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Nurturing the future: novel alternative proteins and traditional animal sourced foods

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Food Security



THE INSTITUTE
FOR GLOBAL
FOOD SECURITY

Food security: when all people, at all times, have physical, social and economic access to sufficient, safe & nutritious **food** that meets their dietary needs and **food** preferences for an active and healthy life



National

Food Systems at the UN Climate Change Conference

A healthy food system for people and planet

- Ensure food security against climate change and biodiversity loss
- Reduce environmental and climate footprint of food system
- Improve nutrition in food and food safety
- Strengthen the food system resilience
- Lead global transition towards a competitive sustainability from farm to fork

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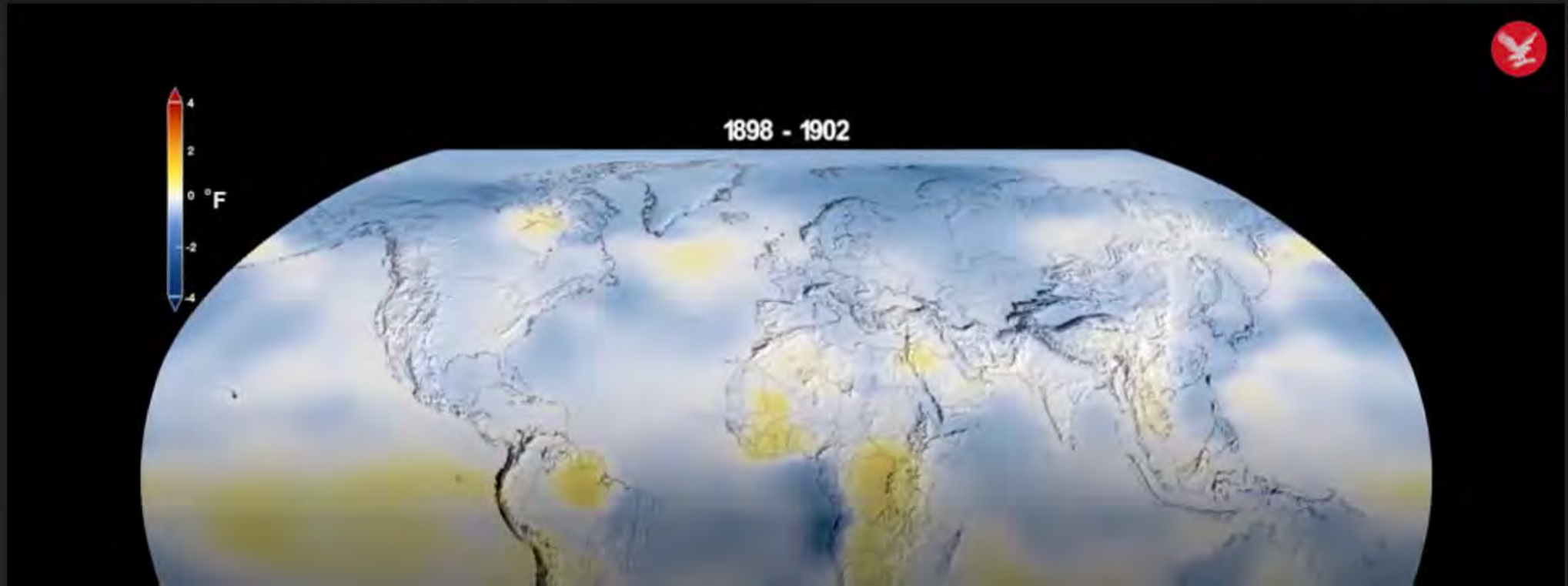
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UK could experience 'civil unrest' due to food shortages triggered by climate disasters

Experts say extreme weather events are the most probable cause of food shortages and subsequent distribution issues

Stuti Mishra • Monday 16 October 2023 11:21 BST • 15 Comments



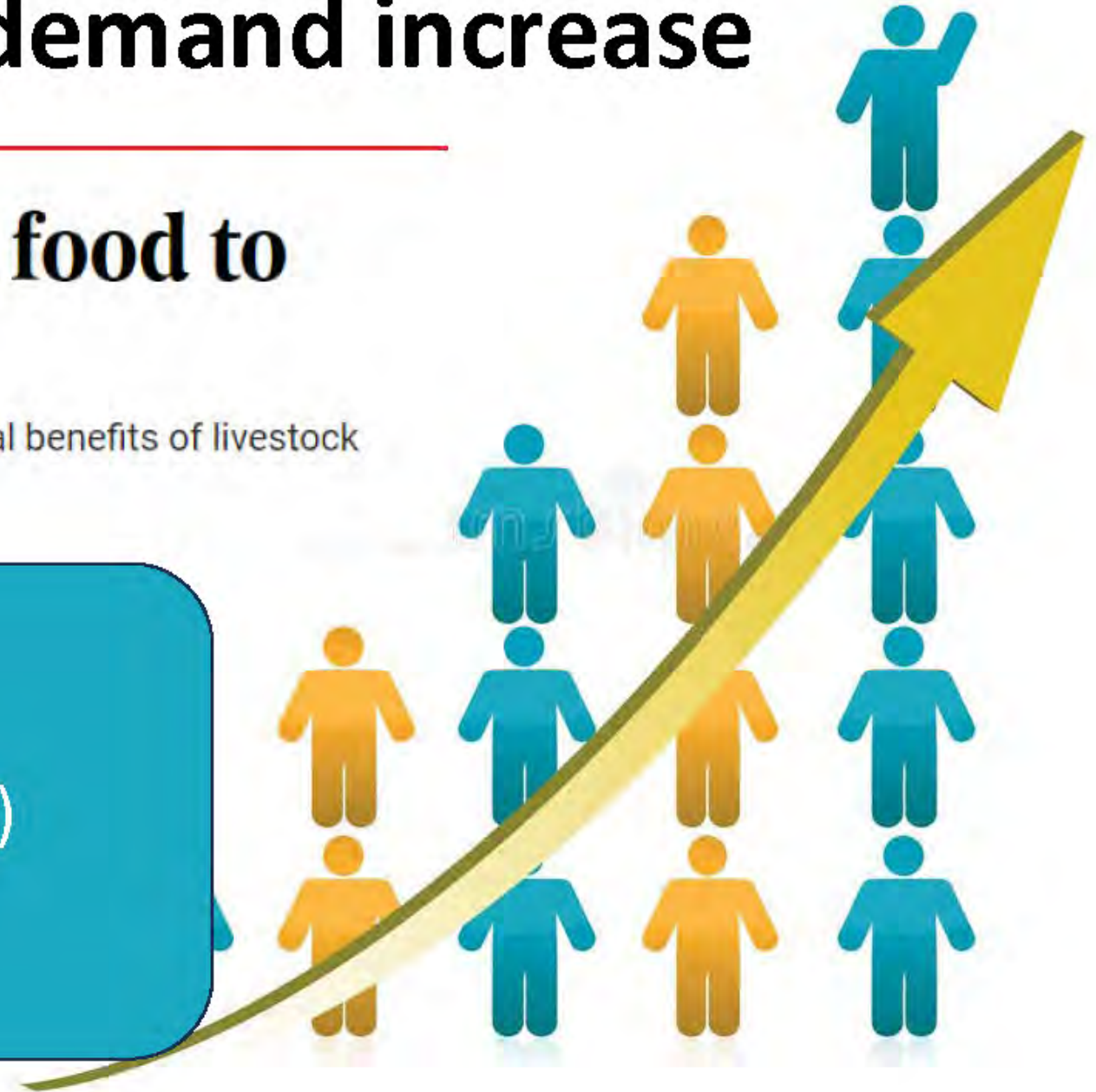
Protein demand and demand increase

Demand for protein rich food to jump 78% by 2050

A Teagasc and Bord Bia conference heard of the nutritional benefits of livestock derived protein.

