Regulatory Framework for Laboratory-Grown Meat

For Prelims: Food Safety and Standards Authority of India (FSSAI), Plant-based Protein Products, Cultivated Protein, Zoonotic Diseases, Bird Flu, Swine Flu, Covid-19, Greenhouse Gases, Animal Cell, EU, Legume, Plant Oil, Food Safety and Standards Act, of 2006, Bioreactor.

For Mains: Regulation of laboratory-grown meat in India. Scope and challenges in adoption of laboratory-grown meat.

Source: LM

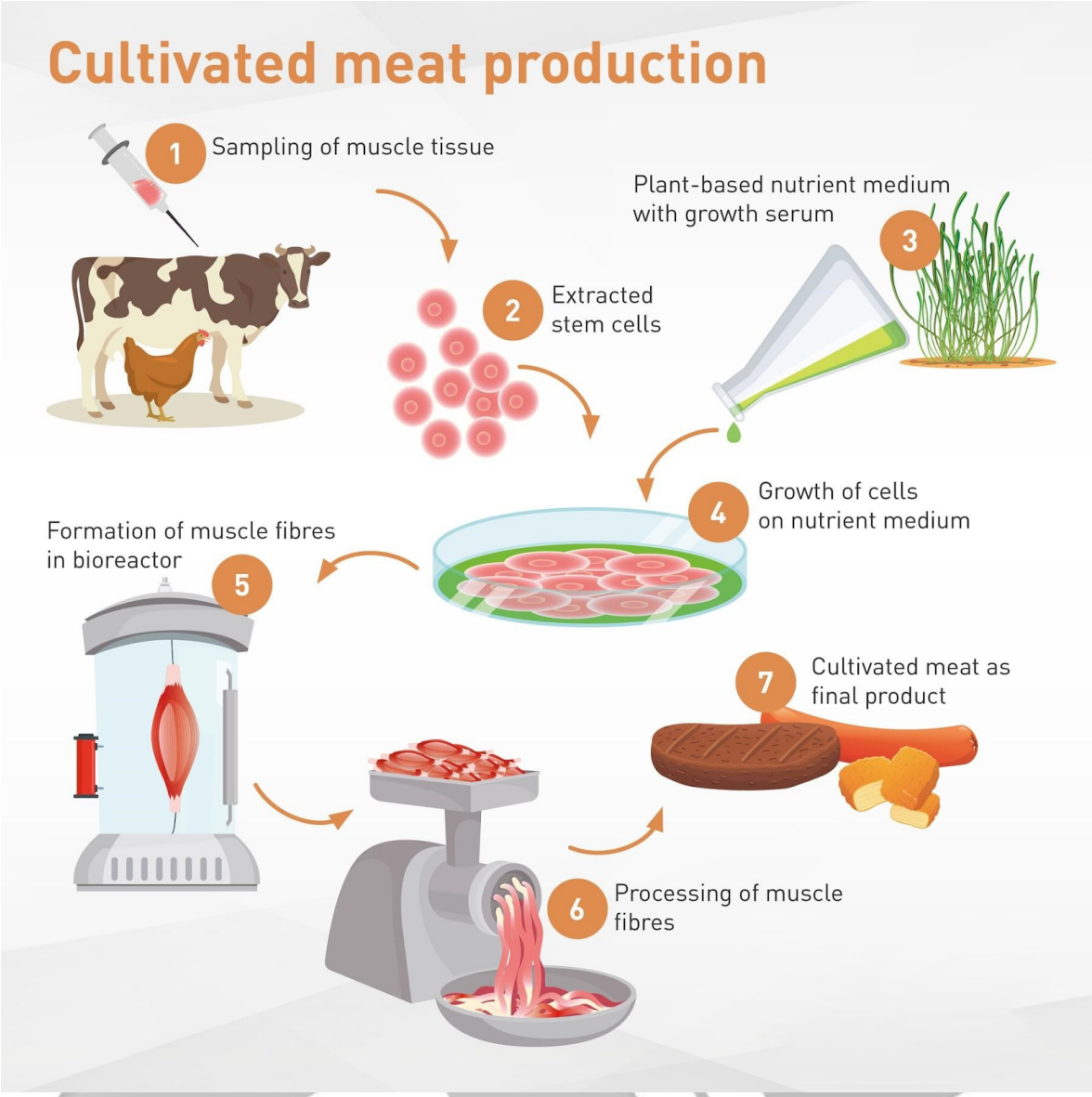
Why in News?

