UNIT 5

New trends in sustainable animal production

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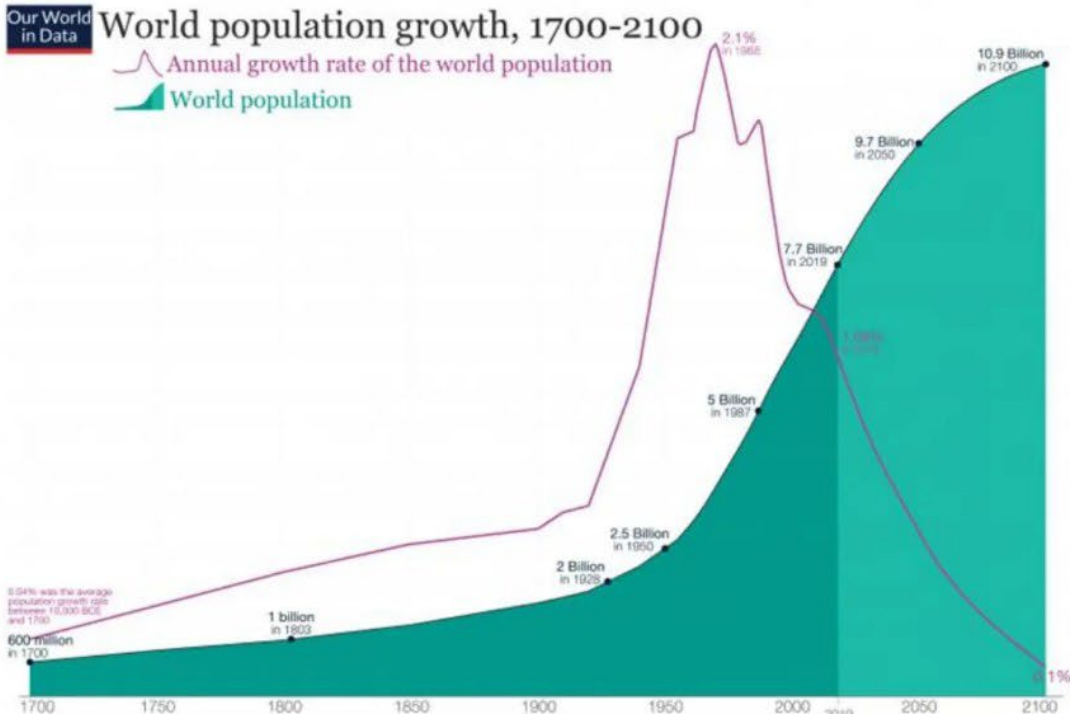
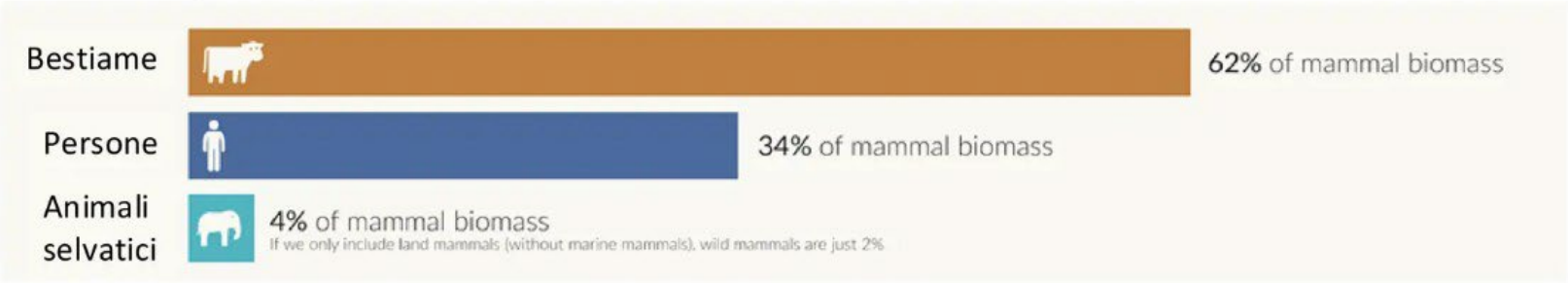
La popolazione mondiale ha raggiunto gli 8 miliardi. Ecco come siamo distribuiti
Suddivisione della popolazione mondiale per area geografica
America del Nord
750 Mln
Europa
602 Mln
439 Mln
Sud America
1,4 Mld
Africa
4,7 Mld
Asia
Oceania 44 Mln


Our World in Data
World population growth, 1700-2100
Annual growth rate of the world population
World population
2.1%
10.9 Billion in 2100
9.7 Billion in 2050
7.7 Billion in 2019
5 Billion in 1987
2.5 Billion in 1950
2 Billion in 1928
1 billion in 1803
600 million in 1700
1700
1750
1800
1850
1900
1950
2000
2050
2100

Mammiferi

All mammals – including land and marine – have a combined biomass of around **162 million tonnes of carbon**.
Wild mammals are just 4% of global mammal biomass



Volatili

All birds have a combined biomass of around **7 million tonnes of carbon**.
Poultry – mostly chickens – biomass weigh more than twice that of wild birds.

Source: Bar-On et al. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*.

How will 10 billion people be fed in 2050?

