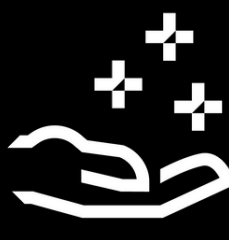


ALTERNATIVE PROTEINS CHEAT SHEET



The food sector accounts for **26% of GHG emissions** worldwide. The biggest impact lever is moving towards a fully plant-based, or at least flexitarian diet. This can only be achieved by substituting animal products for alternative proteins.



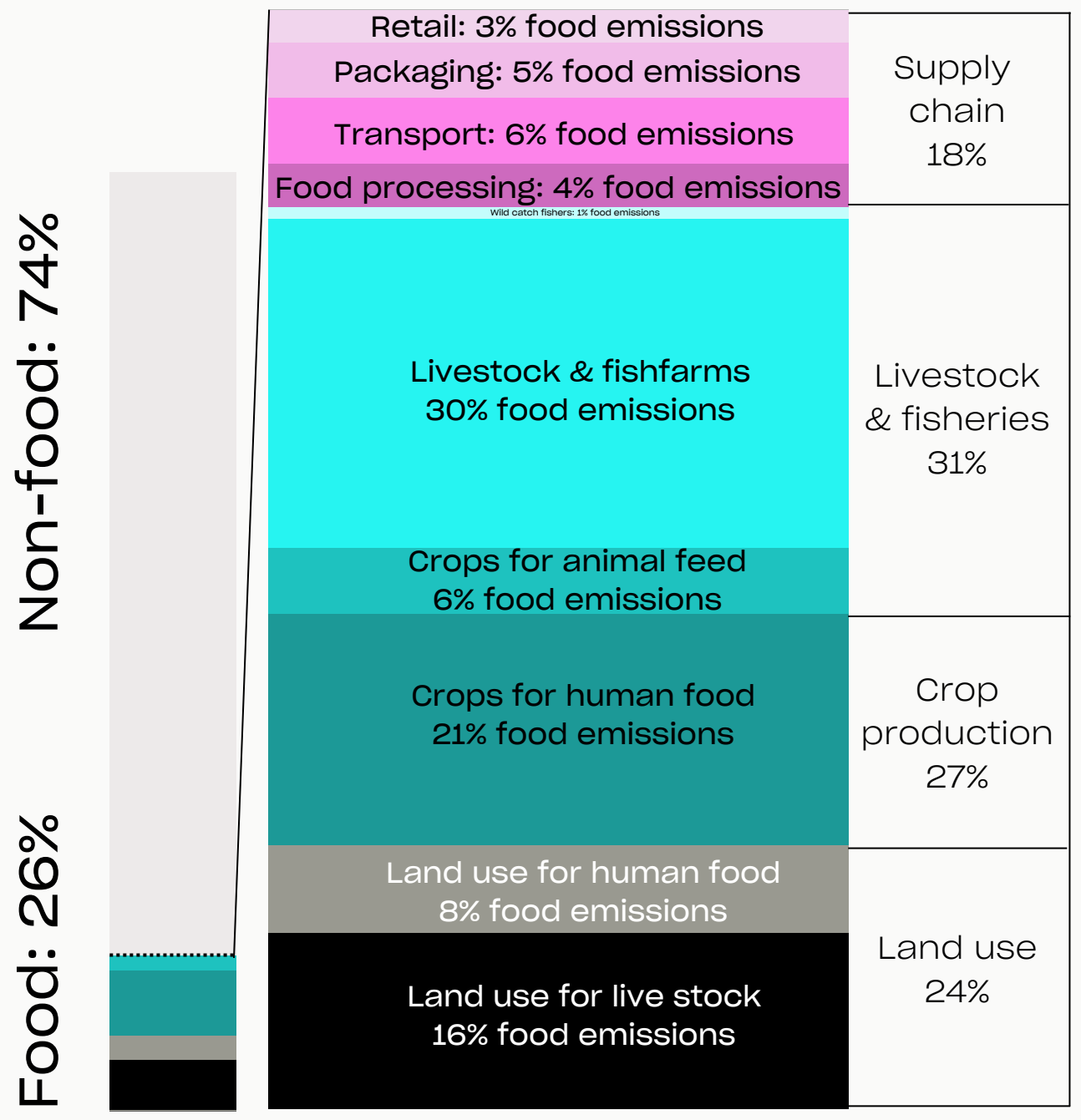
Thesis: The shift toward a flexitarian diet will require cost- and impact-effective alternative proteins. Input (ingredients, taste) and process efficiency gains are necessary to scale plant-based and microbial solutions. The key breakthrough technologies are low-energy/GHG microbial and cellular proteins, and by-product utilization.

