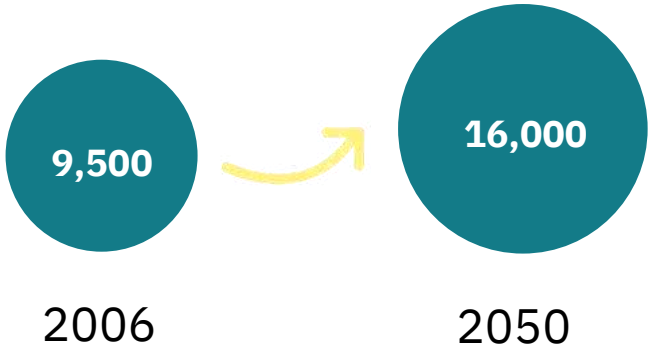
Lecture theme: Food Policy and Public Health

Laws Associated to Animal Protection: Master's in Animal Protection Laws

September 2022

The key question

How will we feed 10 billion?



trillion kcal/year

As the global population increases and people move into higher income brackets, more food is needed.

"To adequately feed more than 9 billion people by 2050, the world must close a nearly 70 percent gap between the amount of food produced in 2006 and that needed by mid-century."

- World Resources Institute, 2014

Source: https://www.gfi.org/images/uploads/2018/05/WRISustainableFoodFuture.pdf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Sustainably

Industrialized animal agriculture is in the top **2-3 most significant contributors** to the world's most pressing environmental issues such as water use, air pollution, and loss of biodiversity.

Industrialized animal ag is responsible for **14-18% of greenhouse gas emissions—**a higher share than the entire transport sector.

Source: United Nations, Livestock's Long Shadow (report)

Efficientl y

It takes **nine calories** of food fed to a chicken to produce **one calorie** of meat.

75% of agricultural land is used for raising and feeding livestock yet only provides **1/3** of the global protein supply.

Sources: World Resources Institute (calorie formula); UN FAO (land use)

Safely

Animals in the United States **consume more than 2x** as many medically important antibiotics as humans do.

There are risks to producers due to inherent supply chain vulnerabilities

Medical experts expect **10 million annual deaths** from antimicrobial resistance (AMR) in 2050, a 14-fold increase over current deaths.

Sources: FDA (animal-consumed antibiotics); IMS Health (human-consumed antibiotics); United Nations IAGC (AMR)

Inefficiency leads to waste and food insecurity

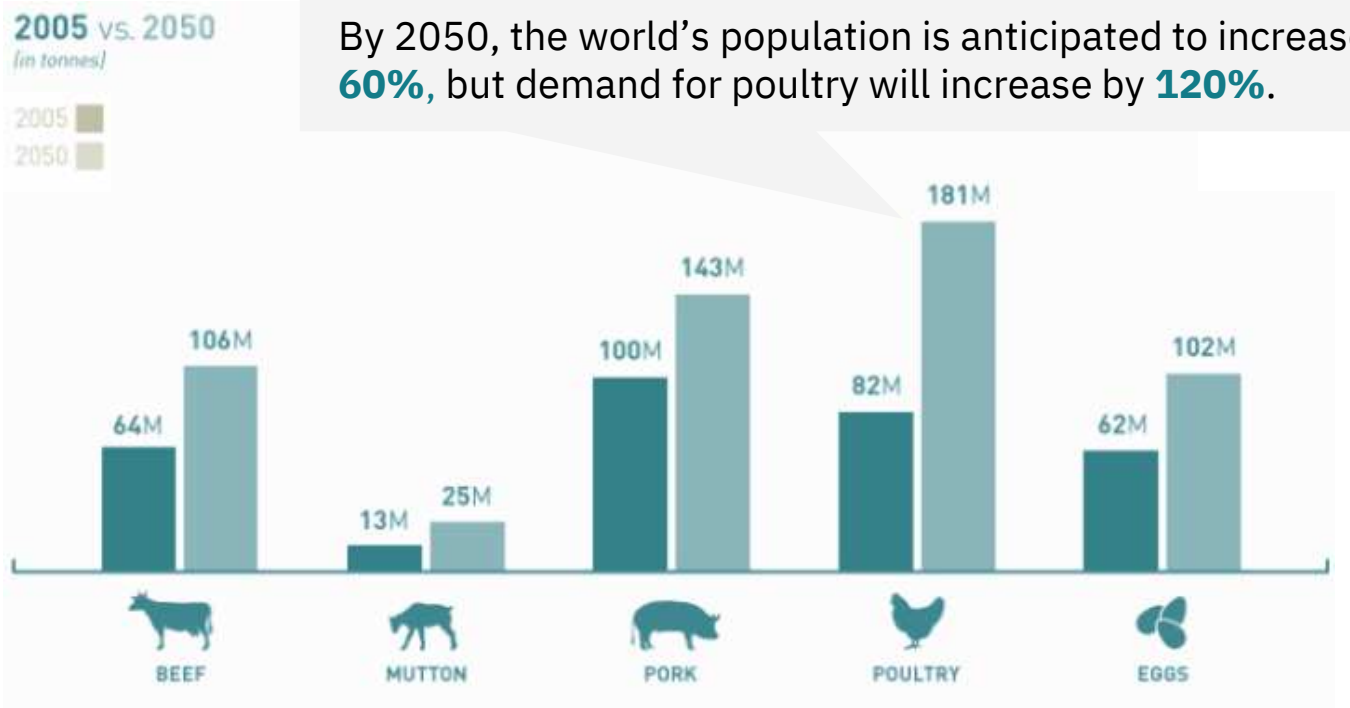
9 CALORIES IN	→	**1** CALORIE OUT	**13%** CONVERTED
11 CALORIES IN	→	**1** CALORIE OUT	**9%** CONVERTED
40 CALORIES IN	→	**1** CALORIE OUT	**3%** CONVERTED

