T20 POLICY BRIEF

G20 BRASIL 2024

T20 Brasil 2024 Let's rethink the world

Task Force 01

FIGHTING INEQUALITIES, POVERTY, AND HUNGER

Toward A Global Protein Transition: Urgency, Potential, and International Cooperation

Ankur Chaudhary, Policy Specialist, Good Food Institute APAC (Singapore)

Carla Forte Maiolino Molento, PhD, Professor, Cellular Animal Science Laboratory, Agricultural Sciences Sector, Federal University of Paraná (Brazil)

Carolina Escobar Cardona, Food Change Campaign Coordinator, Fundación Veg (Colombia)

Karina Rie Ishida, Food Systems Coordinator, World Animal Protection (Brazil)

Mariana Bernal, Multilateral Engagement and Policy Analyst, Good Food Institute (Brazil)

TF01

Abstract

This briefing emphasizes the critical need for a global protein transition to align with the Paris Agreement's 1.5°C target. By significantly reducing emissions, minimizing land use, and addressing global health, food security, and animal ethics concerns, alternative proteins have emerged as a scalable solution essential for achieving the Paris Agreement goals. If alternative proteins rise to half the global protein market, they will mitigate five gigatons of carbon dioxide equivalent annually, and GHG emissions from land use and agriculture will decrease by 31% by 2050 instead of increasing. By highlighting the health benefits of a global protein transition and noting its potential to mitigate future pandemics and antibiotic resistance linked to animal-source food production, as well as the climate and economic benefits of alternative proteins, this briefing explores an innovative pathway that can revolutionize the food industry. Recommendations include scientific assessment and new partnerships to fund research and development initiatives that provide support for the global adoption of alternative proteins. The document also calls for governments worldwide to invest in alternative protein science, innovation, and commercialization. By embracing international and regional collaboration, countries can collectively contribute to achieving long-term climate goals, foster economic development, and promote global sustainability compatible with the 1.5°C target.

Keywords: Protein Diversification, Food Security, Development, Global Health

Diagnosis of the issue

The need for a transformation within traditional protein production practices stems from the issues associated with industrial food production and its impacts on people's livelihoods and food security. This paper presents alternative proteins[1] as a key opportunity to reduce the climate impact of agrifood systems for food security as well as to mitigate and adapt to the impacts of climate change on food production. The briefing also highlights recommendations and implementation scenarios within international cooperation programs and policies.

The current agrifood system amplifies the socio-environmental and economic challenges faced globally. Conventional protein production is also inefficient. More than three-quarters of agricultural land is used to produce meat, dairy, and eggs. However, animal products account for less than a fifth of the global calory supply. Nearly one in ten people face food insecurity, meaning they are "not able to acquire enough food to meet the daily minimum dietary energy requirements throughout one year" (FAO 2020).

Meat and GHG emissions

Meat consumption is projected to increase by at least 50% worldwide by 2050 (FAO 2018). The OECD (2021) predicts that by 2030, overall meat consumption will grow by 30% in Africa, 18% in Asia and the Pacific, and 12% in South America, meaning a relevant growth in the volume of staple crops fed to animals. While the UN projects that

1 Alternative proteins are products created to provide consumers with the sensorial characteristics of animal products using plants, fermentation, or animal cell cultivation (GFI Brasil, 2024).

the global population will approach 10 billion people by 2050, this growth will require countries to close a 56% food production gap (WRI 2018).

Although food insecurity has been a major concern worldwide, over 80 billion farmed land animals are raised and fed annually, with an estimated 70% of them within factory farm systems (Ritchie 2023). As these farming models spread to an increasing number of countries to meet the forecasted increased demand in meat consumption, so will the associated GHG impacts on traditional livelihoods, especially in climate-vulnerable communities. This will increase food system emissions, worsen climate-related disasters, and potentially impact sustainable agroecological producers and their diversified independent farming systems currently thriving.

