# What's cooking?

## An assessment of the potential impacts of selected novel alternatives to conventional animal products

UN environment programme

Belgium
partner in development

Frontiers 2023 | SPECIAL ISSUE 8 December 2023

# Background

## Animal agriculture is an important source of nutrients for many communities.

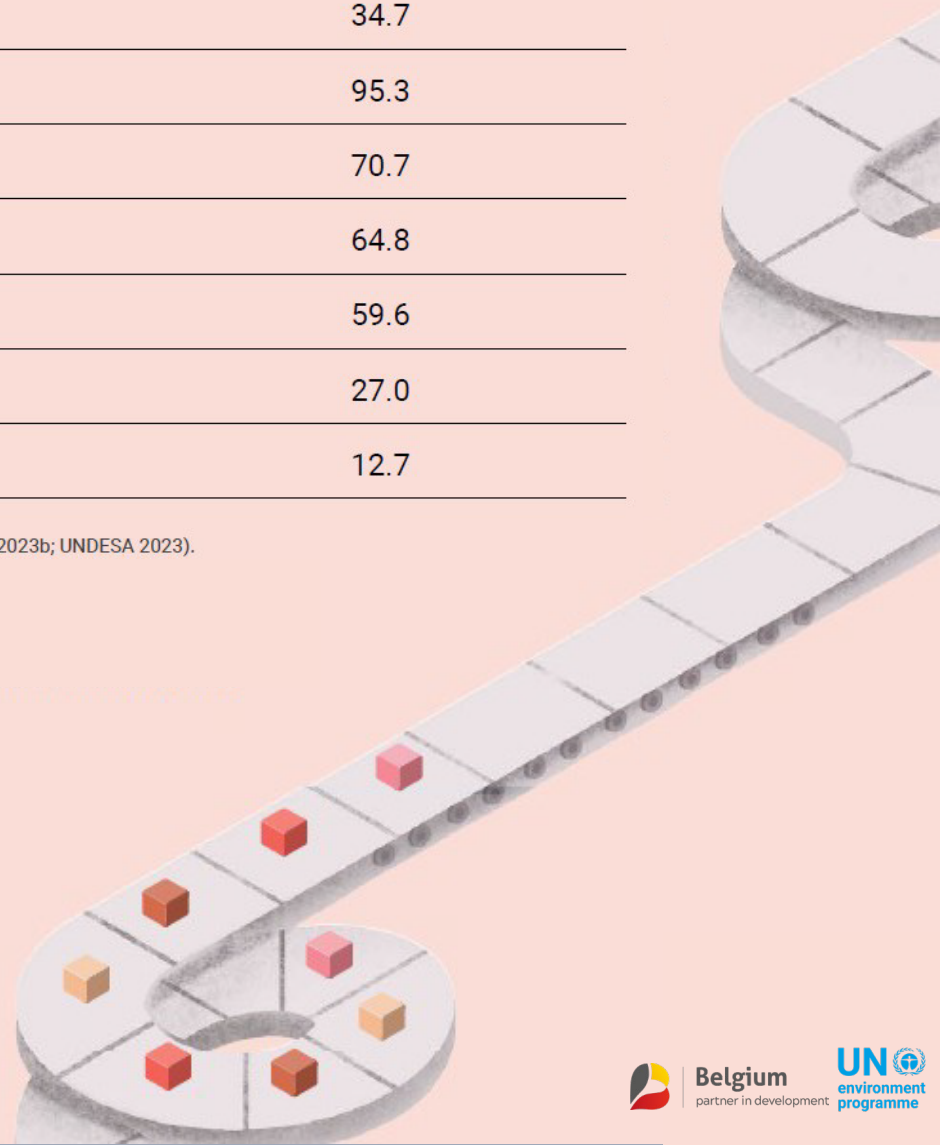
There are important **regional differences** in current consumption, and **variations among different income groups.**

## Global meat consumption is expected to grow by 50% or more by 2050.

**High levels** of animal source food **consumption and production threaten SDGs related to climate, biodiversity, and health.**

| Region | OECD-FAO Outlook |
|---|---|
| World | 34.7 |
| North America | 95.3 |
| Oceania | 70.7 |
| Europe | 64.8 |
| Latin America and Caribbean | 59.6 |
| Asia | 27.0 |
| Africa | 12.7 |

Source: (OECD and FAO 2022; FAO 2023a; FAO 2023b; UNDESA 2023).