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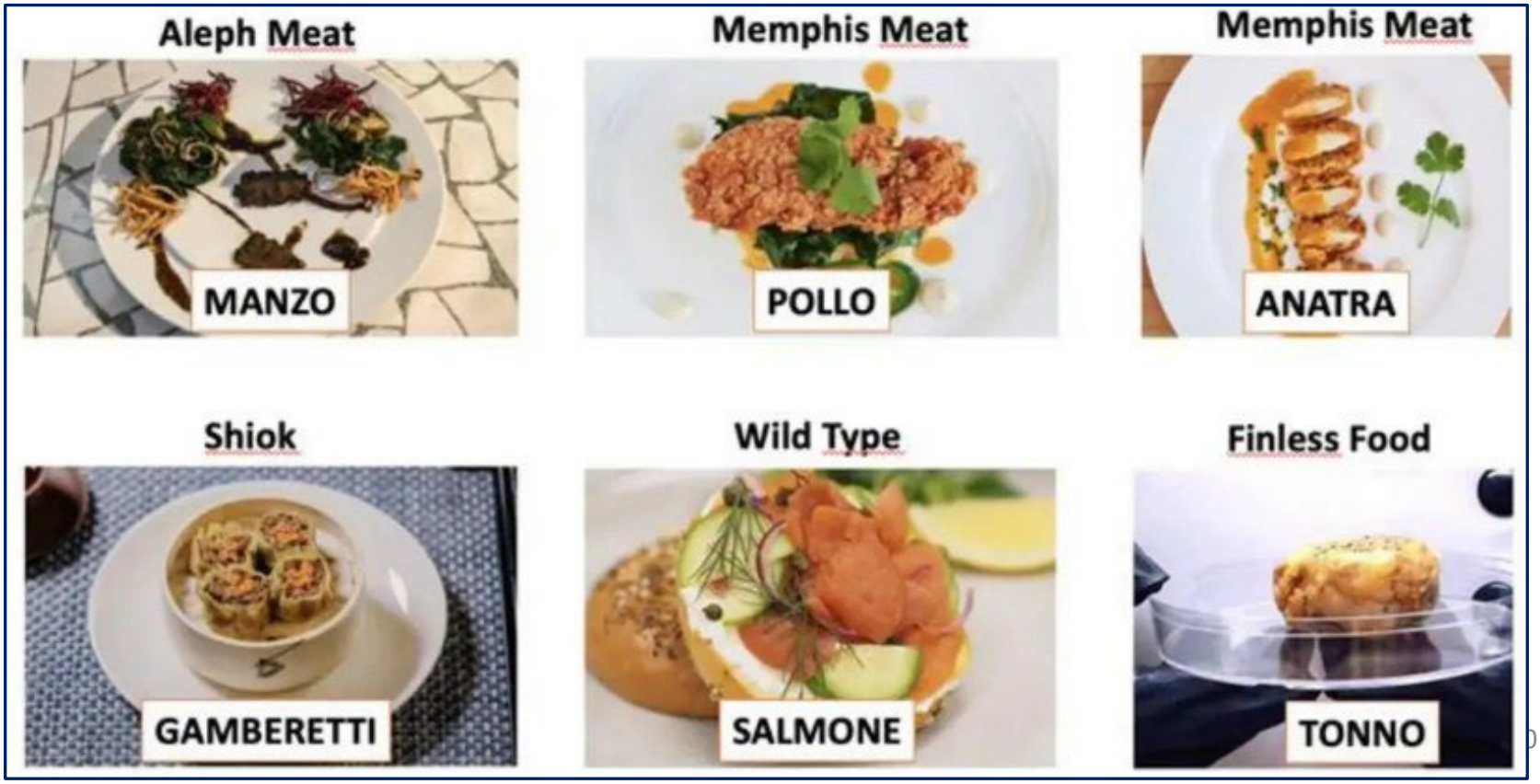
…Can we go further with genetic selection?

"Naked Chicken" by Avigdor Cahaner (2002)
Hebrew University of Jerusalem, Faculty of Agriculture, Israel

Alternative proteins...

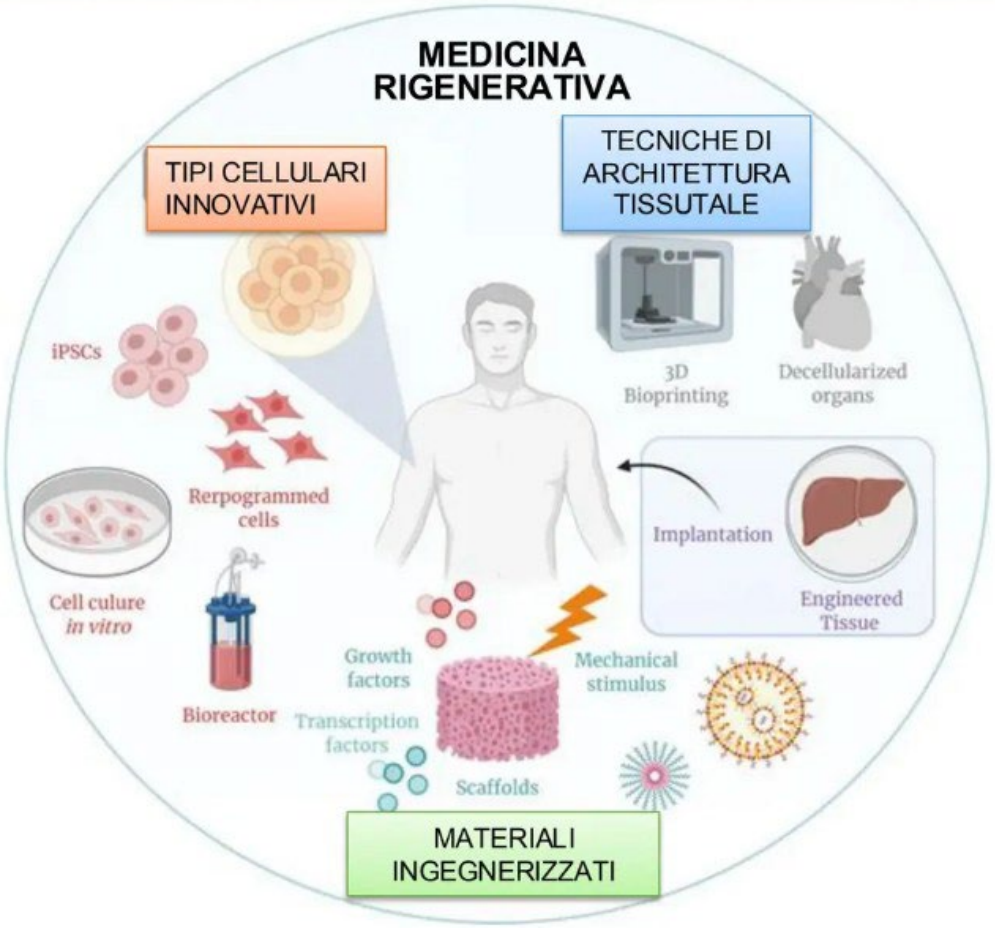
Cultured meat is REAL animal meat that aims to replicate the sensory and nutritional profile of conventional meat.