The sixth assessment report by the IPCC calls for decarbonization in all sectors, including food systems (IPCC 2021). Animal-source foods provide around 18% of calories and 37% of consumed protein but account for 58% of agriculture's GHG emissions (Poore and Nemecek 2018). More recent studies put animal farming's share of food production's GHG emissions even higher, at nearly 80% (Barthelmie 2022). As demand for meat increases and producers shift toward even greater diversion of high-quality crops to feed animals, estimates are that crop diversion to animal feed will soar to between 48 and 55%, even as climate change adversely impacts yields, especially in Asia and Sub-Saharan Africa. Food production requires 4 billion hectares of land, 3 billion of which are used for animal agriculture - equivalent to the size of China plus India, times two, plus Indonesia (Ritchie 2021). Of all glacier-free land, 26% is used for grazing, and 33% of the planet's arable land is used for fodder production. More than two-thirds of agricultural land is used to raise animals.

Deforestation, land, and water use

Industrial animal farming is a major consumer of water resources, competing directly with local communities. The resulting scarcity deepens poverty and marginalization, especially among the most vulnerable populations, who depend on water for their basic needs and subsistence farming. This is particularly pronounced in regions like the Amazon, Cerrado, and Pantanal in Brazil, where large-scale cattle ranching and soy cultivation for animal feed have led to great forest loss while also fueling the disappearance and degradation of natural grasslands in countries such as the US and Argentina. Historically, the continuous drive for new land conversion has also led to land grabbing and the violation of the rights of indigenous peoples and local communities. Additionally, waste from intensive animal farming may reach rivers that thus become improper water sources for the use of communities that depend on them. Furthermore, the concentration of land and resources in the hands of large meat producers can exacerbate gender inequality, marginalizing women who play significant roles in food production in many communities.

Antimicrobial resistance

The widespread and excessive use of antibiotics in animal agriculture has been linked to the rise of antimicrobial resistance (AMR), an alarming threat to global health. Worldwide, 73% of all antimicrobials sold are used in animal agriculture (Ritchie 2017). Animal agriculture expansion and industrialization have also been linked to increased risks of zoonosis emergence, according to the UNEP (2023), posing a risk to public health and food security. Such diseases can disproportionately affect poor communities, which often have limited access to adequate healthcare and epidemiological surveillance systems.

Due to costs, the consumption of high-quality animal protein products is limited. The lack of understanding around the protein contribution of vegetable foods such as legumes tends to induce communities with limited resources to focus purchases on meat by-products, e.g., sausages and ultra-processed foods, which contain compounds associated with diseases (Santamaría-Ulloo & Bekelman 2021). In addition, the popular belief in prioritizing foods of animal origin as the main source of nutritional importance leads to low consumption of plant foods, which are relevant sources of both protein and other nutrients. Consequently, low consumption of micronutrients and dietary fiber is evidenced, facilitating malnutrition and derived diseases (Miramontes-Escobar et al. 2020). Currently, protein-calorie malnutrition represents a relevant disease burden mainly in very young, very old, and low socio-demographic index populations, reflected in opportunistic infections, alterations in growth, obesity, and alteration of vital functions. Clearly, innovative and accessible solutions are required to facilitate food and nutritional security, coupled with education programs that allow better learning about dietary strategies to meet basic nutritional requirements for all.

Recommendations

For countries to reduce malnutrition, eradicate hunger, and add to populations' food and nutritional security, global food systems must transition, especially protein supply chains. Alternative proteins are fundamentally more efficient than traditional meat and dairy products. For any protein production practice, going from crop to meat involves some degree of calorie or energy loss. The difference is in the rate of calorie conversion. As animals evolved to move and perform various behaviors and metabolic functions beyond muscle production, there are limits to how efficiently an animal can turn feed into meat. A chicken—which converts feed into edible meat more efficiently than most farmed animals— needs nine calories of feed to produce one calorie of meat (WRI 2018). According to UNEP's report launched at COP28, "novel plant-based meat, cultivated meat, and fermentation-derived foods could be instrumental in reducing the environmental impacts associated with producing many conventional animal source foods. They also promise reduced risk of zoonoses and antimicrobial resistance" (UNEP 2023).