Cycling calories through animals in this way is equivalent to **87-97% food waste** in production.

Source: Shepon, et al., Energy and protein feed-to-food conversion efficiencies in the US and potential food security gains from dietary changes.

Global meat demand shows no signs of slowing down

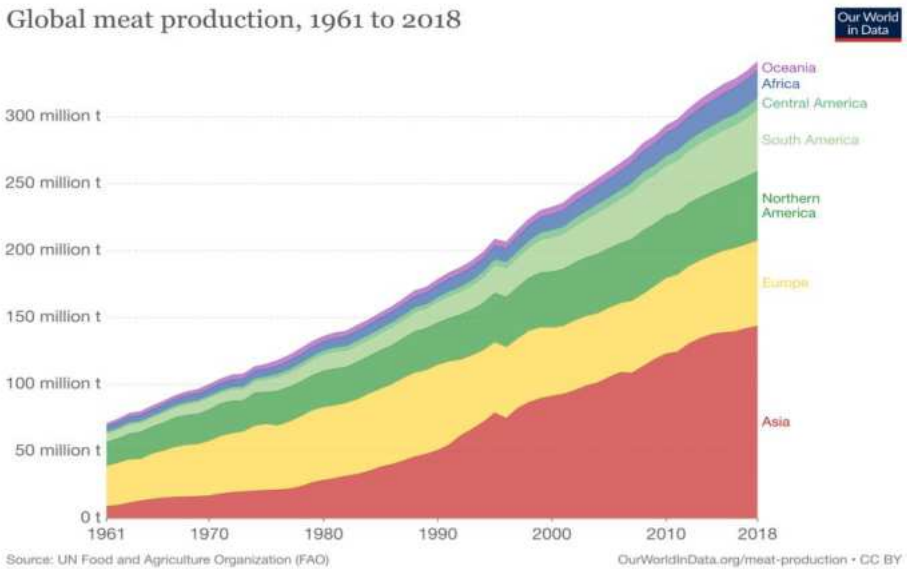
By 2050, the world's population is anticipated to increase by **60%**, but demand for poultry will increase by **120%**.