Different types of meat and fish can be reproduced...

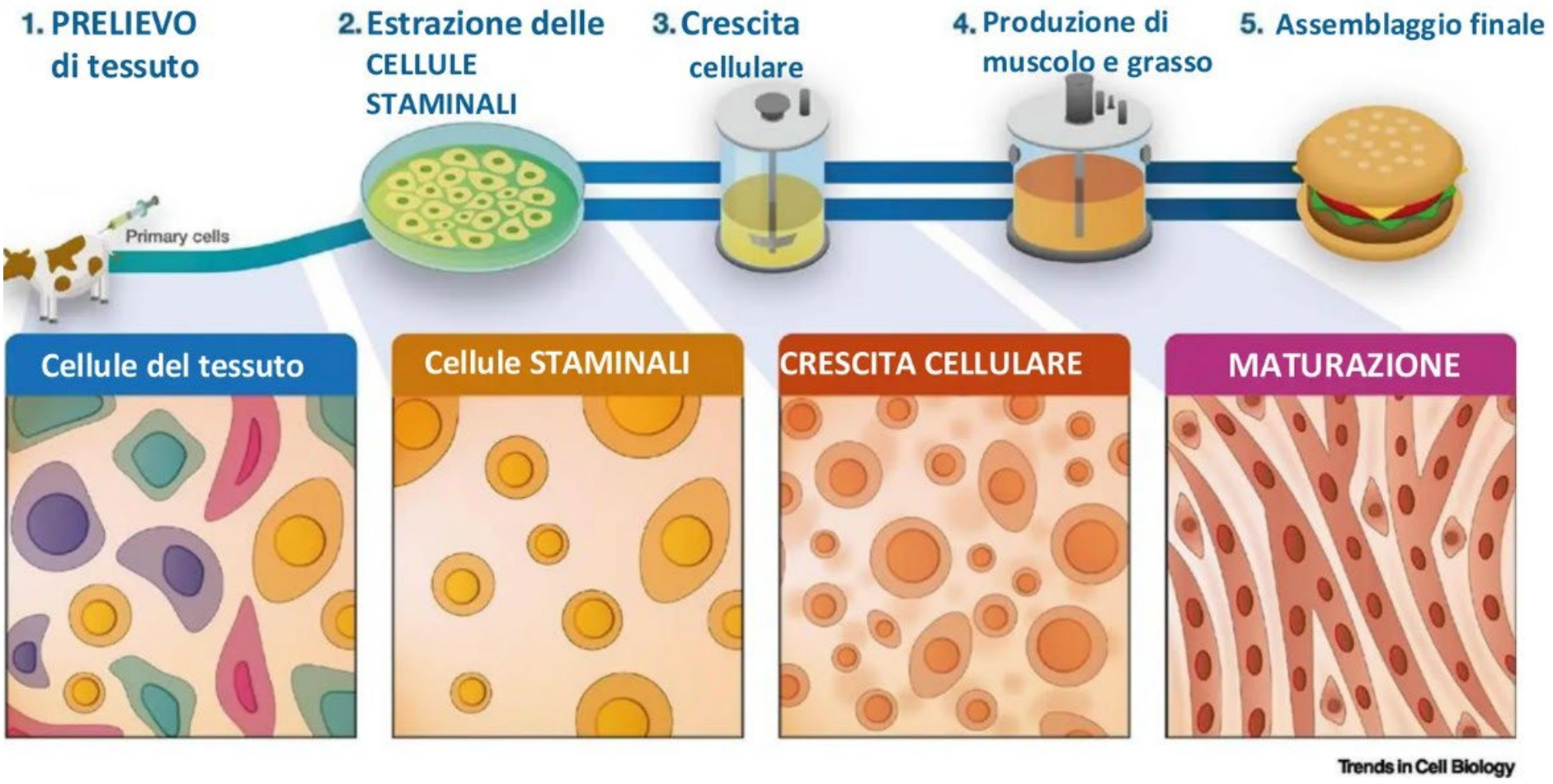


Where does this approach come from?

The Regenerative Medicine



How is produced the cultured meat?



How is produced the cultured meat?