# Impacts of animal agriculture include

**Major driver of climate change**

- **60% of food-related emissions**
- **14-20% of global emissions**

**Widespread environmental effects**

- **deforestation**
- **air and water pollution**
- **biodiversity loss**
- **soil degradation**

**Significant public health risks**

- high intake of **red and processed meats** is associated with various NCDs
- **zoonotic diseases**
- **antimicrobial resistance**

**Animal welfare concerns**

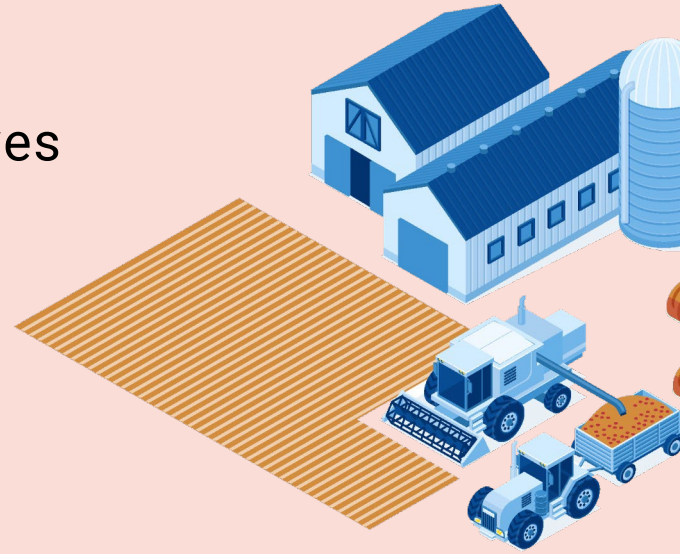
- **Tens of billions of animals are raised and killed for food** annually, the vast majority in intensive farms

Belgium partner in development
UN environment programme

**A range of interventions** have been proposed **to help reduce the environmental impact of animal agriculture.**

So far, these **have not delivered change** at the scale and speed necessary.

- Reducing food loss and waste
- Smaller-scale, extensive or regenerative livestock farms
- Reducing meat consumption in favour of whole plant proteins
- Feed additives
- Meat taxes