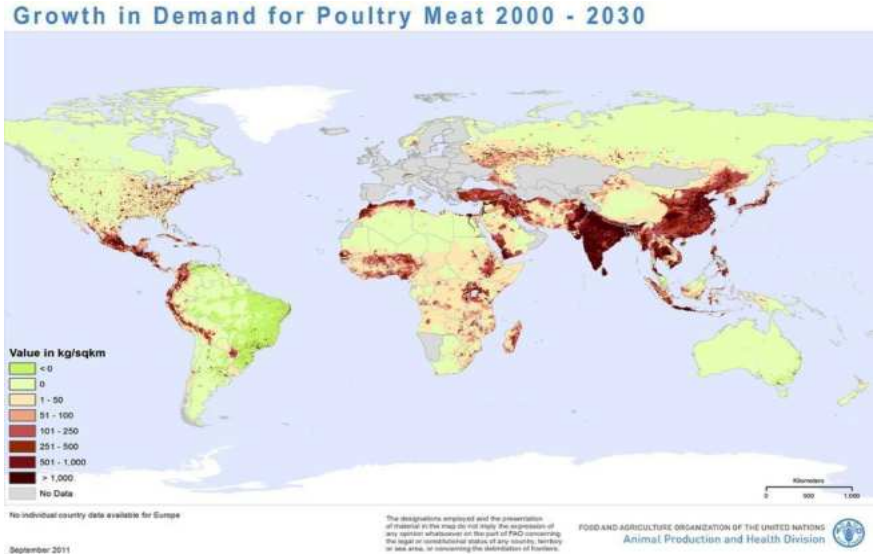


Source: Food and Agriculture Organization of the United Nations; ESA Working Paper No. 12-3, p. 131

Meat demand to rise 70% by 2050

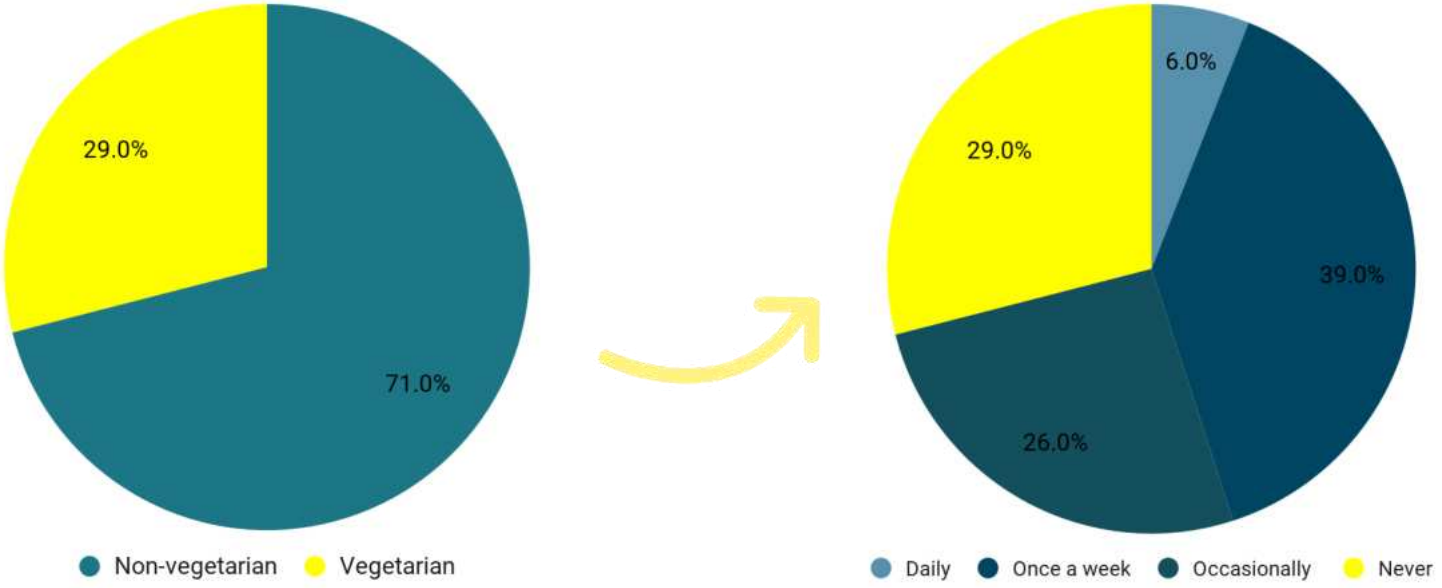
Driven by emerging economies such as India, China & SE Asia





Contrary to the popular misconception, 77% of India's 1.3 billion people self-identify as non-vegetarian

Approximately 200 Mn households eat non-vegetarian food



Source: Census-level Sample Registration Survey, 2014, NFHS-5

GFI India's theory of change, in a nutshell:

Source: Y Combinator

What is ‘Smart Protein’?

‘Smart protein’ (also known as ‘alternative protein’) is enabling a global protein diversification. GFI India defines smart protein as products which can reliably and predictably substitute the consumption of animal-derived meat, eggs, and dairy, because they perfectly replicate the sensory and cultural experience for consumers and offer several advantages in the supply chain for producers. These fall into 3 main categories.