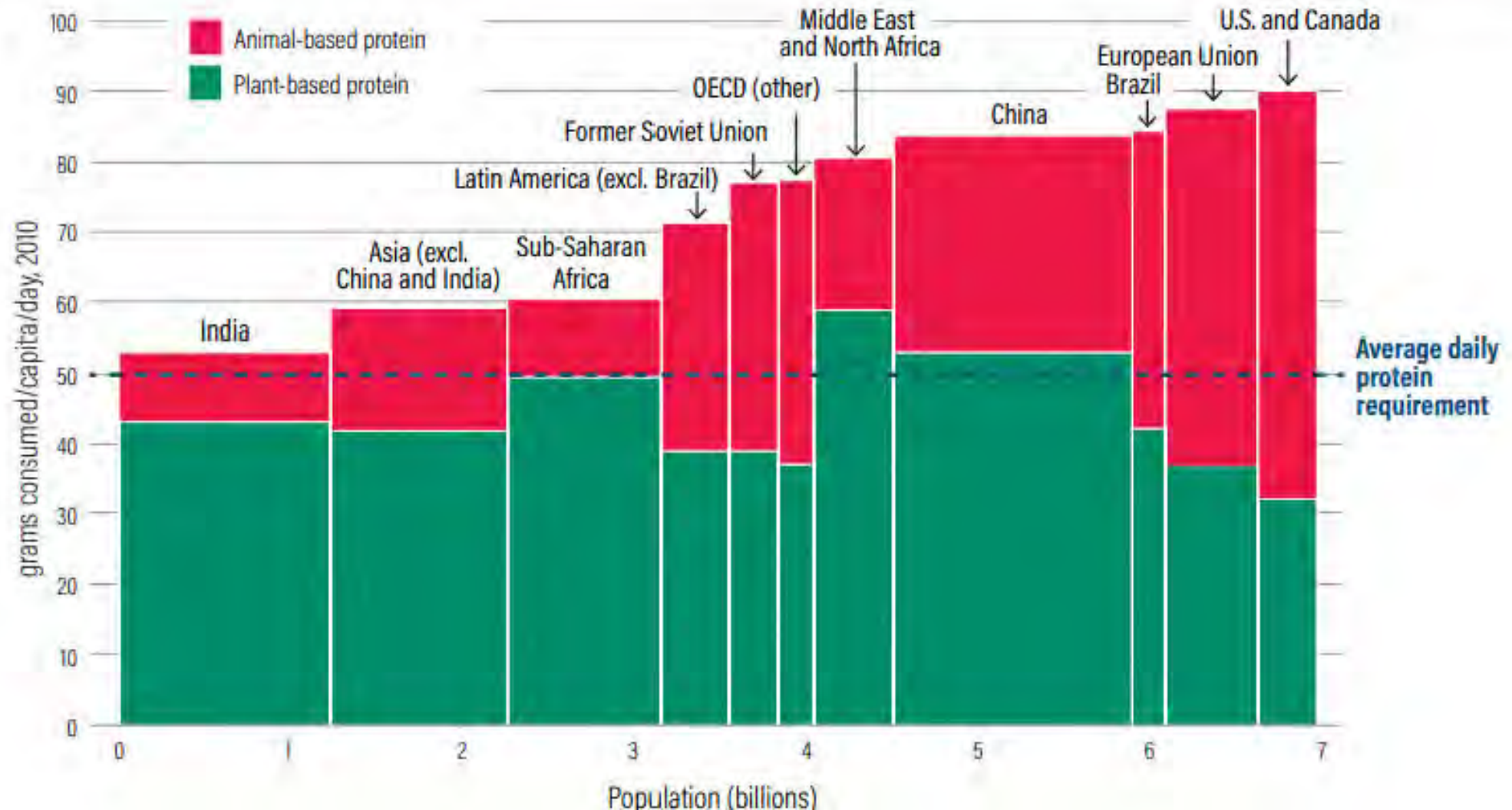
Things to consider:

- Geographical location
- Age (individual and population)
- Culture, religion and dietary preferences



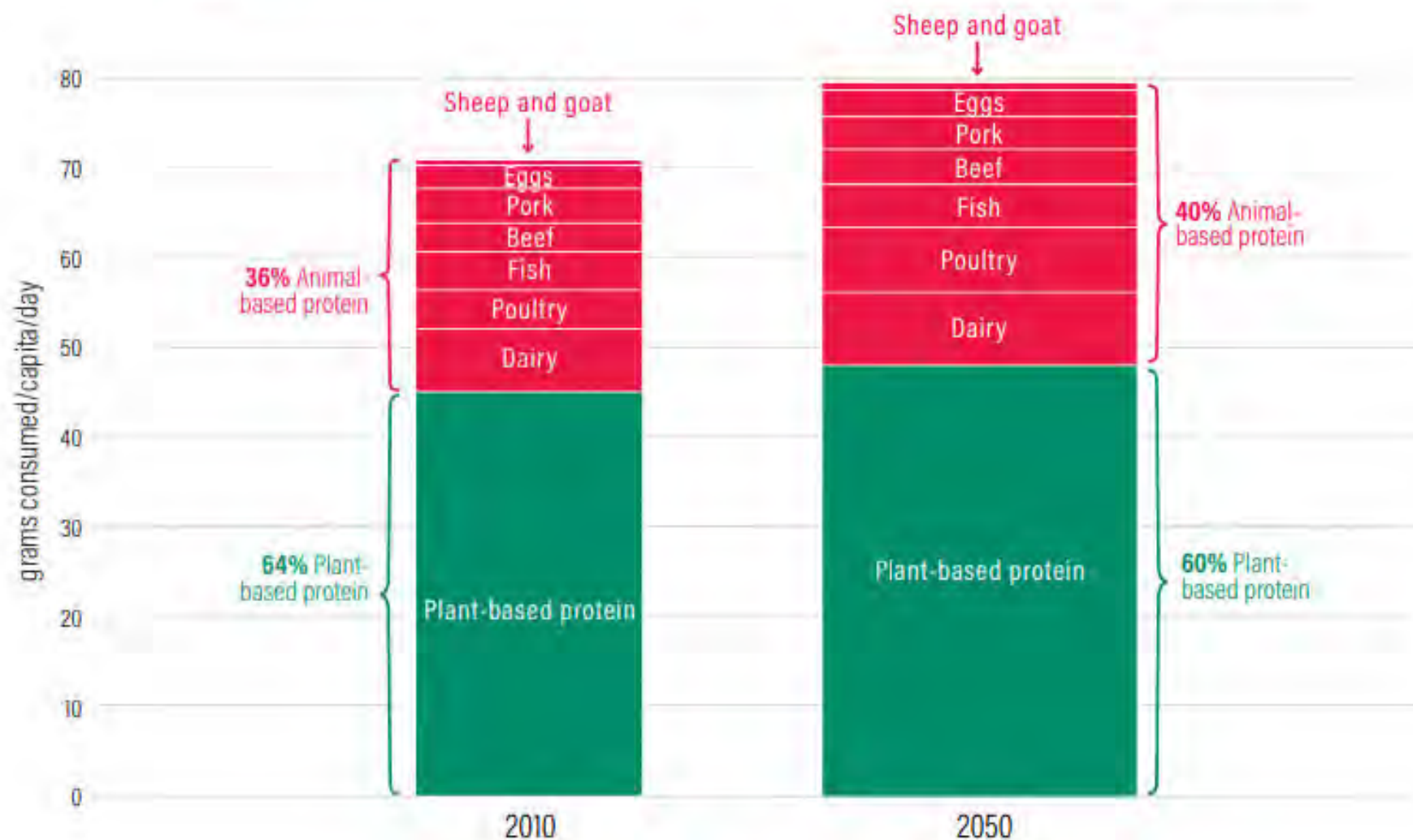
Protein requirements World Resources Institute

