while only excludes selectively the anti-tryptic factor. Roquette has developed different pea protein formulations having specific functionalities: some have specific emulsifying capabilities and others have specific solubility at different pH, therefore Roquette has a variety of options for specific applications in the food industry.

Record investments for the sector in only the first quarter of 2020 driven by cell-cultured meat companies and start-ups

Within this area, cell-cultured meat - also referred to as 'clean meat' - represents a new front of innovation. This meat is produced by growing muscle tissue in vitro using animal cell cultures. Companies developing such technologies are attracting large investment rounds, along with other big start-up names. In 2020, Impossible Foods (with their 'bleeding' burgers) raised \$500m, LiveKindly (a media site and agora for alternative food brands) raised \$200m and Memphis Meats (which specifically grows cultured meat) raised \$160m.

Impossible Food has developed a unique patented technology that provides the bleeding aspect to their burgers. This technology is based on a heme protein from non-animal sources, specifically the leghaemoglobin molecule found naturally in the roots of soy plants. Heme

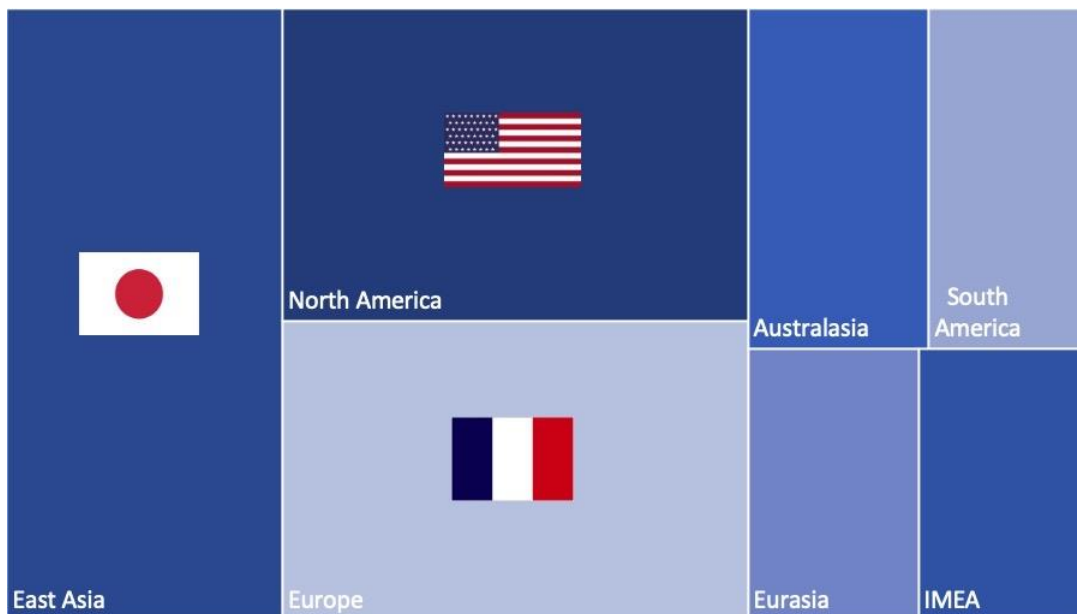
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proteins are specific proteins carrying iron and they are responsible for the red colour of the blood and other meat characteristics. To synthesise it in large quantities, the company has engineered a yeast and uses a fermentation process very similar to some brewing processes.

Memphis Meat has strategic patents on how to improve the efficiency of growing cells in vitro. Put simply, for the production of clean meat, cells are grown in bioreactors - finite environments - and while they grow they produce ammonia. In the body, ammonia is mainly filtered and removed in urine but, in the bioreactors, it can be toxic for the growing cells above certain levels. An enzyme, called glutamine synthetase, is the solution because it converts the ammonia in glutamine which is a nutrient for the growing cells. Memphis Meat has patented a mechanism to overexpress this enzyme in the cellular systems growing in the bioreactors and therefore can control the level of ammonia.

The geographical distribution of the active patent families indicates that the main three innovation hubs are East Asia (26%), North America (22%) and Europe (21%) while, looking at the number of granted patents, the top 3 countries are USA (258), Japan (231) and France (196.)

Meat Substitutes: Active patent families by region



Source: CIPHER

For more information on who owns what and where in the Meat Substitutes space, access CIPHER via your subscription or if you'd like to understand more about the Food and Drink taxonomy used to run this report in CIPHER, contact us directly at www.cipher.ai.

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