The Alternative Protein Landscape

Plant-based

Photo courtesy of Beyond Meat

Fermentation

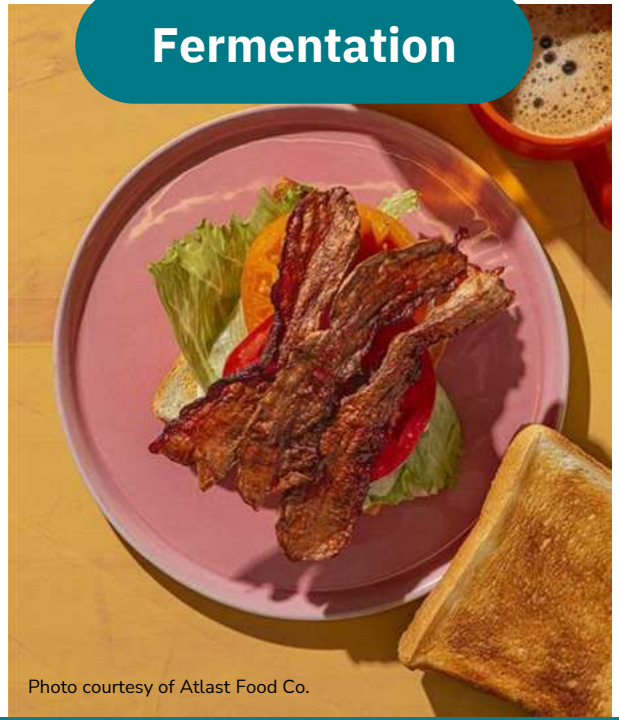


Photo courtesy of Atlast Food Co.

Cultivated

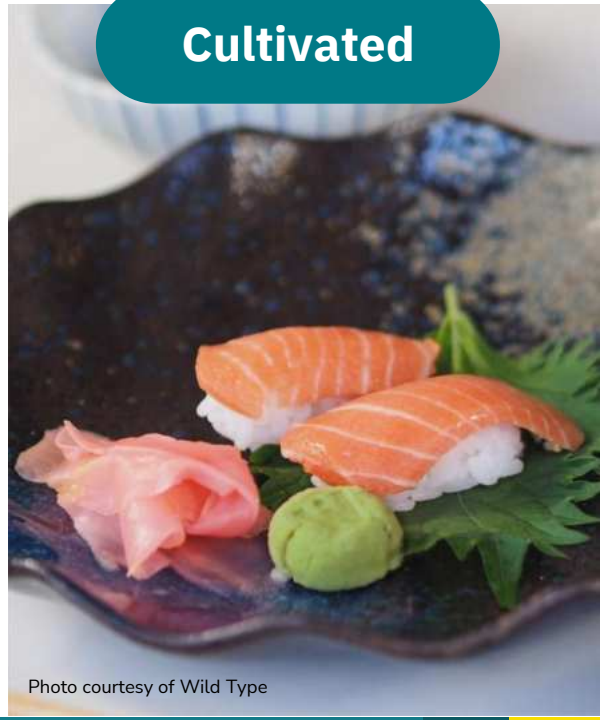


Photo courtesy of Wild Type

Plant-based meats

Plant-based meats are produced directly from plant or crop ingredients like pea protein and coconut oil.

Like animal products, they are composed of protein, fat, vitamins, minerals, and water. Next-gen plant-based options look, taste, and cook like conventional meat, and offer complex carbs and fiber.

In India the plant based meat, eggs, dairy industry is rapidly expanding

Plant-based meat

BLUE TRIBE
greenest THE GREEN PROTEIN CO.
good dot
MISTER VEG
LETZ VEZ!
Sustainable Foods
imagine MEATS
MIGHTY
evolved
SHAKA HARRY – 0% MEAT 100% YUM –
Vezlay Quality Vegetarian Foods

Plant-based dairy

ONE GOOD
oat milk
Alt Co
SOFT SPOT For a plant-powered life!
SIRIVE PLANT POWERED NUTRITION
alt foods
epigamia
slicc oat milk
Milkin Oats
RAW PRESSERY
OATEY
WhiteCub
Only Earth