Figure 6-3 | Average protein consumption greatly exceeds average estimated daily requirements in the world's wealthier regions



Predicted changes in protein now to 2050

Figure 6-4 | Both global protein consumption and the share from animal-based foods are likely to grow by 2050



Are we over or under consuming protein



The long read

Protein mania: the rich world's new diet obsession

Why we can't get enough when we already eat too much

by [Bee Wilson](#)

Are you getting enough protein? The question provides its own answer: if you are worrying about the amount of protein in your diet, then you are almost certainly eating more than enough. This is the paradox of our new protein obsession. For many people,

From 50 onwards losing muscle and protein requirements increase as appetite declines

Our protein needs do not remain constant over the human lifespan: 0.8g per kilogram of bodyweight may be enough for a twentysomething, but not for an octogenarian. If anyone needs extra protein, it is not fit young gymgoers, but old people - particularly those on low incomes who may struggle to buy or cook meals for themselves. Instead of protein bars for the young and rich, we need omelettes and chickpea soup for the old and poor. From the age of 50 onwards we progressively lose muscle and our protein requirements become higher, just as appetite tends to decline. Rates of protein malnutrition are alarmingly high among elderly people admitted to hospital.

Alternative proteins – plant-based, lab grown, insects, algae



THE PROS

How healthy are alternative proteins?

THE CONS



- Foodborne diseases are eliminated.
- Nutritional composition can be tailored.

- Complex structure of meat is replicated using additives.



- More fibre and less saturated fat than meat.
- Comparable protein content to meat.

- Plant-based compounds reduce protein digestibility.
- Can contain high amounts of added fat and sodium.



- Good source of protein, polyunsaturated fatty acids, vitamins and minerals.

- Nutritional values vary.
- Possibility of allergy.



- Good source of protein, polyunsaturated fatty acids and fibre.
- Source of vitamin B12 and iodine.

- Low raw digestibility and may contain heavy metals.
- Nutritional values vary.



Key issues surrounding alternative proteins

- Sensory quality
- Food allergies
- Protein quality
- Digestibility and bioavailability
- Regulatory hurdles
- Public perception
- Cost and economic barriers

FOODLY FUTURE

Common meat substitute could increase food allergies

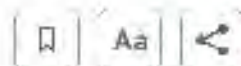
Fava beans give plant-based proteins a meaty taste and texture, however it can also trigger the allergies of people sensitive to other legumes, revealed new research published in *Frontiers*.

Europe

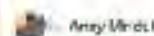
Italy wages war on lab-grown food in drive to protect tradition

By Angelo Amante

March 28, 2023 7:54 PM CMT+1 | Updated 7 months ago



90% of Koreans are Willing to Try Cultivated Meat, with Price & Taste Key Targets for Producers



Amy Wendt

Published on Oct 18, 2021

Last updated Oct 18, 2021

223,545 views

127,707 likes

1,000+ photos

DAILY SCIENCE

In a big step forward, lab-grown meat gets a key ingredient: 3D Fat.

To date, research has focused on producing muscle fibers. This new discovery moves us closer to cultured meat that is actually a delicious and viable alternative to animal slaughter.

Trends in synthetic and plant-based meats

CULTIVATED MEAT UPDATE

At the beginning of April, the Italian government proposed the first ever ban of the production and market of all “synthetic foods” including cultivated meat. The draft law, if passed, would be introduced to protect its local farmers, and for industry this is a powerful influence for authentic meats remaining firmly in the food system.

Beyond Meat may ‘need to tap the financial markets in 2024’ to stay afloat, says analyst as firm posts \$70.5m net loss in Q3

November 8, 2023 Elaine Watson

News | March 17, 2023

Nestlé pulls plug on plant-based Garden Gourmet, Wunda brands in UK, Ireland

Applicable only to the UK and Ireland, the withdrawal also includes the Mezeast Middle Eastern food line.



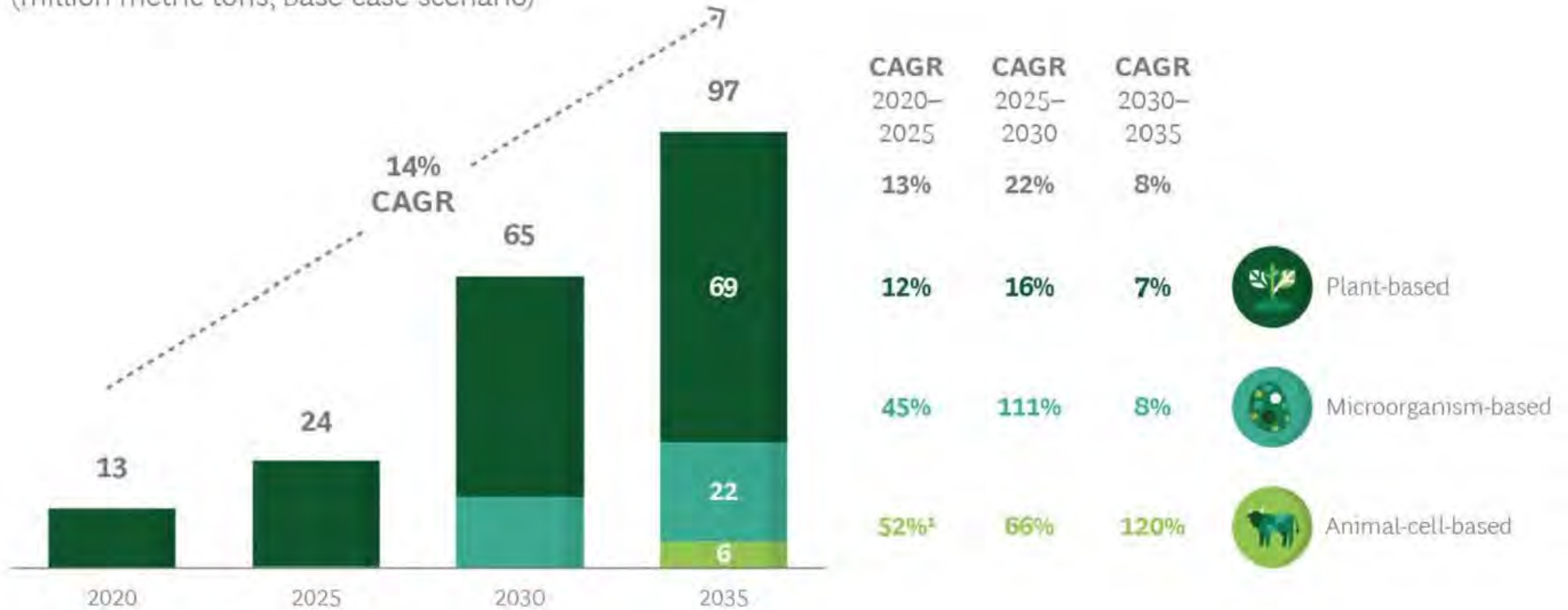
Lab-Grown Meat Up To 25 Times Worse For The Environment Than Beef

Beefing up the production of cultured meat isn't feasible just yet.



