



# How easily (or not) can we replace ➤ animal proteins with alternatives?

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Sources :

EASAC report launched on Sept 4, 2025

Scientific publications

INRAE website



# Motives and barriers of consumption of meat products

According to Eurobarometer on Food Safety in the EU (EFSA, 2022), the main factors that European consumers value in food purchases are **cost (54%), followed by taste (51%) and food safety (46%)**. The impact on the environment and climate (16%) and ethics and beliefs (15%) rank lowest in importance (EFSA, 2022). Cited from EASAC report, page 52.

Young, highly educated  
and rich consumers in  
Western countries

Chinese consumers

Consumers  
from Africa

Consumers  
from Spain  
and South  
America

**Safety  
concerns**

Human  
health

Environmental  
concerns

Animal  
welfare

Meat  
production and  
consumption



**Price**

**Eating quality**

Social identity and  
part of socialization

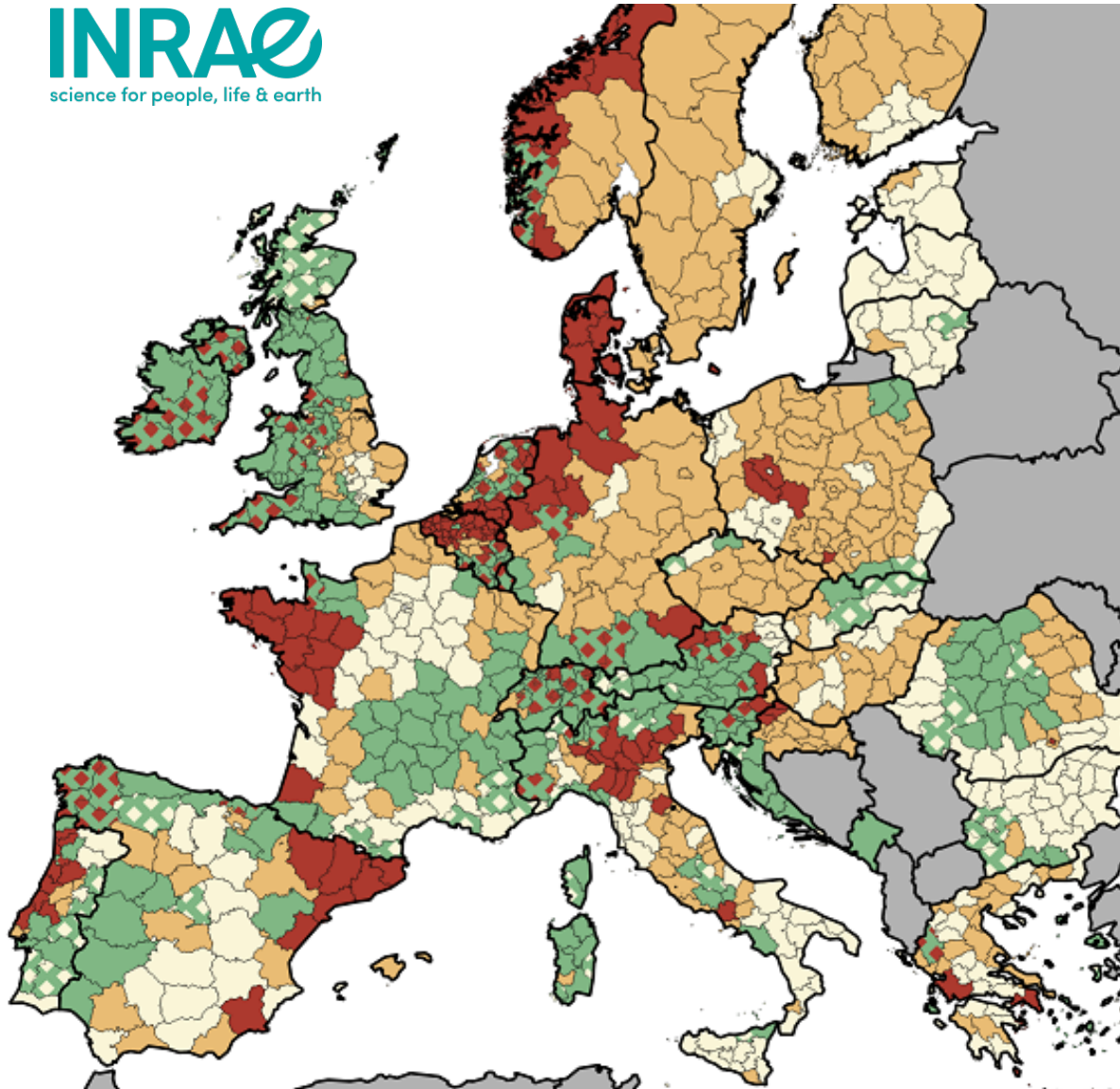
Pleasure of eating meat

Culinary culture, cultural  
aspects, traditions

**Motives to  
consume meat  
substitutes and  
cultured meat**



# The type of livestock systems drives consumers' perception



- Low-grassland areas with high livestock densities
- Grassland-dominant areas with high livestock densities
- Grassland-dominant areas with average livestock densities
- Grassland-dominant areas with low livestock densities
- Both crop and livestock production
- Low-grassland areas with low livestock densities
- No data