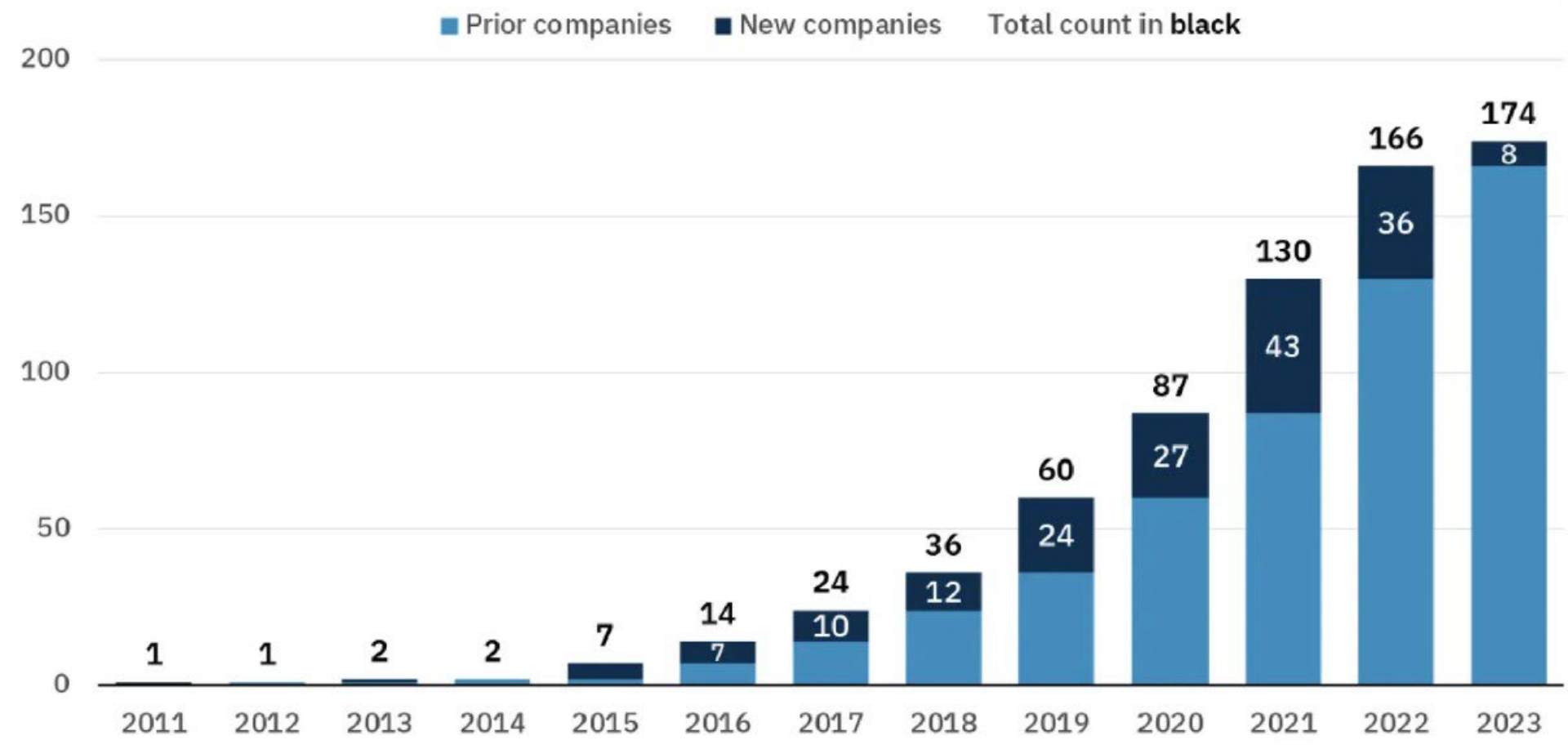
The Pioneer…

MARK POST (UNIVERSITY OF MAASTRICHT /START-UP Mosa Meat)
È STATO IL PRIMO A PRODURRE UN HAMBURGER COMMESTIBILE A BASE DI CELLULE.

L'ASSAGGIO È STATO TRASMESSO DALLA BBC NEL 2013

COSTO ~ $ 280.000 per pezzo

Companies and Start-ups



Some protocols have been positively evaluated in some countries

What the FDA Evaluated During the First Completed Pre-Market Consultation

U.S. FOOD & DRUG ADMINISTRATION

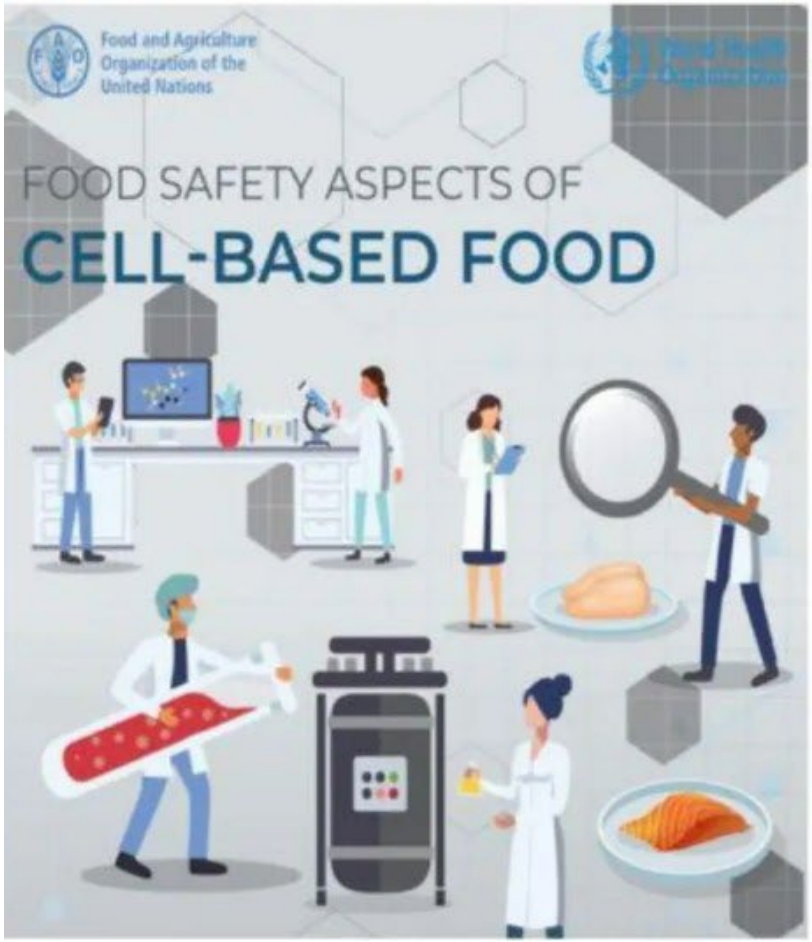
The complex process of taking a small number of live cells from livestock, poultry, seafood, or other animal species and growing them in a controlled environment to create a food can be broadly summarized in a few steps. Below is an example of what we reviewed at each production step during the firm's pre-market consultation:

Firm's Production Steps	What the FDA Reviewed
1 **Cell Collection** Collected samples of cells once from two different chicken tissues.	**How the cells are isolated, including:** • How cells are taken from an animal • How cells are confirmed to be from the right animal species • How cell lines are selected • What measures are taken to ensure the cells are free of contaminants, including microbes or viruses
2 **Cell Line and Cell Bank** Cells from the sample are screened, adapted to culture conditions, and grown to make a "bank" of cells that are frozen and stored for later use.	**How the cell bank is made, including:** • How the cells are adapted to culture and can sustain growth • The firm's quality control measures for the cell bank, including checking the cell identity, checking for contaminants including microbes and viruses, and measuring cell growth and behavior
3 **Transfer and Growth** A small number of cells from the cell bank are placed in tightly controlled environments (sealed vessels) that support growth and multiplication by supplying nutrients and other factors. Cells are transferred to larger vessels over time to reach the amount of material needed for food production.	**Substances used in the culture process as the cells multiply and differentiate:** • Nutrients for cells to grow • Growth factors (substances found in animals that send signals for cells to grow or change) • Substances that manage properties of the medium such as pH or foaming
4 **Differentiation** After the cells have multiplied many times over, into billions or trillions of cells, the environment is changed in ways that allow the cells to assume muscle-specific characteristics.	**Consideration of potential risk factors in the production process, including:** • The firm's assessment of hazards at each production step • How the firm plans to apply food safety control measures based on its assessment • How the firm monitors the growth and health of the cell cultures during production
5 **Harvest** Harvest the material to prepare further using conventional food processing and packaging methods.	**Product that is harvested for use in conventional food processing, including:** • Identity of the cell material • Makeup of the cell material • Potential residues from the culture process • Specifications for food contaminants such as lead, cadmium, mercury, arsenic, and pathogens During the harvest process, when the firm begins removing the chicken cells from the sealed vessels, the FDA and USDA coordinate regulatory oversight as jurisdiction transitions to USDA. USDA oversees the conventional processing and packaging of the food material, as well as labeling of products made from this material.

The FDA's Ongoing Evaluation

In addition to the voluntary pre-market consultation, the FDA's inspectors have been on site at the firm's facility where cells are cultured, grown, and harvested for an inspection. The FDA intends to conduct another inspection after commercial distribution starts. These inspections will help ensure that potential risks are being managed and that the food exiting the culture process is safe and not adulterated within the meaning of the Federal Food, Drug & Cosmetic Act and the FDA's regulations. Get more information about Human Foods Made with Cultured Animal Cells at https://www.fda.gov/food/food-ingredients-packaging/food-made-cultured-animal-cells

Some protocols have been positively evaluated in some countries



THE STRAITS TIMES | SATURDAY, APRIL 8, 2023

UN report says lab-grown meat is safe, cites Singapore as case study

Shabana Begum

Singapore is the only country in the world where consumers can buy cell-cultured chicken, but how safe are such laboratory-grown meats for consumption?

Two United Nations (UN) agencies released a global report to address this issue, in efforts to bring more of such foods to the dining table and assure consumers that they are safe to eat.

Traces of antibiotics in the meat product, pathogens in the animal cells that can spread to humans and possible genetic changes in cells as they multiply were identified as some of the potential hazards of cell-based meats in the report.

Put together by the Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO), the report cited Singapore, which approved cell-cultured chicken for sale in 2020, as a case study in the regulation of such meats.

The report concluded that many of the hazards identified in cell-based foods already exist in conventionally produced foods and livestock agriculture, and hence the meats are safe for consumption if produced and handled the source animals to ensure they are disease-free. Testing for pathogens can also be done before banking the cells, said the report.

The use of antibiotics to prevent the cells from being contaminated by bacteria was also identified as an issue as residual antibiotics in the meat products could be a health hazard and contribute to antimicrobial resistance.

The report recommended that limited amounts of antibiotics should be used. Washing can help remove or reduce the concentration of contaminants in the final product.

Mutations from changes to the genes as the cells multiply could build up and create novel toxins.

However, the mutations alone will not pose any significant problems to consumers, said Professor William Chen, director of Nanyang Technological University's Food Science and Technology programme.