Alternative protein consumption and three growth waves

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



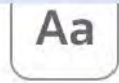
Sources: US Department of Agriculture; Euromonitor; UBS; ING; Good Food Institute; expert interviews; Blue Horizon and BCG analysis.

¹CAGR from 2022 to 2025, starting from market entry.

<https://www.bcg.com/publications/2021/the-benefits-of-plant-based-meats>

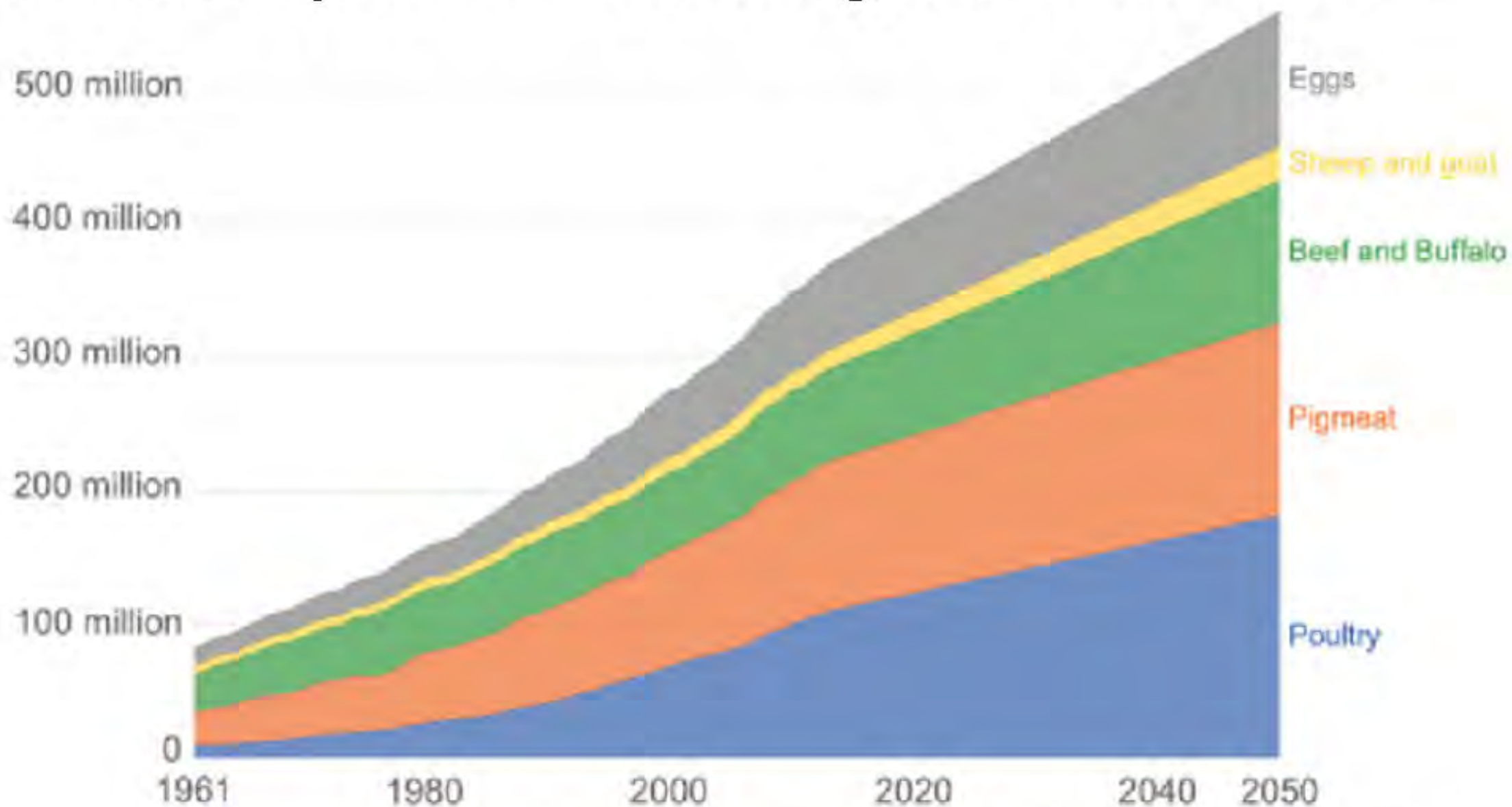
Czech firm Bene Meat gets EU approval for lab-grown meat for pet food

November 8, 2023 5:18 PM GMT · Updated a day ago

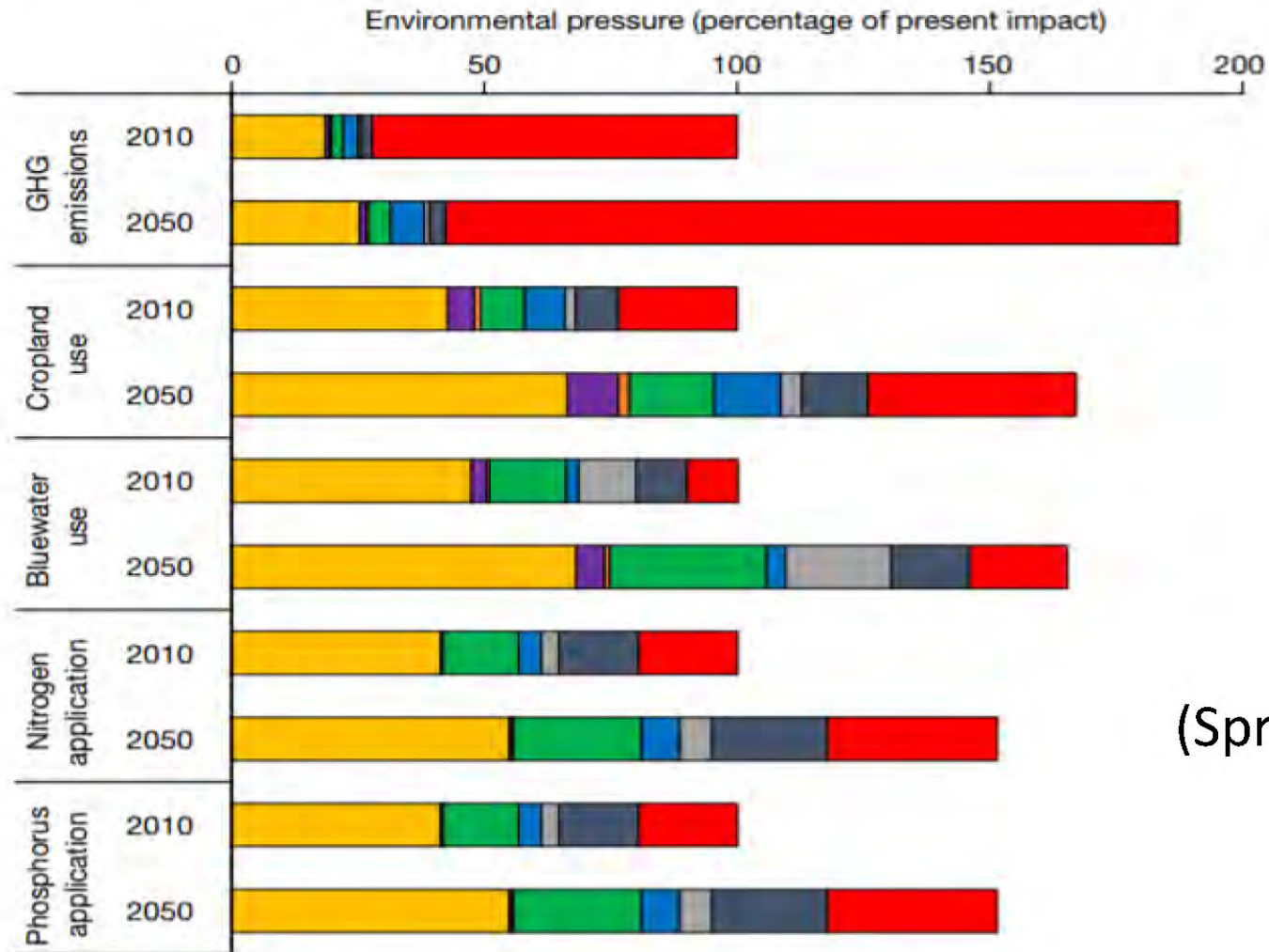


how it tastes to the animals. We expect we will go through this in a matter of months