The impact problem

- Food production is responsible for **1/4** of the world's GHG emissions (including processing and distribution).
- Out of that, **55%** is due to livestock/fisheries (**31%**) and corresponding land usage (**24%**).
- The top contributor to these emissions is, by far, **beef** (100 kg CO2e per kg product), followed by lamb (40 kg CO2e per kg product).
- **Dairy and fish** (13 kg CO2e per kg product) have a lower GHG footprint than bovine meat.
- More than **70%** of all **extracted freshwater** is used in the food production and processing industries.
- The conversion of natural ecosystems for **crop production or pasture** has been the principal cause of habitat loss, consequently reducing biodiversity.



Global GHG emissions from food production



The opportunity

- The shift toward carbon neutrality and healthier (but tasty) products will make food alternatives mainstream and more competitive, mainly in developed markets.
- Substituting traditional animal products (from meat to milk) for alternative proteins bears the biggest GHG reduction potential.
- Winning solutions will master the parity challenge (healthy, tasty and affordable)
- Plant-based and microbial solutions present the most mature technologies but also most competitive startup landscapes.
- Consumer trends (e.g. acceptance), scalability and regulation of new ingredients remain key challenges for this shift.

Technology plays

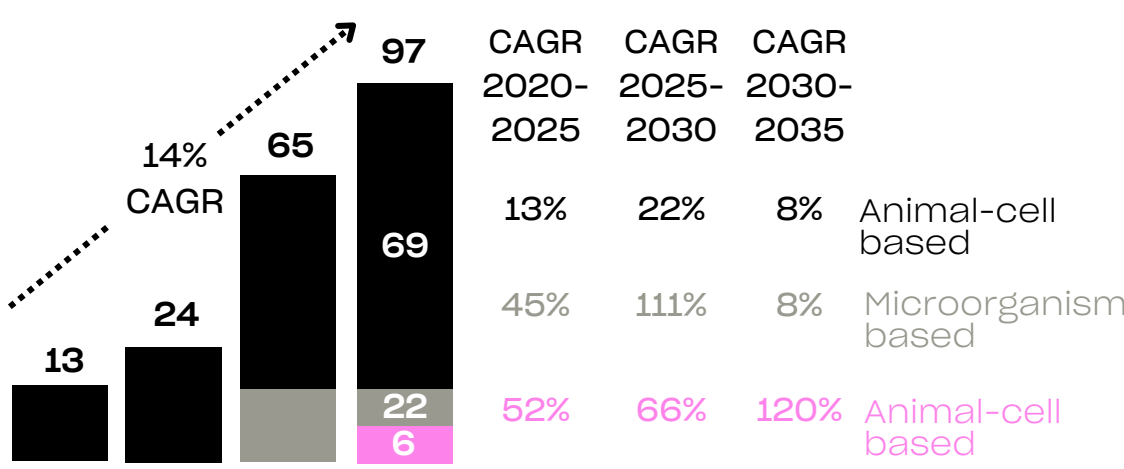
Early Stage (horizontal plays)

- Advanced formulations and ingredients (e.g. premixed binders, flavors, colors, or fats with a clean label).
- Speciality ingredients via precision fermentation through new strain development.
- Useful byproducts (with additional impact).
- Low energy, cellular production (dairy, fish, meat).

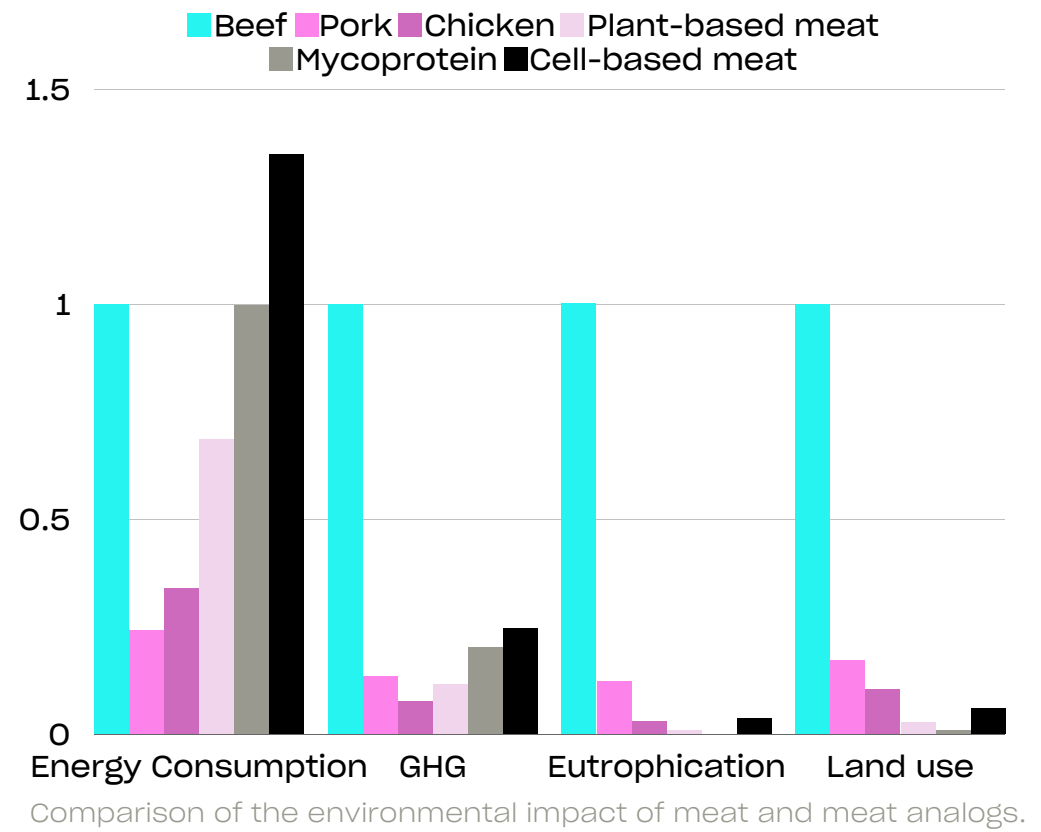
Growth Stage (vertical plays)