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## Some misconceptions about meat and livestock

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### Quelques idées fausses sur la viande et l'élevage

<https://www.inrae.fr/actualites/quelques-idees-fausses-viande-lelevage>

# Plant-Based Meat Alternatives



- This sector has expanded significantly, and **commercially viable products are widely available. Some products are highly processed**, which present specific challenges.
- Compared to conventional meat, environmental impacts are lower in terms of emissions expressed per kg of product but **depend on processing intensity**.
- There are **some concerns in terms of micronutrients** (composition and bioavailability). Furthermore, high levels of salt, fat, and additives used in some highly processed products raise concerns about their long-term health effects.
- Consumer acceptance is relatively high although taste, texture, and price competitiveness remain key factors influencing or limiting market growth.
- Further technological advancements are needed to enhance texture, improving protein quality and bioavailability.

# Biomass and Precision Fermentation Products



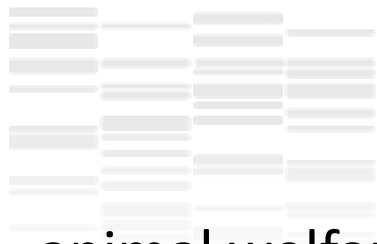
- Biomass fermentation production is an innovative approach in sustainable food technology, focused on generating protein from microorganisms rather than animals. Precision fermentation allows for the targeted production of specific proteins.
- **Environmental benefits depend on the feedstocks used, the production system and the location** with significant land use reductions but potentially high energy demands.
- **Fermentation products can offer a balanced nutritional profile.**
- **Scaling up remains a key barrier**, with production still being expensive.
- Regulatory approvals and consumer perception of the **use of genetically modified organisms may impact adoption**, particularly in regions like Europe.



# Insects as Meat Alternatives



- Insects offer a **highly efficient and sustainable protein source**. It is an attractive option for circular economy applications.
- Nutritionally, insects provide high-quality protein, iron, and zinc, with high bioavailability. However, **concerns exist over allergenic potential and digestibility**.
- **Large-scale production faces technological hurdles**, including automation, cost efficiency, and regulatory clarity, particularly in the EU's novel food framework.
- **Consumer acceptance in Europe and North America remains low**, largely due to food neophobia and cultural perceptions. However, market entry could be easier for processed forms (e.g., insect flour in protein bars).
- There are also some **ethical challenges** including animal welfare implications.