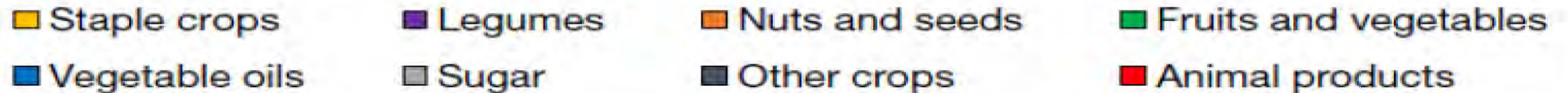
Livestock protein sector growth to 2050



Present and projected environmental pressures



(Springmann, Nature 2018)



Animal Task Force

http://animaltaskforce.eu/Portals/0/ATF/2023/ATF_Policy_Brief_2023_Agricultural_methane.pdf

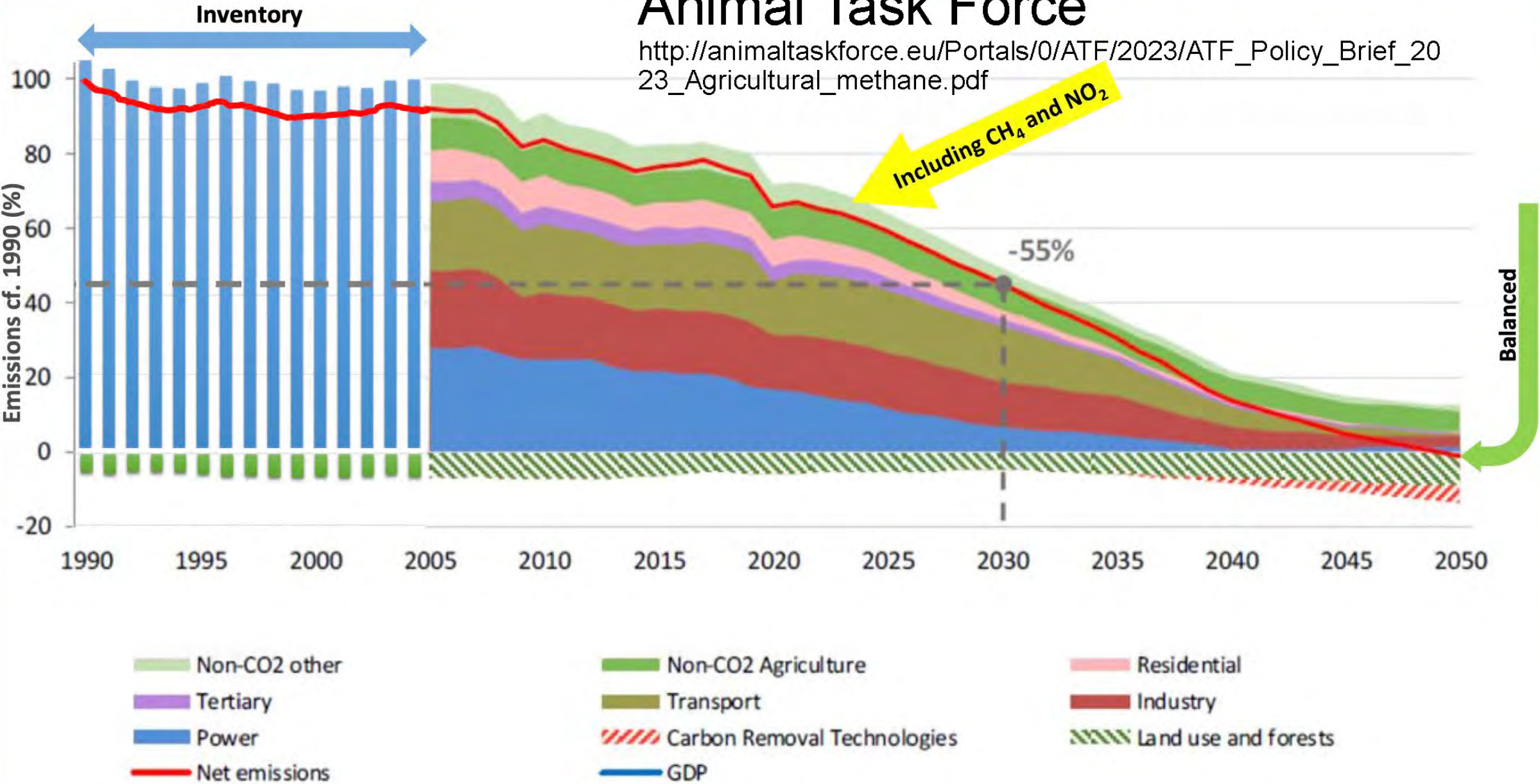
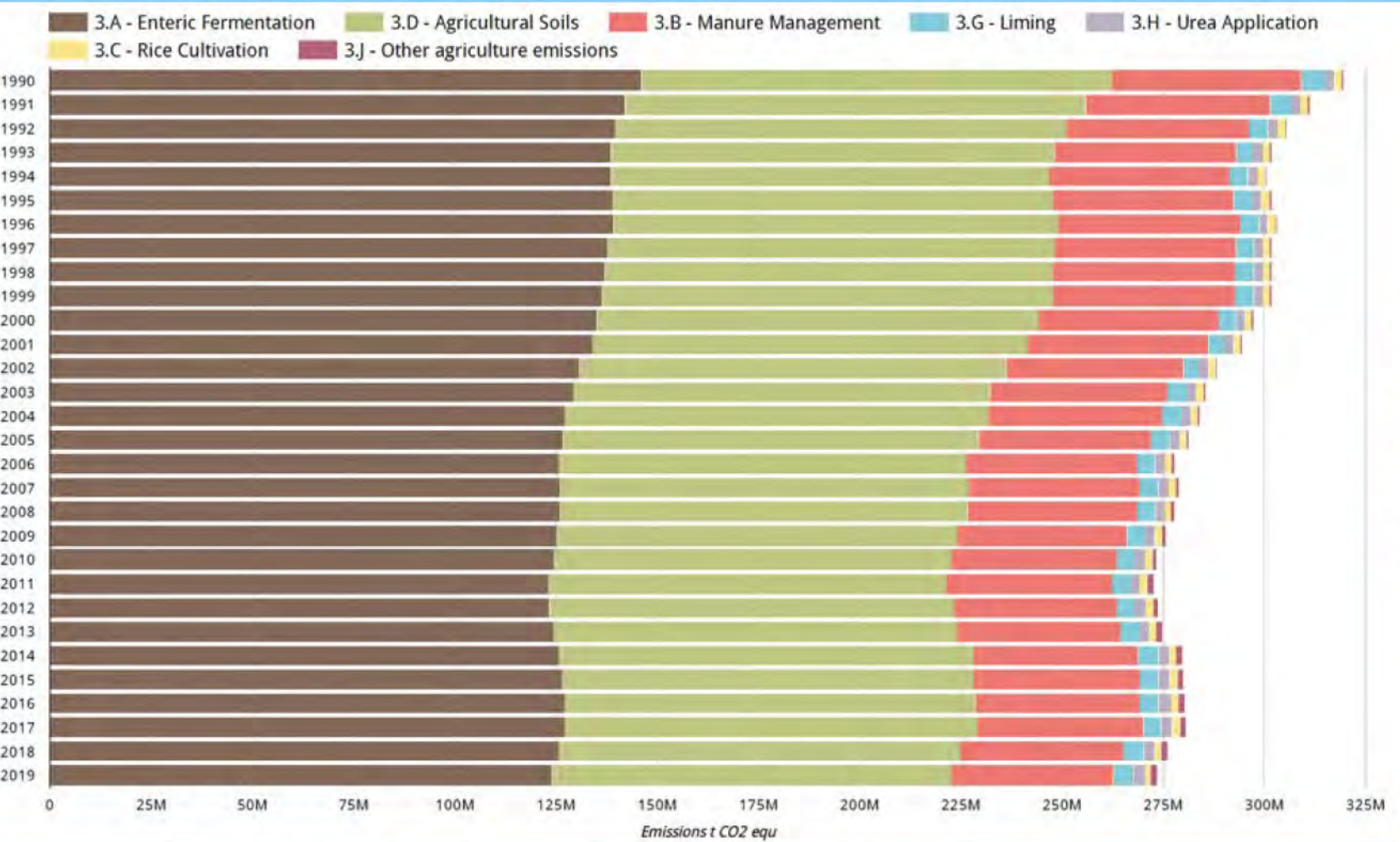