"DNA from meat, with or without mutations, will be degraded in our digestive system, and thus they have a low possibility of integrating into our genes and leading to any potential health risks," said Prof Chen. He is the vice-chair of the panel of international experts who gathered in Singapore in November.

with couscous and fried chicken salad. Each dish costs $18.50.

Other cell-cultured meats, such as beef and fish, are still being developed, while some firms abroad are seeking approval from the Singapore Food Agency (SFA) to sell their slaughter-free thin-cut steaks and minced pork items here.

Currently, there are more than 100 cell-based food start-ups around the world.

Cell-based meat is made by taking cells from a cow, chicken or fish through a biopsy and then growing the cells in a nutrient broth and media. The tissues are harvested, prepared and packaged into meat products.

Such meats generated from cells may combine different cell types like muscle and fat cells to replicate the structure and texture of meat. Extrusion techniques and 3D printing, as well as

The document also noted that cell-based meats are an "alleged sustainable alternative" to conventional livestock, and more work is needed to prove that such meats are indeed greener.

The report concluded that hazard identification is only the first step of the formal risk assessment process for cell-based food, and more scientific data, insights and the sharing of information are needed to further the safety and trust in these future foods.

Prof Chen, who is also a consultant to FAO on alternative and novel foods, said: "The report would help cell-based meat companies align themselves with the global standard and harmonise their processes. This in turn would enhance food safety and boost consumer confidence."

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ADVANTAGES
DISADVANTAGES

utilizza **95%** meno **terra**

utlizza **78%** meno **acqua**

produce **93%** meno **particolato sottile**

produce **92%** meno **composti chimici tossici**

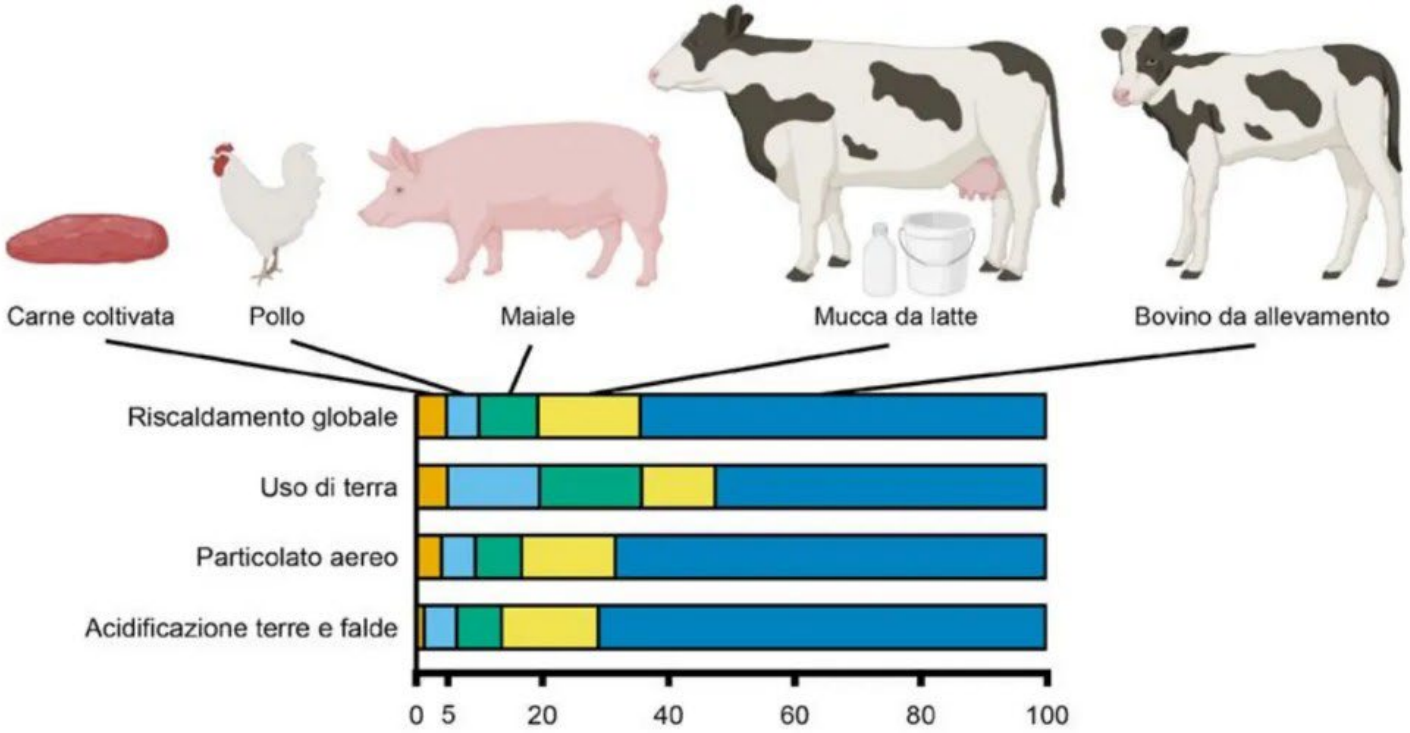
produce **92%** meno **gas serra** (in CO_2-eq*)

ambientale *Per
uzione di carne
el riscaldamen...

...rispetto alla carne di bovino da allevamento intensivo

*Per il confronto tra i gas serra e la produzione di carne bovina convenzionale, i benefici del riscaldamento globale della carne coltivata sono meglio visti come a breve termine, poiché gli impatti della carne bovina sono guidati principalmente dal metano.