G20 countries have a critical role in shaping policies addressing global challenges, including food security, nutrition, and sustainability. To effectively tackle these issues, it is imperative to implement comprehensive strategies that promote the transition toward a more sustainable and equitable food system. The recommendations for the G20 countries include:

Improving investment in food and nutrition education to promote knowledge about plant-based foods that can provide adequate nutrition for all ages. Educational activities should be organized in the most food-insecure communities, focusing on local production of high-nutritional-value foods such as legumes, cereals, and home vegetable gardens. By

empowering individuals with the knowledge and skills to make healthy food choices, countries can enhance overall nutritional outcomes, reduce the prevalence of malnutrition, and foster the adoption of alternative proteins.

Secondly, prioritizing the production of beans, pulses, and grains for human consumption can help optimize land use. Countries' food security can be greatly improved by shifting away from using soybeans for animal feed and increasing their direct consumption by humans. This approach aligns with maximizing food production efficiency while minimizing environmental degradation. As a food innovation approach, alternative protein products are a more sustainable and healthy option for populations that wish to maintain their food habits and cultural practices while enhancing profit for farmers who will be able to sell crops with higher added value.

Higher-income communities also play a vital role in the required food transition. We must, therefore, invest in marketing strategies highlighting the importance of increasing the consumption of plant-based proteins, focusing on the young population who have shown greater concern for the care of the environment and the impacts of unsustainable consumption practices (MAPA 2021).

Investing in greater economic and credit options for producers of plant-based and fermentation-derived foods is another critical step toward building a more sustainable food system. By reducing production costs and facilitating access to alternative protein sources, widespread consumption can be enhanced. This investment will not only benefit producers but also contribute to diversifying food sources and enhancing food security for populations around the world.

Furthermore, increasing grants for research and teaching disruptive innovation in food protein production is essential for progress. By supporting research initiatives that address critical knowledge gaps and optimize processes for scaling up and lowering costs,

governments can foster innovation and accelerate the development of sustainable food solutions. More public funding for cultivated meat research is needed to meet the growing demand for alternative protein sources. Governments should address critical knowledge gaps and optimize processes to scale production and lower costs. Such investments will accelerate the development and adoption of cultivated meat, contributing to a more sustainable and resilient food system.

Incorporating plant-based, fermentation-derived, and cultivated meat into climate adaptation policies, such as the Brazilian ABC+ plan, is also essential. By including alternative proteins in climate adaptation strategies, governments can leverage their potential to reduce GHG emissions and promote sustainable land use practices. On the consumption side, research around the nutritional and health aspects of plant-based products must be considered within food guides to the population, as well as their inclusion in national food programs. The establishment of national food policies that promote educational programs in schools will facilitate more consumer autonomy and understanding of the benefits of such market shifts.

Public investment in research and development should also promote G20 countries' leadership on clean energy and climate. By funding public, open-access research that benefits the entire sector, countries can address the technical challenges, inspire additional research, and create new growth opportunities. Research can be funded by creating new initiatives or using existing engineering, agricultural innovation, climate science, and economic development programs. One focus area should be incentivizing research on better ingredient processing and manufacturing equipment.

Many technologies in use are repurposed from other industries and are sub-optimal in scale, cost, and functionality. Governments can direct research or fund grantmaking programs to address critical scaling issues in the alternative protein industry. Key research

areas include developing low-cost, scalable protein and ingredient extraction methods that preserve essential functional and nutritional properties. Additionally, investing in extrusion and newer manufacturing technologies can enhance the texture and taste of plant-based meats while reducing energy inputs.

Incentivizing manufacturing and infrastructure investment is crucial for scaling up alternative protein production and ensuring equitable access to these products. Strategic incentives such as investment tax credits, loan guarantees, and other financial support mechanisms have proven effective in catalyzing growth in other sectors like renewable energy. Governments can facilitate a smooth diversification from conventional to alternative protein farming, processing, and manufacturing by prioritizing capital investment in rural areas. This approach stimulates economic development and promotes sustainable land use and resource management practices.