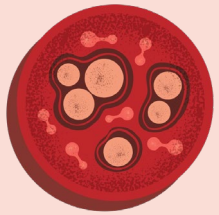


UN environment programme

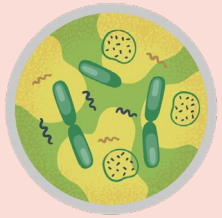
Belgium partner in development

# Three novel alternatives are examined in the report:

**Novel plant-based foods**: Replicate the sensory experience of animal products



**Cultivated meat**: meat produced directly from animal cells.

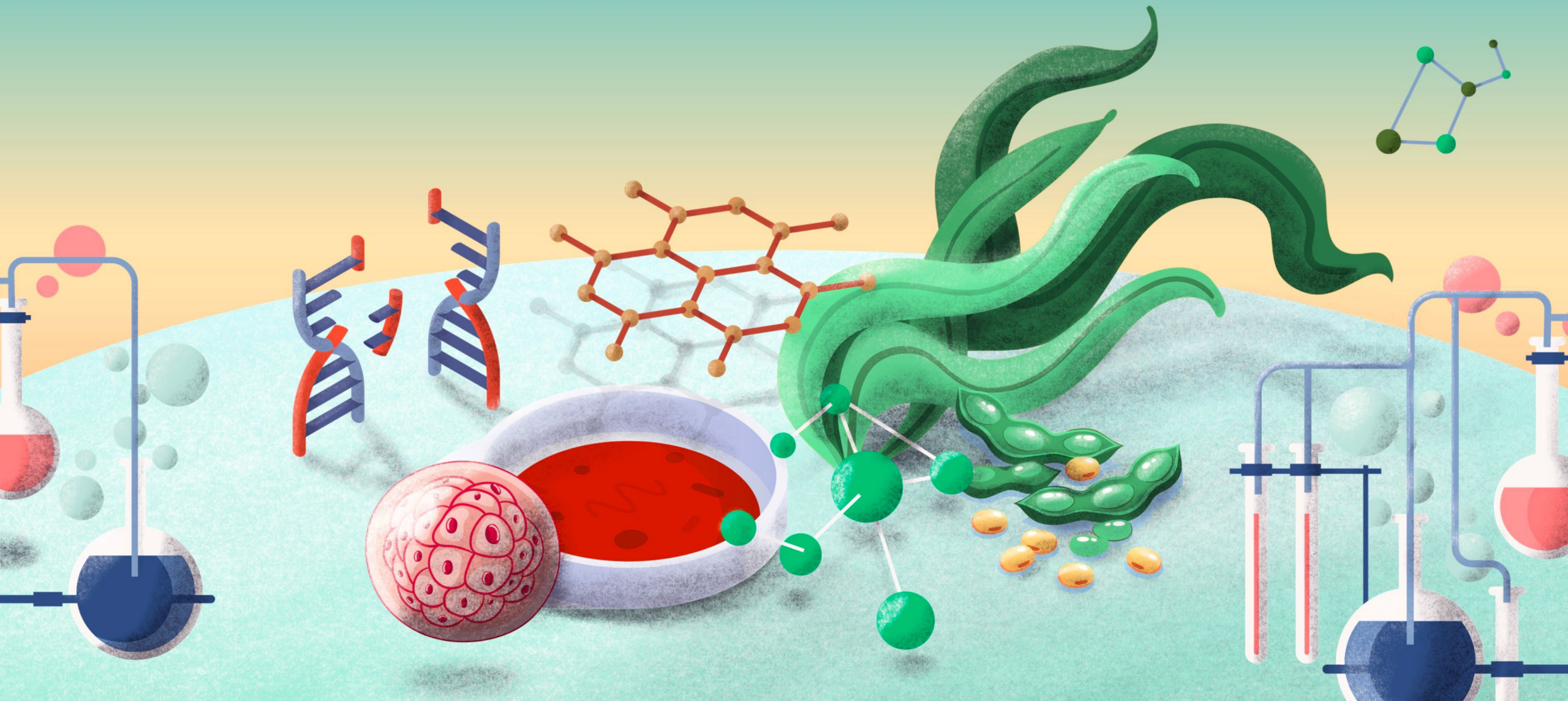


**Fermentation-derived products**:
foods produced using **biomass** and **precision** fermentation

Using microorganisms to make protein-rich food, **microorganisms are the primary ingredients.**

**Micro-organisms are used to produce specific ingredients** (protein, flavour, vitamins).

# Key findings



# Alternatives offer promise of reduced environmental impacts

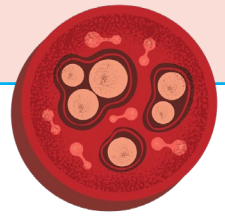
## Novel plant-based products

compared to conventional beef, offer reductions of:

- **Land use: 86–97%**
- **GHG emissions: 67-89%**

Compared to conventional pork and chicken:

- Substantial **land use reductions**
- **Lower GHG emissions, if low-carbon energy is used.**

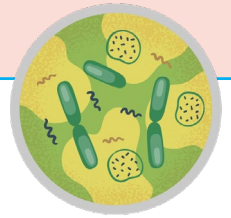


## Cultivated meat

could significantly reduce **land use** needs:

- **Beef: 97–99% per kg**
- **Pork: 60–99% per kg**
- **Chicken: 43–98% per kg**

**Using low-carbon energy** with the most carbon efficient production techniques**, the GHG footprint of cultivated meat could be up to 40 times smaller than conventional beef** and a quarter of conventional chicken and pork.