Recently, the Food Safety and Standards Authority of India (FSSAI) is planning to put a **regulatory framework** for **laboratory-grown meat**, dairy, and egg products.

- FSSAI regulates **plant-based protein products**, but **lab-grown** and fermentation-derived proteins have no clear regulations.

What is Laboratory-Grown Meat?

- **About:** Lab-grown meat is **produced in laboratories** using cells from **living animals or fertilised eggs**, rather than coming from slaughtered animals.
  - It is also known as **cultured meat** or **cultivated meat**.
- **Production Process:**
  - **Cell Extraction:** The process begins by **extracting cells** from living animals.
  - **Growth Medium:** The cells are then placed into a **mixture** containing **amino acids, fatty acids, sugars, salts, vitamins**, and other essential nutrients.
  - **Cultivation:** These cells grow into **larger masses**, eventually forming **muscle tissue** that resembles **traditional meat.**
- **Current Market Availability:** The US, the EU, Singapore and Israel have issued regulations for cultivated and fermentation-derived protein.
- **Environmental Impact:** Lab-grown meat is considered to be **more environmentally friendly** than conventional meat production.
  - Early studies suggest that lab-grown meat requires **45% less energy, uses 99% less land, and produces 96% fewer greenhouse gas emissions** compared to beef.



Plant-Based Meat

- **About: Plant-based meat** is a meat **alternative** made from **plant ingredients** that replicates the **taste, texture, and appearance** of actual animal meat (such as sausage, and chicken) without using any animal products.
- **Ingredients:** Plant-based meat is made primarily from **vegetables, grains, and legumes**.
    - Common ingredients include **protein sources** like tofu, tempeh, soy, and peas, as well as **plant oils** (e.g., sunflower, canola) and **vegan binding agents** (e.g., flour, aquafaba, beans).
- **Processing:** Plant-based meat manufacturers use advanced technologies like **extrusion** and **wet texturization** to enhance the **texture** and consistency of the product.
    - **Heat and mechanical pressure** make plant products more **meat-like**, creating **stringy or sinewy textures** similar to animal meat.

What is the Need to Regulate Laboratory-Grown Meat in India?

- **Public Health Concerns**: Regulating lab-grown meat can help reduce the risks of **zoonotic diseases** like **bird flu, swine flu, and Covid-19** by ensuring safety and quality standards.
- **Ecological Sustainability**: Lab-grown meat is a **sustainable alternative**, using less land, water, and energy, and emitting fewer **greenhouse gases.**

    - Clear regulations are needed to ensure sustainable production and maximise environmental benefits..
- **Market Development**: India has **over 15 companies** working on **cultivated meat** with several **start-ups** preparing to launch these products and seek regulatory approvals.
    - Companies need clear standards for **quality, labelling, and marketing** of lab-grown meat to build consumer trust and ensure food safety compliance.
- **Potential for Growth:** Experts said that lab-grown meat could **capture 10-15%** of the traditional animal meat industry's market share as **younger and more environmentally-conscious** generations may show interest.
- **Ethical Considerations**: Lab-grown meat, which is cultivated from **animal cells** without the need for **slaughter,** addresses growing concerns over **animal cruelty** in traditional meat production.
- **Global Competitiveness:** As countries like the **US, EU, Singapore, and Israel** already have **regulatory frameworks** in place for cultivated and fermentation-derived proteins, **India risks falling behind** in this emerging industry without a clear regulatory stance.