Fonte: Valutazione del ciclo vitale di Good Food Institute & Delft (2021). Dettagli al link: https://gfi.org/blog/cultivated-meat-lca-tea/

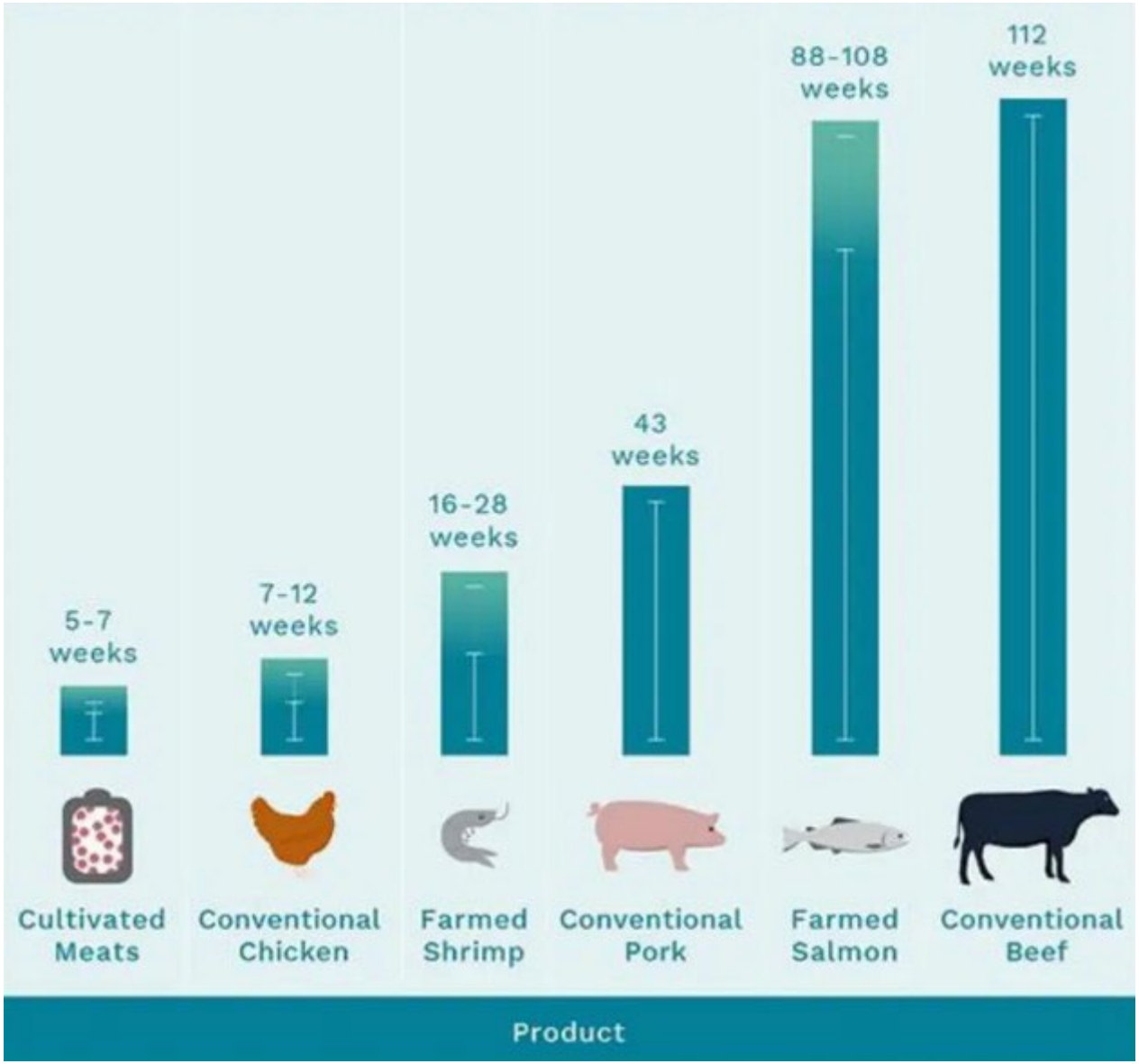


Percentuale di impatto ambientale risultante dal consumo di 1 kg di ogni tipologia di carne