Federal investment assistance can help companies access processing equipment and manufacturing facilities at a lower cost than available through private equity financing. Moreover, expanding insurance programs for specialty crops used in alternative protein production can provide additional support.

Scenario of outcomes

Climate and Bioconservation

Alternative proteins consume resources directly rather than cycling them through animals. Using 25% of all agricultural land, plants yield approximately two-thirds of the world's protein (Ritchie and Roser 2019). A land mass more than twice as large as China and India combined could become available if we switched to plant-rich diets (Ritchie 2021). The released land, potentially about 3 billion hectares (2021), could help mitigate climate change by reforesting and sequestering carbon. This could remove up to 26 gigatons of CO_2 equivalent annually—roughly half of all current global emissions (Hayek et al. 2021). Alternative proteins would offset five gigatons of CO_2 equivalent yearly if they were to take half of the world's protein market. Consequently, GHG emissions from land use and agriculture would decrease by 31% by 2050, as opposed to rising (ClimateWorks 2021). Alternative proteins can potentially reduce GHG emissions by about the same amount as decarbonizing the entire aviation sector if alternative proteins can secure just 11% of the protein market by 2035 (BCG Global 2022).

Alternative proteins can be a crucial tactic in protecting biodiversity by reducing habitat loss and deforestation. Additionally, alternative protein production is less water-intensive, contributing to conservation efforts and diminishing agricultural runoffs, reducing pollution, and improving soil and water quality. Alternative proteins have a huge positive impact on air pollution. Using plants, fermentation, or cell cultivation instead of animal production, alternative protein production does not emit the same toxic air pollutants—including ammonia, particulate matter, and hydrogen sulfide—as conventional meat production.

Job creation

The quick adoption of alternative protein sources for human consumption could boost the industry's gross value added (GVA) by a projected 10.9% annually, or US$1.1 trillion, by the year 2050. Adoption of additives might result in an extra US$12 billion in GVA. It is anticipated that the market could sustain 9.8 million jobs by 2050, and in the medium- to long-term, the scaling up of investment in alternative proteins required to facilitate a diet shift away from animal products will generate up to 83 million jobs by 2050. This is two-thirds of all jobs that methane innovation creates (ClimateWorks 2021).

Health and welfare benefits

A shift to alternative proteins could enhance global food security and reduce animal suffering in animal farming practices. Regarding the alarming data around antibiotic resistance, alternative protein production requires reduced levels of antibiotics. By reducing intensive animal farming, the main drivers for new pandemics are reduced. In terms of nutritional health, protein diversification could offer overall protein availability advantages and potentially improve public health outcomes through optimally designed protein and fat sources.

Conclusion

Transitioning to alternative proteins comes with a set of challenges. It necessitates a supportive approach toward conventional farming, ensuring its smooth integration into new paradigms. Culturally, the success of this transition hinges on the widespread acceptance of alternative proteins, necessitating concerted education and awareness efforts. Regulatory frameworks and public policies will also be essential to guarantee these new food sources' safety, quality, and fair commercialization. Regarding benefits, transitioning to alternative proteins provides renewed hope for positive future scenarios.

References

Barthelmie, Rebecca J. "Impact of Dietary Meat and Animal Products on GHG Footprints." Climate 10, no. 3 (2022): 43. https://doi.org/10.3390/cli10030043.

BCG. "The Untapped Climate Opportunity in Alternative Proteins." July 2022. https://www.bcg.com/publications/2022/combating-climate-crisis-with-alternative-protein.

ClimateWorks Foundation. "Global Innovation Needs Assessments: Protein Diversity." 2021. https://www.climateworks.org/wp-content/uploads/2021/11/GINAs-Protein-Diversity.pdf.

FAO. "Livestock's Long Shadow." 2006. https://www.fao.org/3/a0701e/a0701e.pdf.