India’s Meat Market

- India has the **world’s largest** livestock population.
    - The country is the **largest producer of buffalo meat, 2nd largest producer of goat meat, and ranks 5th in poultry** meat production.
- In **2022-23**, India produced around **2.1 million tonnes of cattle**, 13.6 million tonnes buffaloes, 73.7 million tonnes sheep, 9.3 million tonnes pigs and **331.5 million poultry meat.**
- India's **exports** of animal products in **2023-24** was worth **USD 4.5 billion,** which included **buffalo meat** worth **USD 3.7 billion**, **poultry meat worth USD 184.58 million**, and **sheep or goat meat** of **USD 77.68 million.**
- Indian Council of Agricultural Research (ICAR)-**Central Marine Fisheries Research Institute (CMFRI)** has undertaken a research project to develop **lab-grown fish meat.**

Food Safety and Standards Authority of India

- FSSAI is an **autonomous statutory body** established under the **Food Safety and Standards Act, of 2006.**
- The Act of 2006, **consolidates various laws** related to food, such as the **Prevention of Food Adulteration Act, 1954, the Fruit Products Order, 1955**, the Meat Food Products Order, 1973, and other acts that were previously handled by different ministries and departments.
- FSSAI is responsible for **protecting and promoting public health** by regulating and supervising food safety and quality in India, operating under the **Ministry of Health & Family Welfare.**
- The **Chairperson and Chief Executive Officer** of FSSAI is appointed by the central government. The Chairperson is in the **rank of Secretary** to the Government of India.

What are the Challenges in Promotion of Laboratory-Grown Meat?

- **Regulatory Uncertainty**: The lack of a clear regulatory framework for lab-grown meat creates uncertainty, **confusing manufacturers and investors** and hindering sector growth.
    - Scaling up production to a mass level remains a significant challenge as **no country** has been able to **scale up production at a mass scale.**
- **Dietary Preferences**: In India, food habits are shaped by cultural, religious, and social factors, with many avoiding both meat and meat-like products.
    - While lab-grown **meat may mimic taste and texture**, it **lacks equivalent nutrition.**
        - A survey revealed that **73%** of Indians are protein-deficient, and over **90%** are unaware of their daily protein needs.
- **Lack of Consumer Awareness**: The concept of laboratory-grown meat is still r**elatively new** in India. People who are **meat eaters** may give it a **try but not continue it for long.**
- **Environmental Impact:** Lab-grown meat production is **highly energy-intensive, using 4 to 25 times** more energy than retail beef, raising concerns about its long-term environmental impact, especially in resource-constrained countries like India.

- **Resistance from Traditional Meat Industry**: Lab-grown meat faces resistance from India's traditional meat industry, which sees it as a threat to small-scale farmers' livelihoods.
    - Additionally, **limited market acceptance** persists as many Indian consumers prefer traditional meat for its familiar taste, texture, and affordability.

Way Forward

- **Clear Regulatory Framework:** FSSAI must prioritise the **creation of regulations** for laboratory-grown meat to ensure that the production of lab-grown meat aligns with **national food safety standards and global best practices**.
- **Consumer Awareness:** Educating the public on the **safety, nutritional value, and environmental impact** of lab-grown meat can help shift attitudes and build confidence in the new technology.
- **Research in Biotechnology:** Investing in R&D in biotechnology can **reduce costs, improve nutrition**, and make lab-grown meat a viable long-term alternative to traditional meat.
- **Leveraging Livestock Population:** India can leverage its **diverse livestock**, such as **buffalo, goats, and poultry**, to develop lab-grown meat, creating a **competitive edge** and positioning itself as a key player in the global market.
- **Scale Up Production:** India needs to develop infrastructure, including **bioreactors and cell culture facilities**, to scale up lab-grown meat production.
    - Collaboration with **global biotech firms** could provide the technical expertise needed for rapid scaling.

Drishti Mains Question:

What is laboratory-grown meat? Discuss the need for a regulatory framework for laboratory-grown meat in India.