FIGURE 3. EU PATHWAY TO CLIMATE NEUTRALITY (EU COMMISSION)

Agriculture Emission Trends and Drivers



Enteric Fermentation, Agriculture Soils, Manure management are major emission sources



Co-funded by the European Union

Rising livestock emissions undermine world's climate fight – FT climate- food & agriculture 9/11/23

Greenhouse gas emissions from the world's top meat and dairy producers increased further this year, highlighting the urgent need for the food industry to clean its practices and help prevent global warming.

Disclosed emissions from the world's 20 largest public companies rose 3.3% from 2022 levels, according to a network FAIRR Initiative. Its analysis includes companies like Tyson Foods Inc. and China's New Hope Liuhe Co., which supply Walmart Inc. and McDonald's Corp.



Disclosed emissions from the world's 20 largest publicly-listed meat and dairy companies rose 3.3% from 2022 levels, according to a report by investor network FAIRR Initiative. Mario Tama—Getty Images

Feed for livestock -drivers for change

- Reliance on unsustainable protein sources (i.e., imported soya)
- Feed vs Food vs Energy competition for resources
- Environmental impacts of conventional protein sources
- Economic and geo-political uncertainties (i.e., energy prices, trading partnerships)



Feed for livestock -drivers for change

- Livestock feed → largest coverage agri land globally (~2 x food)
- Expansion of soya production in global South → land degradation, deforestation, biodiversity decline, GWP, water
- Transportation over long distances → emissions, costs, vulnerable supply chains to interruption
- Feed & food safety of conventional feeds
 - chemical contamination (e.g., pesticides)
 - biological contamination due to long-term storage and transportation (e.g., mycotoxins)

Feed for livestock – novel feeds



- What **alternatives** could help **substitute** conventional, unsustainable protein feed ingredients (e.g., imported soya)?
- How **environmentally** friendly, **commercially** viable, **affordable**, and **safe** are they likely to be?
- Do they pose any significant risks to **feed & food safety** and **security**?
- How can they contribute towards **sustainable development** of the **livestock sector**?

Growing alternative protein crops

Home grown legumes → faba beans, peas, lupins

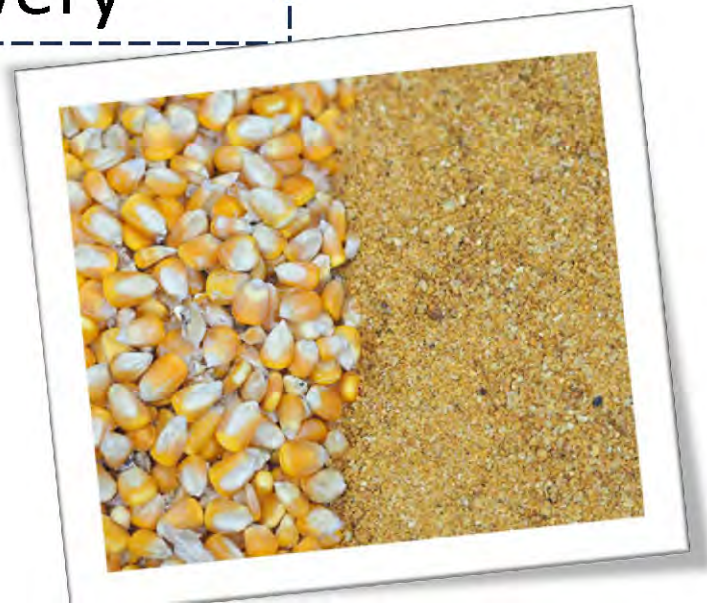
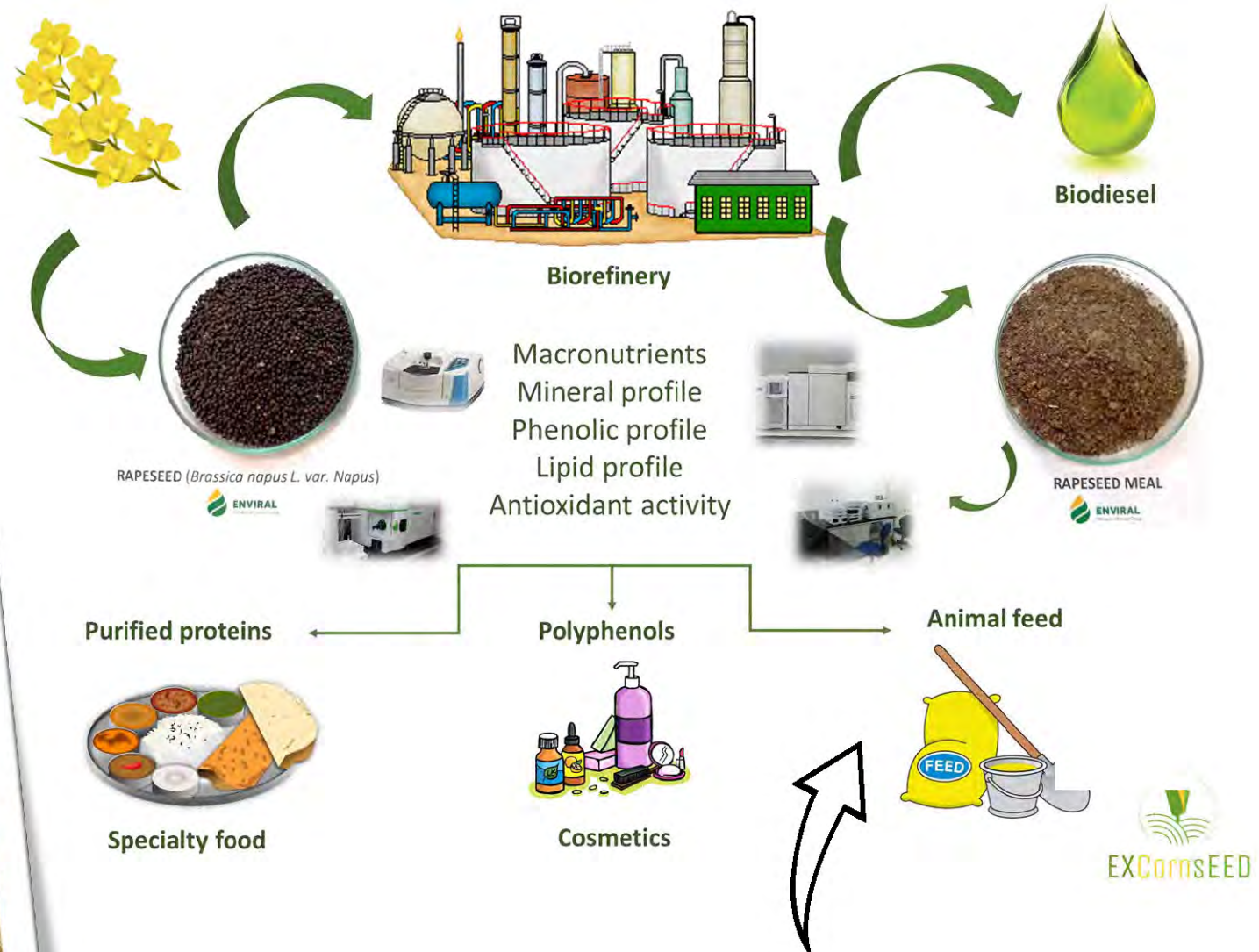