Plant-based eggs

evo
PLANTMADE

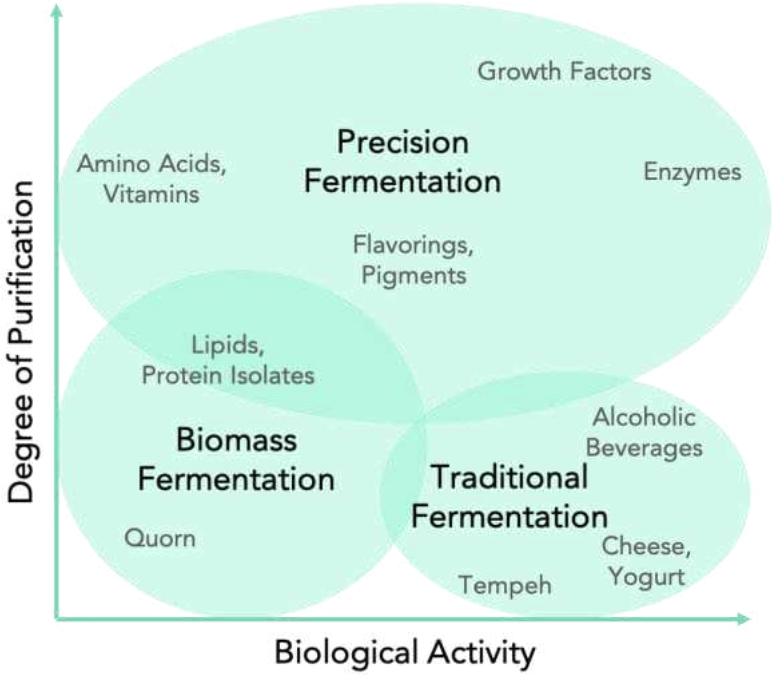

Ingredient suppliers

DEVIGERE BIOSOLUTIONS
PROEON
SUPPLANT FOODS LLP
ALTEIN Ingredients
gfi

What is Cultivated Meat?

- Cultivated Meat (CM) is **genuine animal meat** derived through cultivation and expansion of animal derived muscle cells.
- Replicate the **sensory and nutritional profile** of conventionally produced meat
- Safe for consumption at a large scale.
- CM meat involves various steps starting from cell line immortalization, co-culturing of various cells to large scale optimization of meat cultivation for consumption.
- Ideally closely to naturally existing animal muscle tissue.
    - All the **cell types**
    - **Three-dimensional structure**

Microbial fermentation can serve many roles in alternative protein applications



Traditional fermentation uses intact live microorganisms to modulate and process plant-derived ingredients.

Biomass fermentation leverages the fast growth and high protein content of many microorganisms to efficiently produce large quantities of protein.

Precision fermentation uses microbial hosts as “cell factories” for producing specific functional ingredients.

Precision fermentation can address key functional & sensory challenges in plant-based products and cultivated meat

Clara Foods

Egg white proteins

Perfect Day

Milk proteins (casein, whey)