## Fermentation-derived products

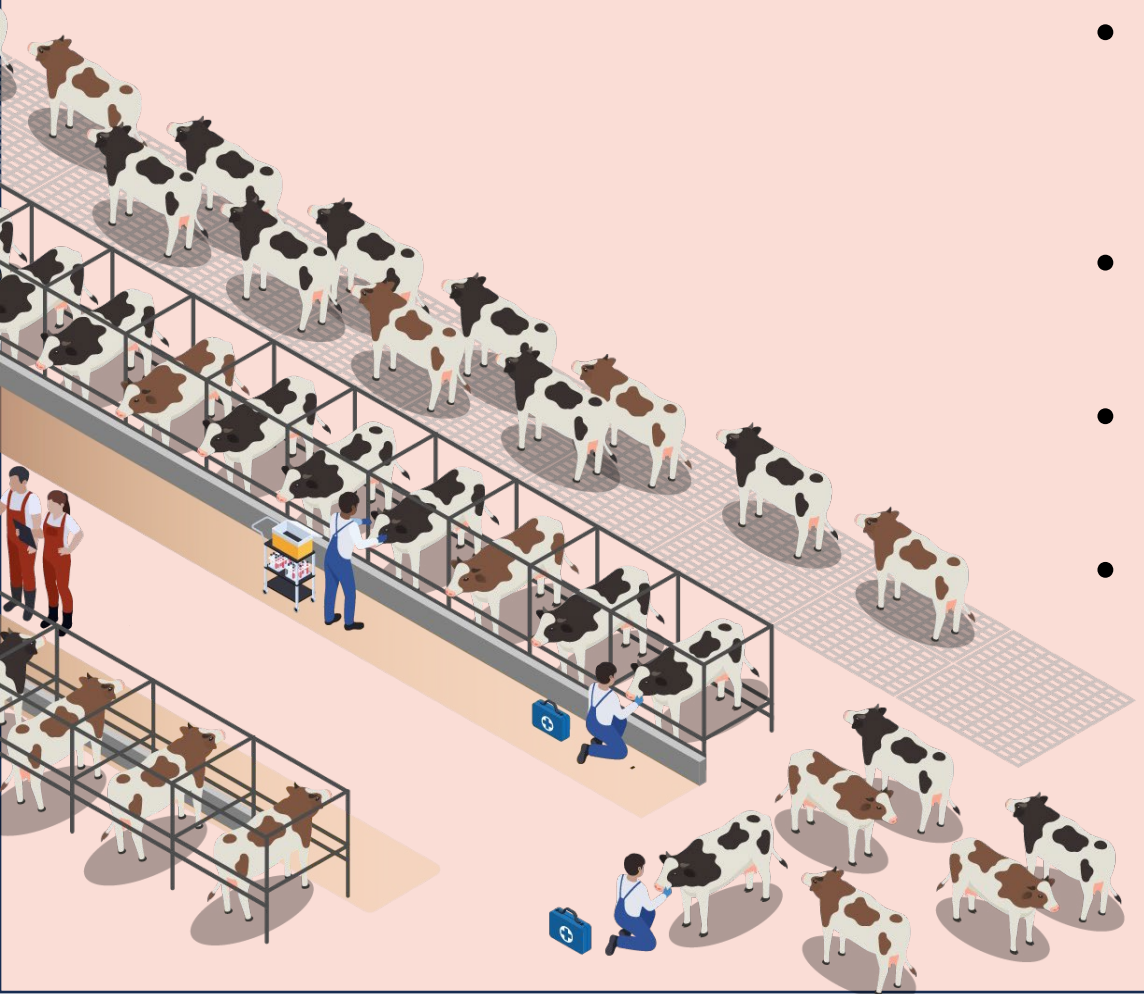
compared to ruminant meat, per unit, offer reductions of:

- **Land use: 90%**
- **GHG emissions: 80%**
- **Water use: 90%**

**The environmental benefits of replacing pork and poultry with mycoprotein are less clear.**

UN environment programme
Belgium partner in development

# Other significant benefits for public health and animal welfare:



- reduced risks of **zoonotic disease outbreak**
- reduced risks of **antimicrobial resistance**
- reduced **foodborne illnesses**
- reduced **animal welfare concerns** associated with large-scale animal agriculture.

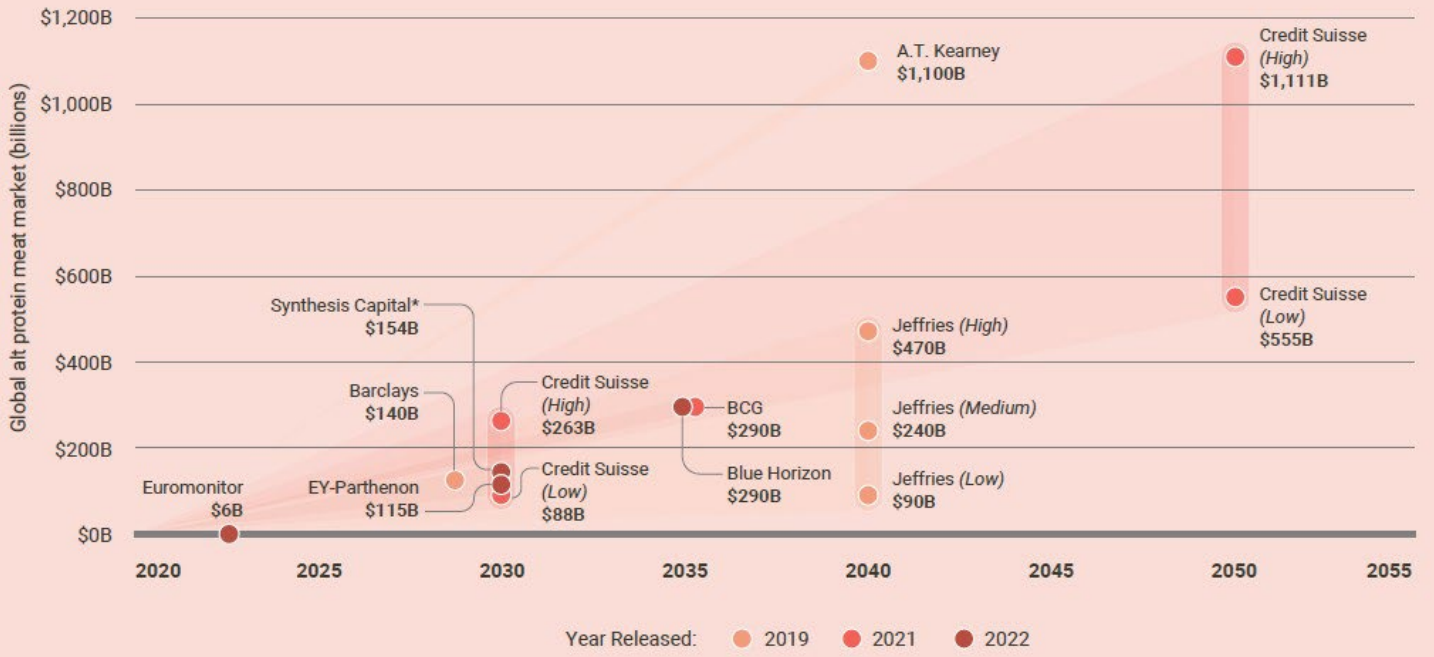
# Forecasts for the size of market vary significantly