Circular agriculture for protein feeds

Crop production

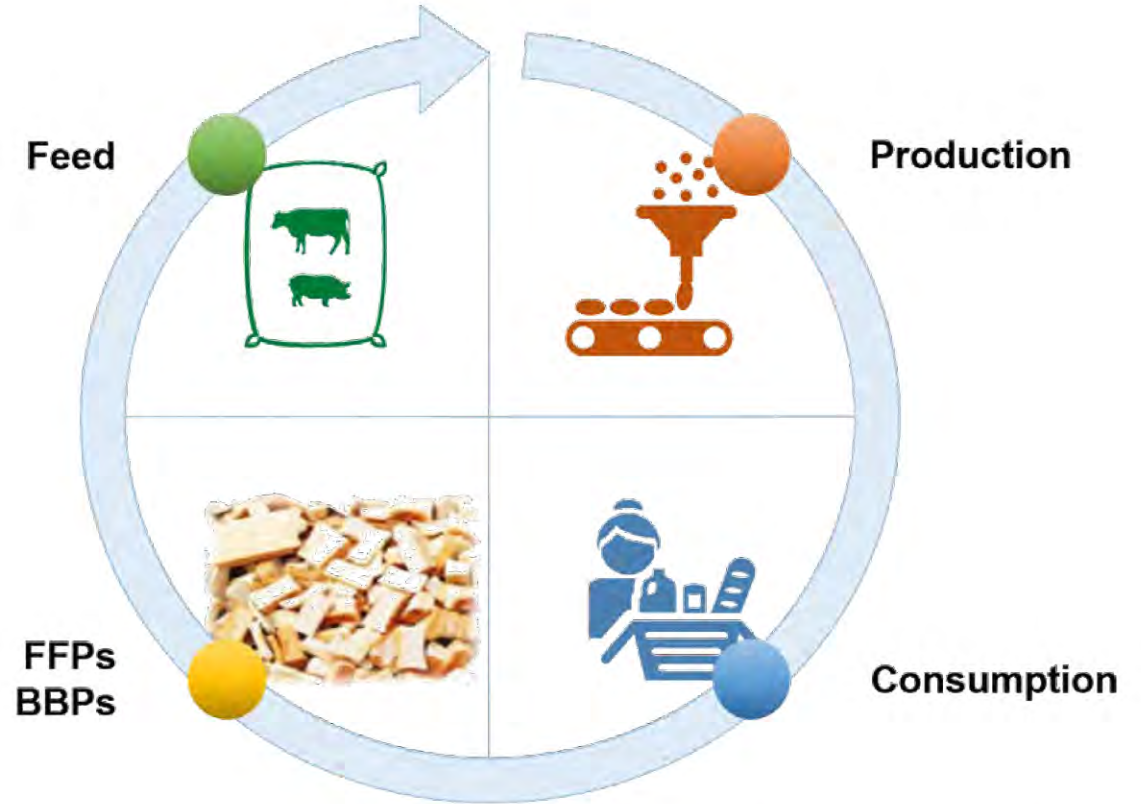
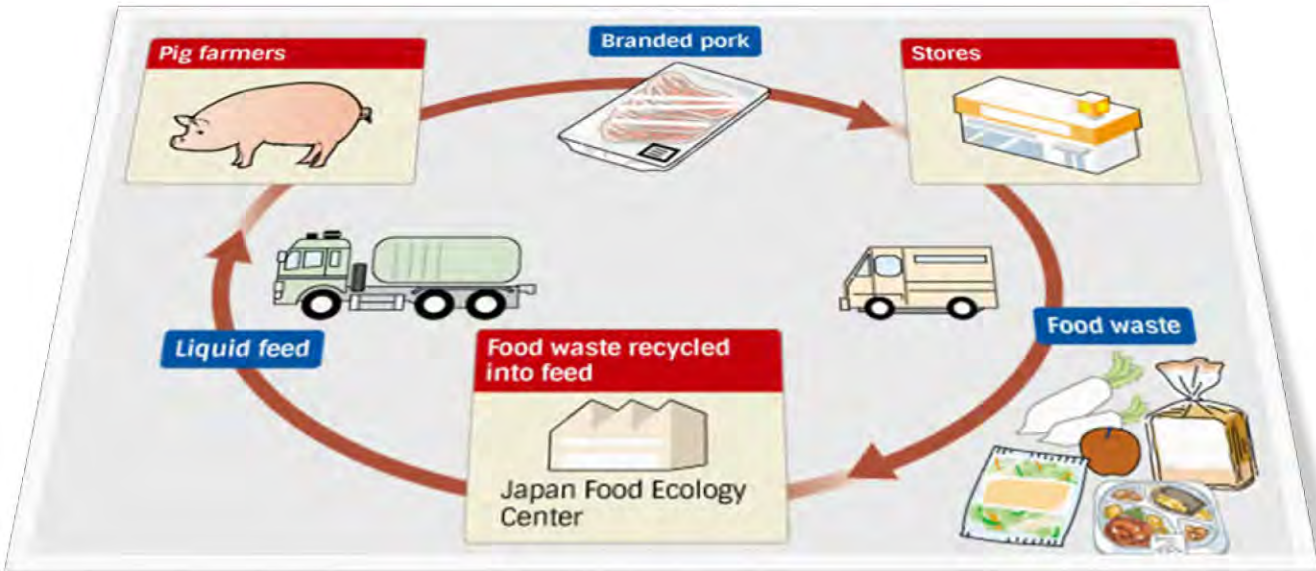
Biorefinery