- Supply chain optimization: Improving protein production & extraction (at lower GHG).
- Partnerships with early stage technology plays, or superior in-house R&D.

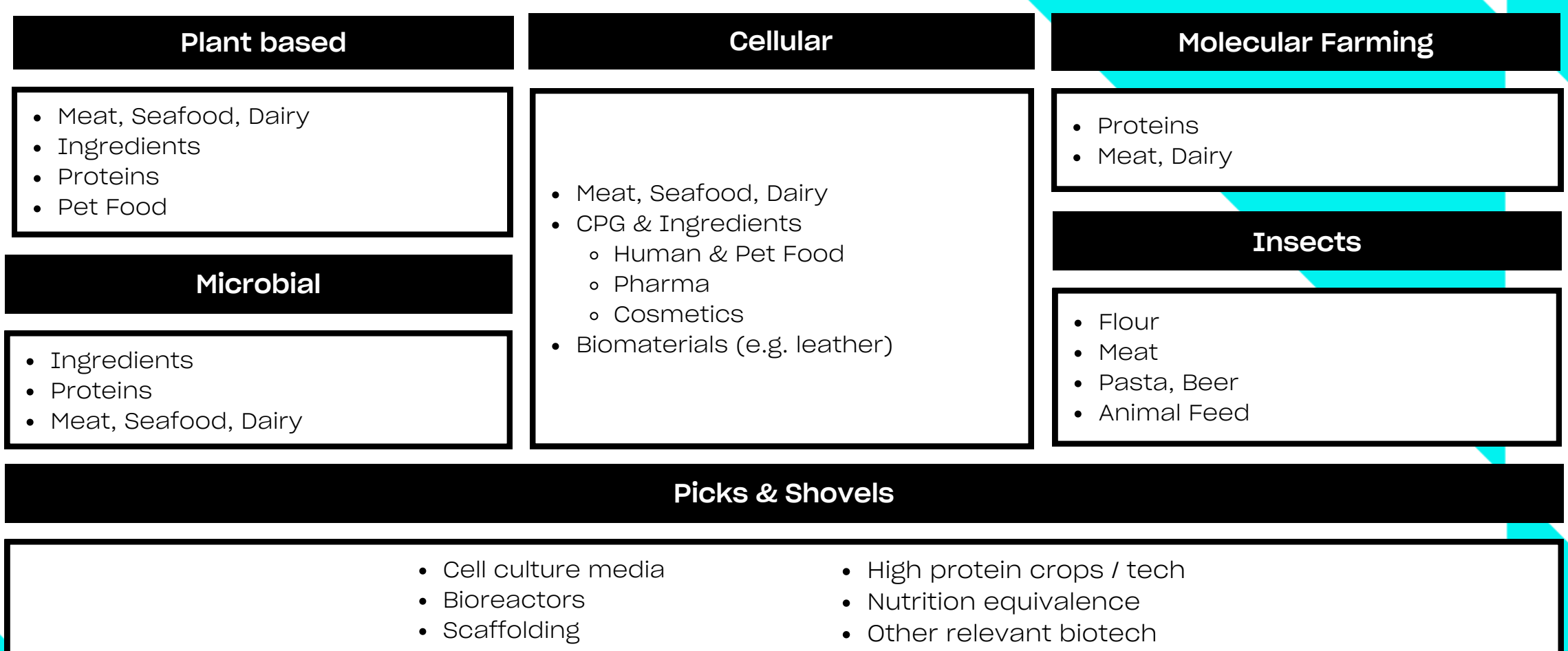
Consumption of alternative proteins by protein source (million metric tonnes, base-case scenario)



Growth Rate of Alternative Proteins Consumption 2020-2025 (BCG)



Alternative proteins mapping



Startups to watch