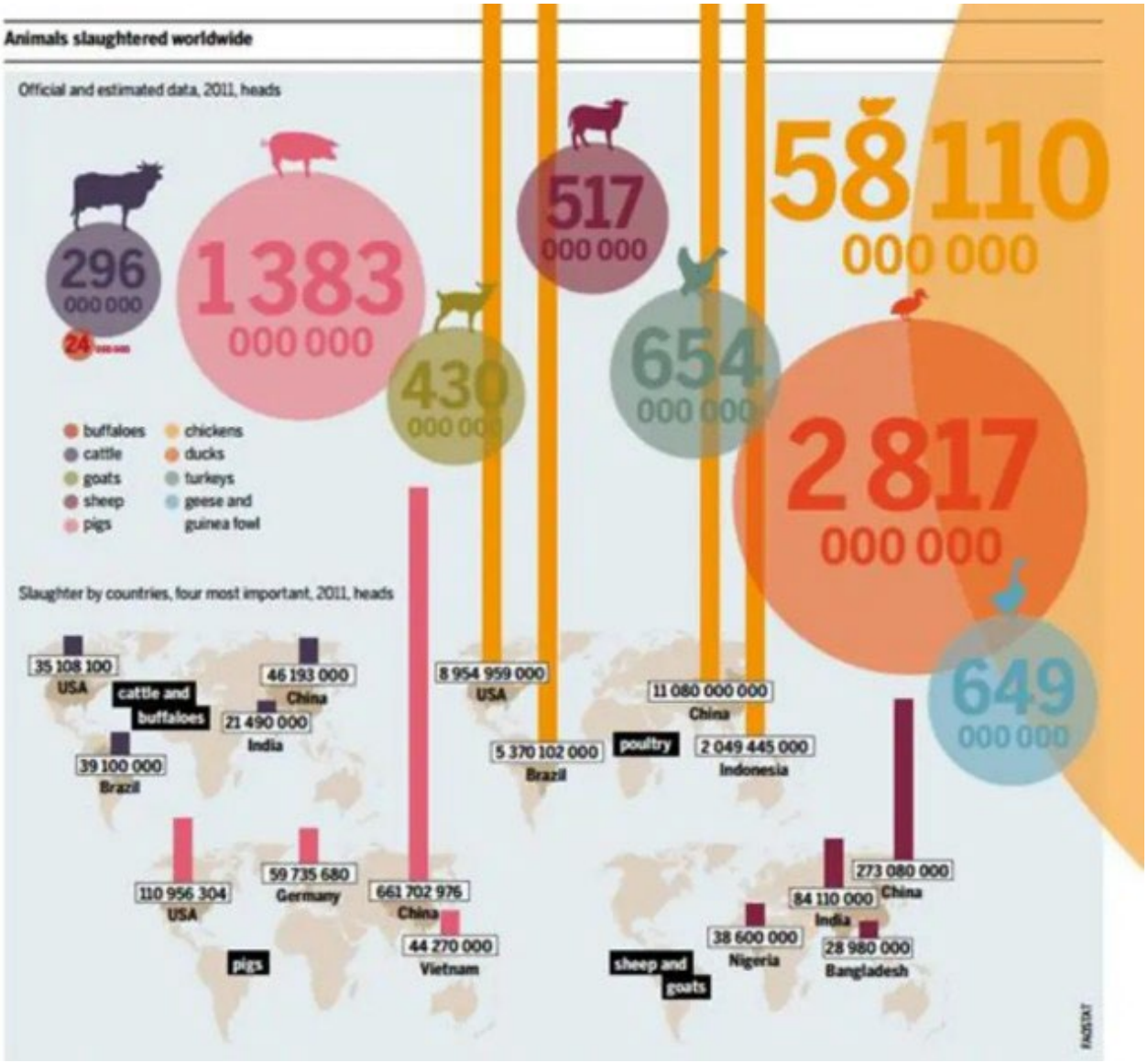
Proiezioni dell'impatto ambientale di diversi tipi di carne nel 2030.

Dati rianalizzati da: Sinke, P., Swartz, E., Sanctorum, H., van der Giesen, C. & Odegard, I., Int. J. Life Cycle Assess. 28, 234–254 (**2023**).

Production efficiency



Reduction in the number of animals sacrificed



Potential positive impact on health

Disadvantages

TRADITIONs?

OCCUPATION?

USING FBS?

PRODUCTION COSTS?

...in Europe?

FoodNavigator EUROPE

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'A great achievement for the Dutch government': First Member State approves pre-market tastings of cultivated meat

By Flora Southey
19-Jul-2023 - Last updated on 19-Jul-2023 at 15:37 GMT

A code of practice for cultured meat and seafood tastings has been developed in collaboration with the Dutch government, meat producers Meatable and Mosa Meat, and sector representative HollandBio, and will be implemented by Cellular Agriculture Netherlands. GettyImages/miodrag ignjatovic

RELATED TAGS Cultivated Meat | Cell Cultured Meat | Lab-Grown | Alternative Protein

FORBES > INNOVAZIONE > SOSTENIBILITÀ

Il Parlamento olandese approva la degustazione di carne coltivata nei Paesi Bassi

Daniela De Lorenzo Collaboratore
Scrivo di sistemi di produzione alimentare e agricola sostenibili.

Seguire

The first government sanction in the EU for how cultivated meat tastings can be conducted has received national government approval in the Netherlands.

The Netherlands is the birthplace of cultivated meat, being where Professor Mark Post of Maastricht University, co-founder of cultivated ground beef producer Mosa Meat, created the first cultured hamburger 10 years ago.

Since that time, cultivated meat products have received regulatory approval in Singapore and the US. In the absence of pre-market approval in the EU, this month the Dutch government has passed a landmark agreement allowing for tastings, and therefore consumer feedback, ahead of market entry.

"We believe that this is the first government protocol for how tastings can be done with national government approval," Robert Jones, head of public affairs at Mosa Meat told FoodNavigator.

...in Europe?

Economia Carne coltivata, alla Ue arriva la prima richiesta di ok

I NOSTRI VIDEO

G7 – Industry Stakeholders Conference: Bridging Gaps and...

Quaglini "Edison Energia lancia 'Risolve'"

Carne coltivata, alla Ue arriva la prima richiesta di ok

La startup francese Gourmey ha annunciato di aver presentato la domanda per il suo foie gras coltivato

di Micaela Cappellini

26 luglio 2024 • Aggiornato il 27 luglio 2024 alle ore 13.17

il fatto alimentare®

MENU

PIANETA

CARNE COLTIVATA, LA PRIMA RICHIESTA DI AUTORIZZAZIONE IN UE È PER IL FOIE GRAS

Agnese Codignola 26 Luglio 2024

…in Europe?

If approved at European level, cultured meat could be imported and marketed in Italy...but not produced in our country.

Insights…

https://www.youtube.com/watch?v=kG4EO-P93Dk

https://www.raiplay.it/video/2023/10/Il-futuro-del-cibo---PresaDiretta-02102023-677b1601-d2f9-40a5-8d3d-4190501c9772.html