Brewery



Circular agriculture for protein feeds

Food waste



Former foods & food industry by-products

Alternative proteins - insects

Tyson Foods teams up with Dutch insect ingredients firm Protix for sustainable protein production

 by Vishal Singh — October 18, 2023 in (Crowd)funding, News



Market Research

Insect Protein Market Anticipated to Grow \$3.3 billion by 2027

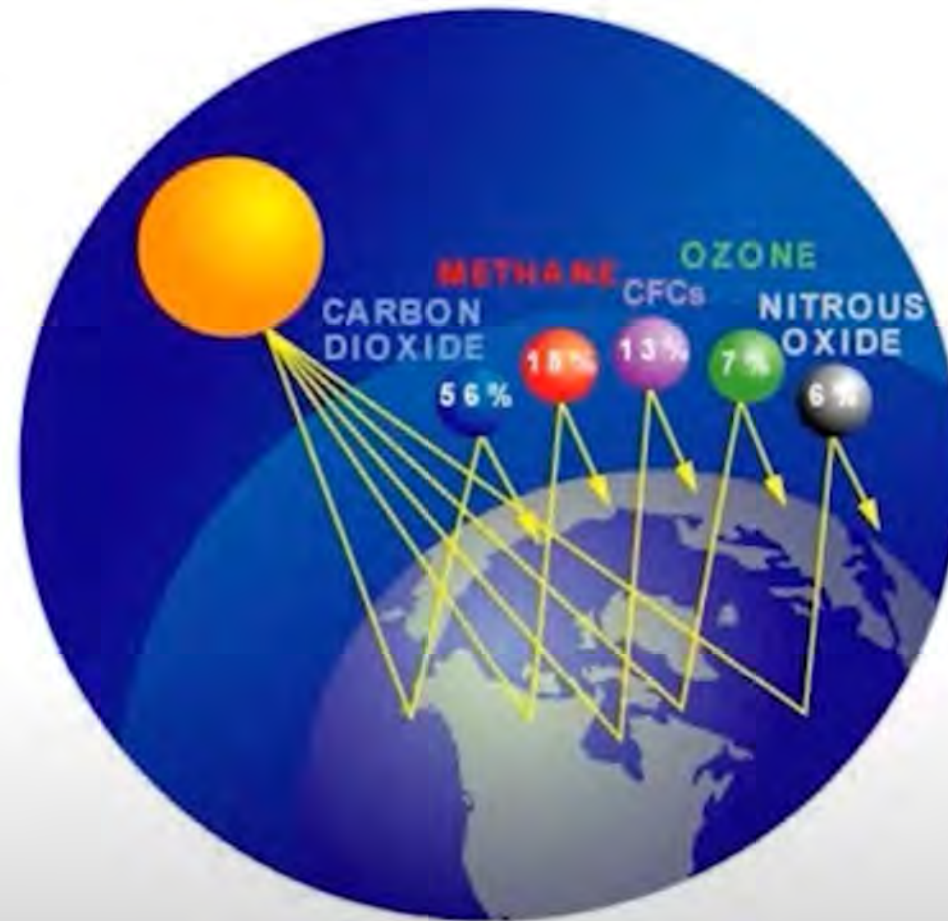


Greenhouse gases (GHGs)

Carbon Dioxide (CO₂)

Methane (CH₄)

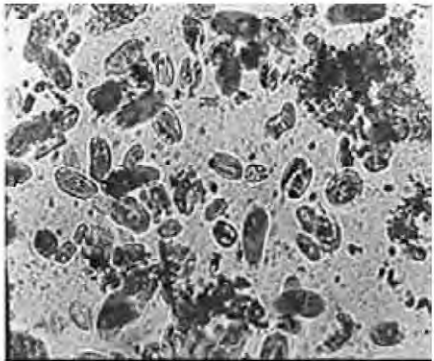
Nitrous oxide (NO₂)



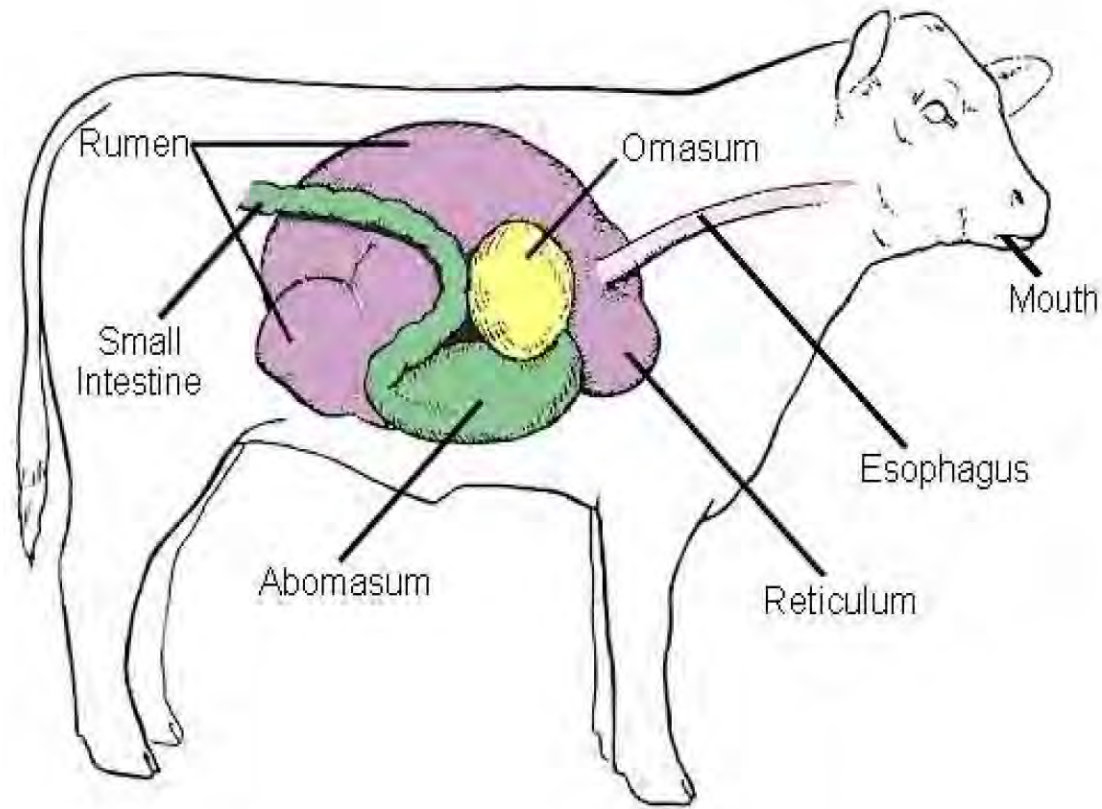
Rumen microbiome is central to planetary health



Bacteria: 10^9 - 10^{10} /mL



Protozoa: 10^4 - 10^6 /mL



Fungi: 10^3 - 10^4 /mL



Archaea (methanogens)
Approx. 10^4 /mL

Animal Task Force

http://animaltaskforce.eu/Portals/0/ATF/2023/ATF_Policy_Brief_2023_Agricultural_methane.pdf

RECOMMENDATIONS



- **RECOMMENDATION 1**

The appropriate reduction target for methane, particularly agricultural methane, should be assessed using the scientific basis that accounts for the short-lived nature of methane.



- **RECOMMENDATION 2**

Developing and deploying methane mitigation options should be high priorities for EU research and innovation activity. The Expert Group on methane emissions to promote the uptake of innovative mitigation actions should be re-activated.

Meeting the protein demand together

Novel alternative proteins and
traditional animal sourced foods

*Access to sufficient, safe &
nutritious **food** that meets their
dietary needs and **food** preferences
for an active and healthy life*





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