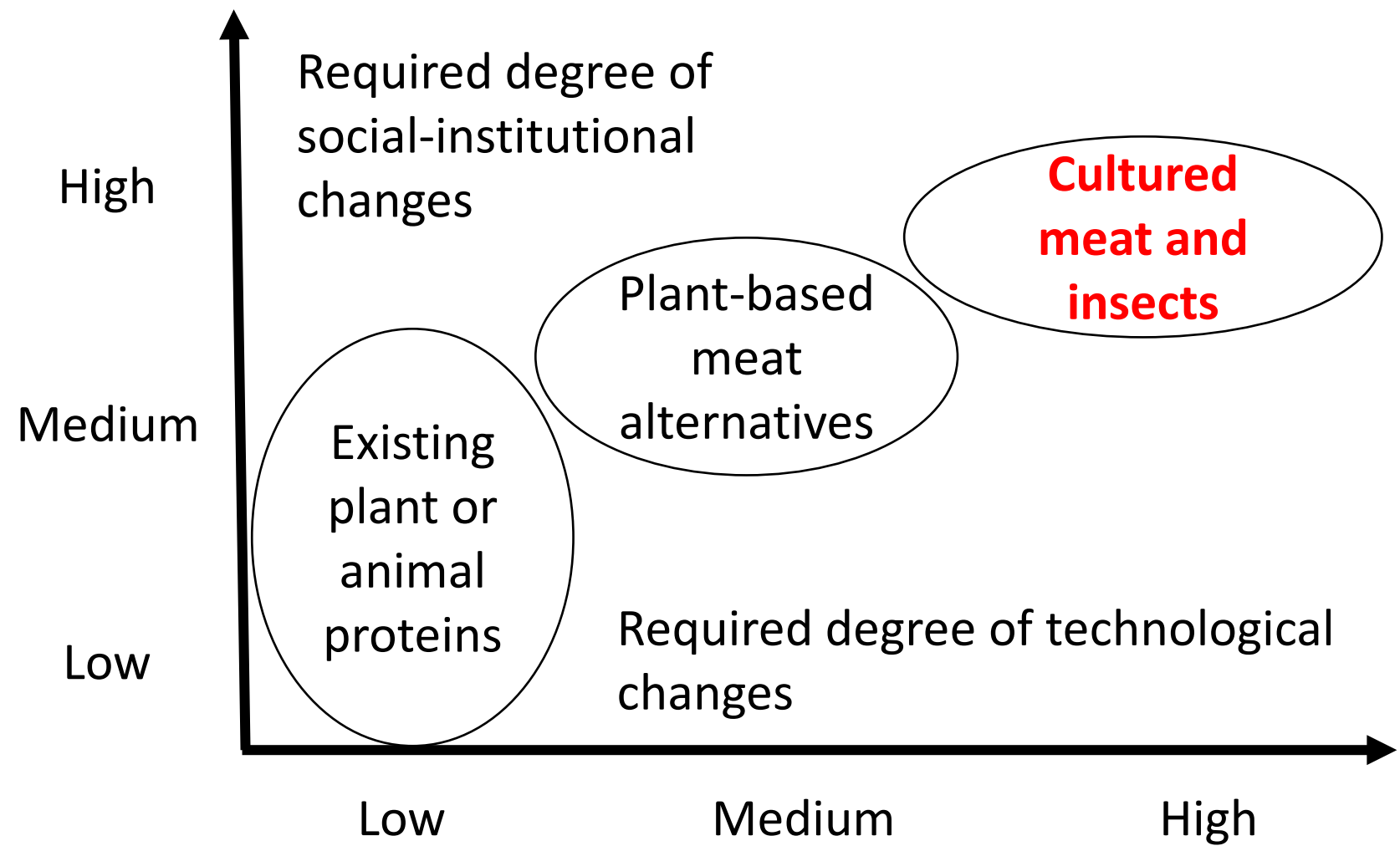


# Cultured meat



- In Europe, animal welfare is a key driver for its development, whereas in other regions, sustainability and life cycle assessments are more central.
- Studies about **life cycle assessments (LCAs) have uncertainties**. They suggest that cultivated meat could have lower emissions than traditional beef production, but that impacts are comparable to poultry if energy sources are not optimized. They also suggest that it may require high energy inputs depending on the production process.
- **Health benefits and risks remain uncertain** due to limited market exposure. More research should be conducted on product composition and digestibility.
- Although there are no warnings in Singapore, the US, Israel and Oceania (where cultured meat has been approved for commercialisation), assessing health impacts may take time and approval of products in the EU is still pending (with at least 2 applications).
- A significant ethical issue is the **perception of cultivated meat as "unnatural"**. This reflects deep-seated cultural and ethical concerns about its acceptability.

# The required degree of changes is a driver of food acceptance



Meat alternatives	TRL (Technology Readiness Levels) (0-9)	CRI (Commercial Readiness Indicators) (1-6).
Plant-Based alternatives	8-9	3-4
Biomass Fermentation	8-9	3-4
Insects	8-9	3-4
Cultured meat	3-7	1-2

Adapted from EASAC report, page 64.



Van der Weele C, Feindt P, Jan van der Goot A, van Mierlo B, van Boekel M. Trends Food Sci Technol. (2019). 88:505–12.  
Warner (2019). Animal, 13, 12, 3041-3058. <https://doi.org/10.1017/S1751731119001897>



# Ethical matrix for meat alternatives

The transition to meat alternatives involves a complex web of ethical and social considerations which can be systematically analysed through an ethical matrix focusing on three core values: well-being, autonomy, and fairness.

Stakeholder	Well-being (livelihoods, health, and environmental sustainability)	Autonomy (freedom of choice and participation in decision-making processes)	Fairness (equitable access, affordability, and the distribution of benefits and risks)
Consumers	Questions about <b>health implications and environmental impact</b> of new food products.	<b>Freedom to choose their food</b> , depending on price and information availability.	<b>Accessibility and affordability</b> of food products.
Traditional farmers	<b>Economic impact</b> due to competition from new industries.	<b>Ability to maintain their activities.</b>	<b>Marginalization</b> if policies favour high-tech food production
Meat alternatives producers	Opportunities for <b>new market</b> .	Navigating regulatory frameworks and technological <b>Constraints</b> .	Concerns about <b>corporate control and equitable access to emerging markets</b> .
Farmed animals	Potential reduction in livestock farming, leading to <b>fewer animals and better well-being for animals</b> .	<b>Lack of autonomy</b> ; ethical considerations vary across species.	<b>Ethical distinctions</b> between farmed animals and insects.

# Recommendations for policy makers

## **Increase Transparency and Labelling Standards**

Assessment by independent third bodies.  
Clear nutritional labelling (nutrient contents and bioavailability, and food processing levels).  
Implement standardized sustainability metrics.

## **Health and Nutrition Guidelines**

Enhance the nutritional quality of meat alternatives.  
Clear policies to mitigate potential deficiencies.  
Assessing the long-term health impacts of meat alternatives.

## **Environmental Sustainability Standards**

Standardized, transparent and updated methodologies.  
Comparison with the same type of energy.  
Assessment of the sustainability of the processes.

## **Consumer Information and Awareness**

Initiatives to better inform consumers.  
Provide balanced diets without compromising health.  
Fights against misinformation.

## **Regulatory Frameworks and Policy Support**

Maintain high safety and sustainability standards.  
Policy debates based on sound science not opinions.  
Support of research and assistance for livestock farmers to adapt to changing markets .

## **Ethical Considerations**

Need to recognize the varying dietary needs, culture, traditions, and economic conditions.  
Attention to ethical considerations in producing some meat alternatives.  
Also considering the needs and preferences of livestock farmers and consumers.