**The degree of uptake will depend on:**

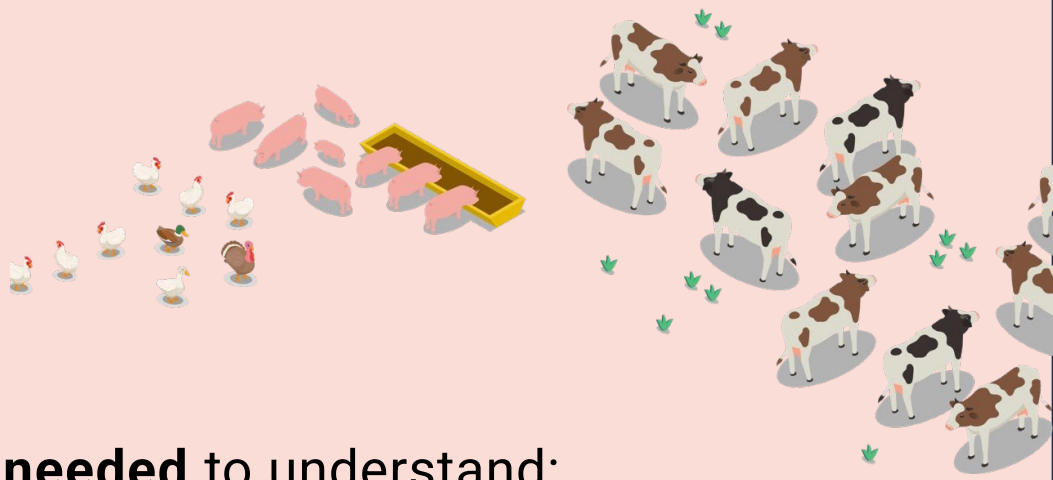
- Bringing down the **cost**
- Improving **taste**
- **Cultural acceptability**
- Overcoming significant **technical challenges** (for cultivated meat) including bioreactor systems and growth media that can scale
- **Regulatory developments**

Figure 3.4

**Global alternatives to conventional meat industry forecasts by year**



# Research gaps



**More open access research is needed** to understand:

- **Nutritional implications** of regular consumption of alternatives
- Other **socio-economic and health implications of their uptake in different regions**, especially considering equity between different income countries, food security, and livelihoods of smallholder farmers.
- **How to bring down the cost** of novel alternatives

# Policy landscape

# Policy avenues

## Current policies

- Funding **open access research** and/or **research centres**
- **Funding industry or manufacturing**
- **Regulation** (novel foods approval processes, labelling)
- **Financial investments and instruments** (tax exemptions, subsidies)
- **Workforce development**

## Additional policy options available

- Further investments in **R&D and open access research**
- Support **for commercialization**
- **Development of appropriate regulatory frameworks**
- Incorporating **environmental and health externalities** in price of conventional ASF
- **Just transition planning and support**
- **International collaboration**

# Conclusion

If supported by appropriate regulatory regimes and governance instruments,

**Novel ASF alternatives can play an important role**, likely with regional differences, **in a shift towards food systems that are more sustainable, healthier and less harmful to animals.**

# Thank you!

UN environment programme

Belgium
partner in development

United Nations Avenue, Gigiri
PO Box 30552 – 00100 GPO Nairobi,
Kenya

www.unep.org