Geltor

Collagen proteins

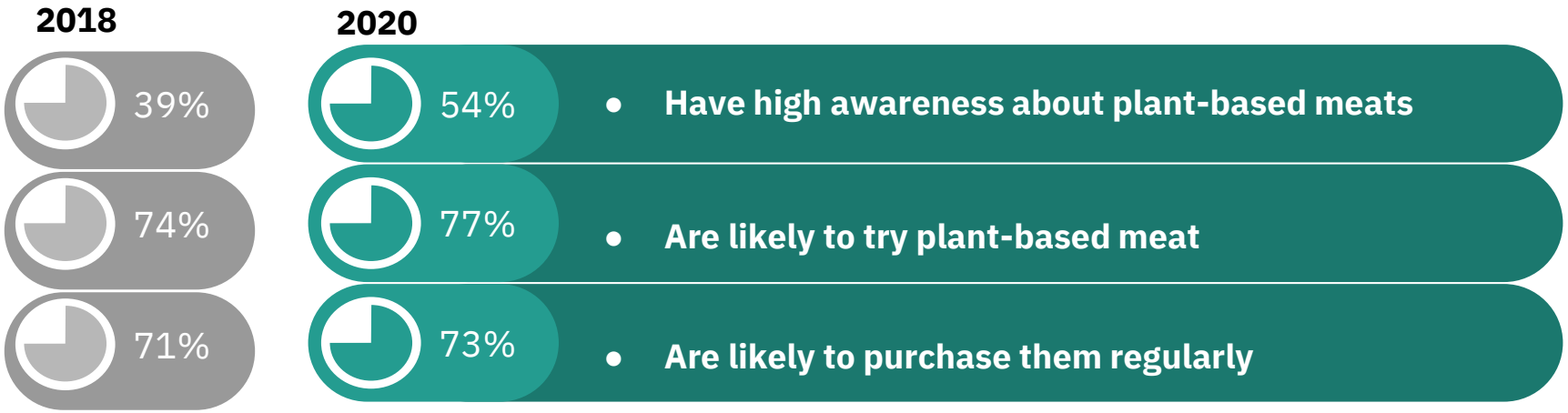
TRITON ALGAE INNOVATIONS

Heme proteins

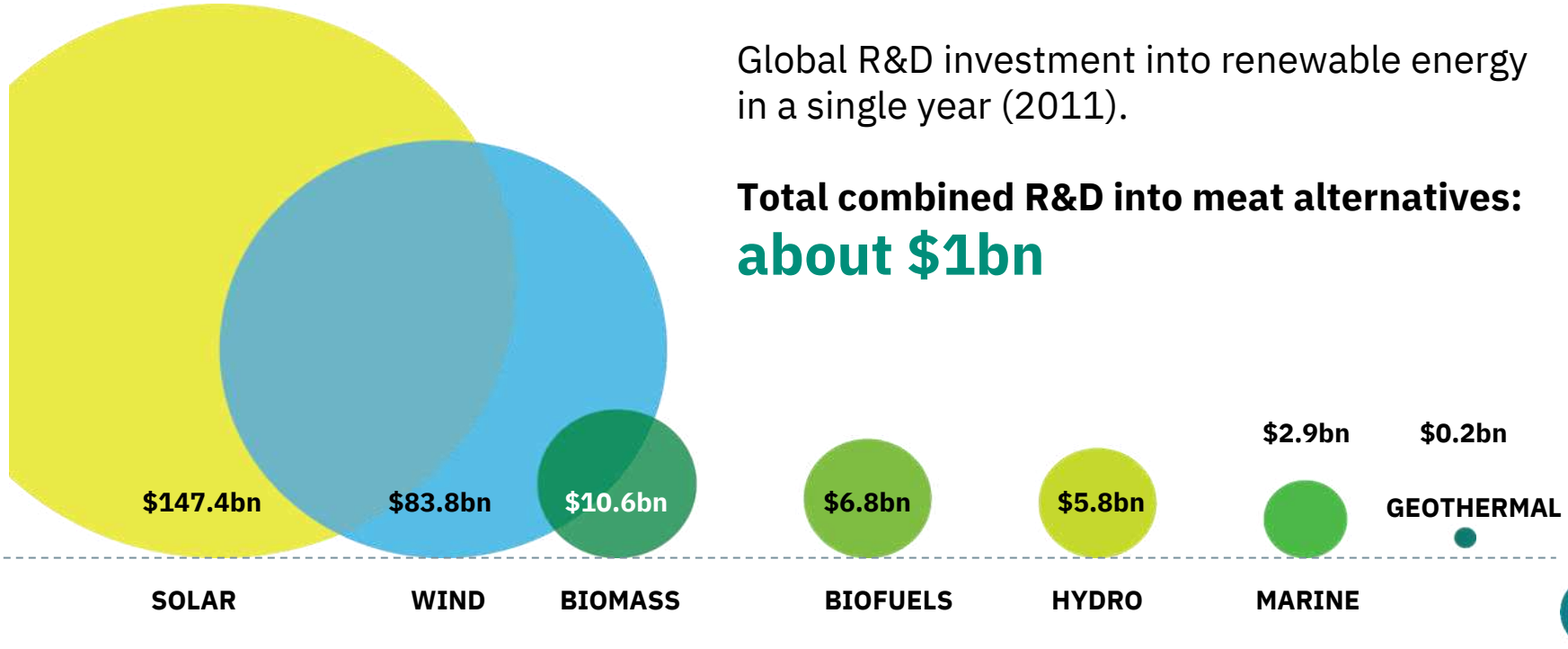
RICHCORE

Growth factors

High positive disposition seen towards the category in India with 54% early adopters familiar with plant-based meats and 77% willing to try them



Alternative protein development is highly underfunded and will benefit from additional resources



Global R&D investment into renewable energy in a single year (2011).

