



## CELLULAR AGRICULTURE - GS III MAINS

Q. Cellular agriculture has a potential solution to problems like climate change and global nutrition. Discuss (10 marks, 150 words)

**News: Explainer: What Is Cellular Agriculture And How It Can Help Reduce the Sector's Carbon Footprint?**

### What's in the news?

- The United Nations sees cellular meat, alongside other shifts like plant-based diets, as a potential solution to problems like climate change and global nutrition.

### Key takeaways:

- Earlier this year, two companies received FDA and USDA approval to sell cell-cultivated chicken.

### Cellular Agriculture:

- Cellular agriculture, also known as **cell-based agriculture or lab-grown meat**, is a technology that involves the production of animal products such as **meat, milk, and eggs using cell cultures** and tissue engineering techniques, rather than raising and slaughtering whole animals.

### Process of Cellular Agriculture:

- The process involves taking a small sample of animal cells and providing them with the necessary nutrients and conditions to grow and differentiate into the desired product.
- This approach has the potential to provide a more sustainable and ethical way of producing animal products while reducing the environmental impact and ethical concerns associated with traditional animal agriculture.

### Examples:

- Perfect Day, a start-up in California uses genetically-engineered fungi to produce milk proteins, such as whey protein, without the need for cows.
- TurtleTree Labs in **Singapore** is the first company to use stem cells from mammals to make milk in large bioreactors.

### Significance of Cellular Agriculture:

#### 1. Less Environmental Impact:

- Figures show 70% lower use of resources like land, food grain, water, and thus reduced carbon emissions to produce a kilogram of meat.
- From an environmental standpoint this means less water is used to produce meat, less methane gas is put into the atmosphere, and it's overall a much cleaner solution than factory farming.

#### 2. Better Products:



- Cellular agriculture has the ability to design and tune what you are making.
- For instance - it has the potential to make meat with fewer saturated fats and more unsaturated fats, or make leather of different thicknesses.

### 3. Sustainable Products:

- Unlike conventional animal husbandry that has pretty much reached the limits of its efficiency, cellular agriculture has the potential to improve its resource intensiveness over time.
- It can help make global food production more sustainable than it is now.

### 4. Food Security:

- It could enable larger numbers of people to access higher quality nutrition and achieve better health outcomes.
- Cellular agriculture can help to produce more food to feed the world's people that still go hungry.

### 5. Healthier and Cleaner Food Products:

- Producers can control the fat and protein content. They can also control the taste and other features.
- Products are grown in a sterile environment, so there is no contamination. This means that the products will be free of many potential diseases and reduce the use of antibiotics.
- Lab grown meat can be more consistent in terms of quality – because more is in the producer's control, lab grown meat may be of a particular standard/quality more consistently compared to farm grown meat which can vary in quality.

### 6. Employment Generation:

- It adds jobs to the economy. Various lab and factory workers, researchers, scientists etc. get new jobs.
- Further research and development industries develop and boost with technological advancements.

## Concerns Related to Cellular Agriculture:

### 1. Expensive:

- It is very expensive to produce. Technology employed and expenditure on research and development increase the cost of the products and make it non-affordable at present.

### 2. Production at the Cost of Animals:

- It is true that cultured products save many animals from being slaughtered.
- However, many of the animals that will be used for research and development purposes are probably animals that are on the slaughter lines.
- Harvesting of animal cells to culture requires blood of foetuses from slaughtered pregnant cows as the growth medium. So, to mass-produce laboratory-grown consumables scientists would need a constant supply of live pigs, cows, chickens and other animals from which to take cells.



### 3. Safety Concerns:

- Whether genetically modified, factory-grown products are safe for us to eat is yet to be studied. There are ethical concerns similar to GMO crops. There can be a lack of trust between consumers and companies.

### 4. Potential Issues over Regulation:

- The process behind food regulation takes a long time. This could impact how quickly quality and safety among all products are standardised.
- Testing methods for safety, which governing bodies for regulation demand time and resources. This could push development even farther back.

### 5. Cheaper Alternatives:

- Moving towards more plant-based diets (or diets with less meat, dairy and animal products) make better use of resources, and are cheaper, more effective, quicker to implement and healthier than what lab grown meat can offer as a food source. 1

### 6. Complete Nutrition:

- Cellular Agriculture can control nutritional content like fat and protein content.
- There are certain nutrients which we can only get in bulk from natural agriculture outside a lab.

India has an opportunity to become a major player in cellular agriculture. The Union government charged the Hyderabad-based Centre for Cellular and Molecular Biology with the goal of producing lab grown meat on a commercial scale in five years. But the sector needs proper standards and regulation with greater public investment in research and development, as well as private investment in entrepreneurship.