FAO. *The State of Food Security and Nutrition in the World 2020*. https://www.fao.org/3/ca9692en/online/ca9692en.html.

FAO. "The Future of Food and Agriculture—Alternative Pathways to 2050." 2018. https://www.fao.org/3/CA1564EN/CA1564EN.pdf.

GFI Brasil. "Mercado Brasileiro de Carnes Vegetais Ultrapassou R$ 1 Bilhão em 2023." 2023. https://gfi.org.br/mercado-brasileiro-de-carnes-vegetais-ultrapassou-a-marca-de-r-1-bilhao-em-2023/.

GFI. "Cultivated Meat LCA & TEA Report Analysis." https://gfi.org/resource/cultivated-meat-lca-tea-report-analysis/.

GFI. "The Global Health Benefits of Alternative Proteins." https://gfi.org/resource/the-global-health-benefits-of-alternative-proteins/.

Hayek, Matthew N., et al. "The Carbon Opportunity Cost of Animal-Sourced Food." *Nature Sustainability* 4 (2021): 21–24. https://doi.org/10.1038/s41893-020-00603-4.

IPCC. *The Physical Science Basis*. 2021. https://www.ipcc.ch/report/ar6/wg1/.

MAPA. *Informe Anual de Consumo 2020*. https://www.mapa.gob.es/es/alimentacion/temas/consumo-tendencias/informe-anual-consumo-2020-v2-nov2021-baja-res_tcm30-562704.pdf.

Miramontes-Escobar, H. A., et al. "Perfil Nutricional e Menús Proporcionados em um Comedor Social de México." *Universidad y Salud* 22, no. 3 (2020): 203-212. https://doi.org/10.22267/rus.202203.192.

OECD/FAO. "OECD-FAO Agricultural Outlook (Edition 2021)." https://doi.org/10.1787/4bde2d83-en.

Poore, J., and T. Nemecek. "Reducing Food's Environmental Impacts." *Science*, 2018. https://doi.org/aaq0216.

Ritchie, Hannah. "How Do We Reduce Antibiotic Resistance from Livestock?" *Our World in Data*, 2017. https://ourworldindata.org/antibiotic-resistance-from-livestock.

Ritchie, Hannah. "How Many Animals Are Factory-Farmed?" *Our World in Data*, 2023. https://ourworldindata.org/how-many-animals-are-factory-farmed.

Ritchie, Hannah. "If the World Adopted a Plant-Based Diet." *Our World in Data*, 2021. https://ourworldindata.org/land-use-diets.

Ritchie, Hannah, and Max Roser. "Half of the World's Habitable Land Is Used for Agriculture." *Our World in Data*, 2019. https://ourworldindata.org/global-land-for-agriculture.

Santamaría-Ulloa, Carolina, and Traci-A. Bekelman. "Consumo de Embutidos em Mulheres Costarricenses." *Revista de Biología Tropical* 69, no. 2 (2021): 665-677.

Searchinger, Tim, et al. *Creating a Sustainable Food Future*. World Resources Institute, 2019. https://research.wri.org/sites/default/files/2019-07/creating-sustainable-food-future_2_2.pdf.

UNEP. *What's Cooking? An Assessment of Novel Alternatives to Animal Products.* 2023. https://wedocs.unep.org/20.500.11822/44236.

WRI. "How to Sustainably Feed 10 Billion People by 2050." 2018. https://www.wri.org/insights/how-sustainably-feed-10-billion-people-2050-21-charts

WRI. "If the World Adopted a Plant-Based Diet, We Would Reduce Global Agricultural Land Use from 4 to 1 Billion Hectares." Our World in Data. 2021. Accessed March 20, 2024. https://ourworldindata.org/land-use-diets.

G20 BRASIL 2024
BUILDING A JUST WORLD AND A SUSTAINABLE PLANET

T20 Brasil 2024
Let's rethink the world

Let's rethink the world

CEBRI
Rethink Tank

FUNDAÇÃO ALEXANDRE DE GUSMÃO

ipea
Instituto de Pesquisa Econômica Aplicada