Total combined R&D into meat alternatives:

about $1bn

Source: Global Trends in Renewable Energy 2012

India stands to lose *USD 35 trillion by 2070* to climate inaction.

‘Atmanirbhar Bharat’ in Smart Protein

Large crop biodiversity

Lucrative, sustainable value addition in pulses, millets, and other indigenous crops

Globally competitive talent pool

Entrepreneurship and engineering & scientific skill sets

Major industrial opportunity

Rapidly growing biotech and food processing industries

High impact priorities across India

Open access R&D and infrastructure building

- Establishing Centres of Excellence
- Launching open access research grant programmes in smart protein
- Cross country programmes for tech and knowledge transfer

Policy incentives and a conducive regulatory landscape

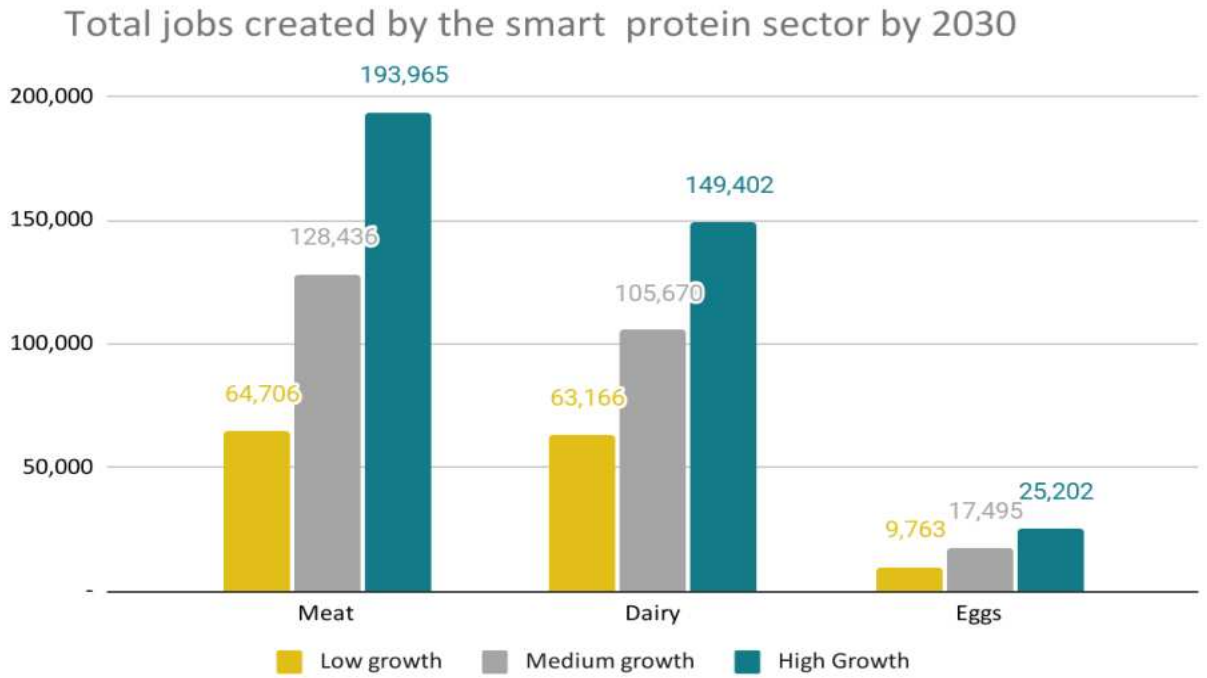
- Establishing regulatory frameworks for emerging categories such as cultivated meat
- Subsidy and policy support at the business and farm level

Building talent pools and skills across the value chain

- Launching Smart Protein curriculum in universities
- Incubation and accelerator programmes focused on smart protein

Career Opportunities in the Smart Protein Industry

Building a resilient green economy: just the meat, egg, dairy smart protein categories could create 4.2 lakh jobs by 2030



Source: GFI India and Deloitte modelling

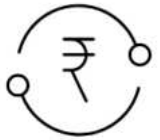
Policy and regulatory talent are key to a thriving smart protein ecosystem

Avenues to build future capacity in improving India's food system

Legal Advisory and Compliance Support

Research and Analysis

Social Finance



Government Advisory and Public Policy

Service Industry

Entrepreneurship

Government bodies

Nonprofits/ NGO

Research organisations

Thank you! Questions?

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