Cellular Agriculture Infrastructure Initiative

Phase I: Roadmapping Global Pre-Competitive Infrastructure

An initiative of New Harvest, seeking funding support

Summary

What is the ideal research infrastructure for cellular agriculture? This is the question the team at New Harvest aims to answer with your support.

The goal of this project is to roadmap the global pre-competitive infrastructure needed, from discovery to commercialization, including tools, facilities, resources, and training, to most effectively advance cellular agriculture.

Background

Cellular agriculture is a new, interdisciplinary field aimed at producing animal products without animals. This technological pursuit comes with the incredible promise of feeding the world animal protein with far fewer negative impacts to the environment, animal welfare, and public health than industrialized animal agriculture.

In the past decade, over $3 billion has been invested in over 100 cellular agriculture companies working on cell cultured meat, milk, and eggs. While there is so much momentum in the private sector, philanthropists and non-profits pushing to advance cellular agriculture must ask the question: **what will the market not solve?**

Complex biotechnology relies on a balance of public and private sector innovation in order to bring discoveries from lab to market. In recent years, cellular agriculture has seen explosive growth in its private sector, but very little support for the traditional public sector, which would normally involve government funding for academic institutions.

The public sector is crucial to the success of cellular agriculture. Without an established public sector, cellular agriculture is facing:

- The lack of a talent pipeline and expertise development, blocking innovation at critical steps in the pathway to market;
- The lack of public data, preventing adequate education of policymakers and the public;
- A high likelihood of redundancy across industry, reducing speed to market; and
- Intellectual property protection that occurs too early in the discovery pathway, leading to IP that excludes rather than discloses

In short, without scientific credibility and transparency that comes from the public sector, there is a risk that cellular agriculture does not make it to market and/or is not able to realize its promised impact for animals, people, and the environment.

Problem/Opportunity

If cellular agriculture is a city, it is one without public infrastructure; there are privately owned houses popping up everywhere, but the roads, bridges, sewers, and public squares - all of which are crucial to a thriving ecosystem - are yet to be built. What is the likelihood of success for this emerging community without this critical infrastructure?

Cellular agriculture must build up its public infrastructure to succeed.

On the surface one might imagine that simply pouring public funding into the classic institution would address this problem. However, it is unlikely that such an atypical, non-traditional industry would benefit from typical, traditional institutional support. There is little chance that traditional institutional support will keep up with the pace of private innovation and be deeply productive for the field at large.

If we can't rely on the market or academic institutions to drive progress in cellular agriculture, where does that leave us?

Solution

As a new technology, cellular agriculture requires a new model for research infrastructure beyond the confines of traditional academia.

We propose devising a roadmap for the global pre-competitive infrastructure needed—from discovery to commercialization, including tools, facilities, resources, and training—to propel innovation in cellular agriculture. The idea is to pull apart the functions of a traditional institution and reassemble a research infrastructure that is purpose-built for cellular agriculture today.

This roadmap will serve as a key stepping stone for industry, academia and government partners to work together to develop the critical infrastructure projects needed to promote growth, transparency, and scientific credibility in the field.

Special attention will be given to opportunities within Canada to address the infrastructure needs, with the goal of using this as a case study for other regions. We are focusing on Canada to bring together Canadian partners and experts in cellular agriculture to leverage existing efforts towards government support.

Our Approach

- Leveraging our existing contacts and position as research leaders in cellular agriculture, through multi-stakeholder engagement and research, we will:
    - Identify pre-competitive gaps which are not being addressed by academic circles or by companies that are necessary for ongoing innovation in cellular agriculture, including socio-economic dimensions
    - Identify critical facilities, resources, tools, training, intellectual property and data which needs to be more accessible to promote growth, transparency, and credibility in the field
    - Map out how these gaps can be best addressed via different structure, funding, and partnership models, including approaches to intellectual property
    - Map out the missing 3rd parties (academic, governmental, philanthropic, or private) who must be involved, and in what capacity
    - Create a dedicated website which lays out the roadmap, identifies gaps/roles yet to be filled, and welcomes participation

- In collaboration with Canadian partners, we will do the following with a focus on Canadian needs and opportunities:
    - Propose specific opportunities, groups, institutions, and individuals in Canada who could fill in the gaps/roles identified

- To create and maintain momentum behind the proposed roadmap through stakeholder engagement with key government and funder contacts.

Outcomes

- A set of highly visible deliverables:
    a. A roadmap of the global pre-competitive infrastructure of cellular agriculture, put on a dedicated website, with clear next steps for the parties which need to come together to address infrastructure gaps
    b. A chapter focused on cellular agriculture infrastructure in an upcoming cellular agriculture textbook

- Collaborative efforts pending stakeholder engagement:
    a. Synchronization with Ontario Genomics, which is currently coordinating the largest bid for synthetic biology research infrastructure in Canada through the CAN-DESyNe biotechnology ecosystem
    b. Synchronization with Purdue University, which has received funding from the Foundation for Agriculture Research to understand the supply chain infrastructure required for cellular agriculture

- Communications efforts:
    a. An article on the Canadian opportunity in a Canadian media outlet
    b. A blog post & web page on New Harvest website

c. Ongoing stakeholder engagement with interested parties to carry the work forward

Why Now?

A roadmap of the ideal pre-competitive infrastructure of cellular agriculture is needed now more than ever.

Institutions (UCDavis, Tufts) are beginning to receive government funding and are in the position to be steered towards new approaches to designing their programming. Governments (such as Singapore, Netherlands, and Canada) are beginning to explore their role in cellular agriculture, and major grant applicants (Ontario Genomics, Purdue University, Planet B.io, GFI) are assembling proposals and strategies to move the field forward. Several of these groups are looking to New Harvest for guidance and direction.

On the other side, industry is facing roadblocks and barriers due to the lack of research infrastructure - the XPRIZE focused cell cultured meat is struggling to find testing labs for cultured meat samples, students do not have clear pathways to work in industry, and regulators and policymakers are approaching New Harvest for independent information.

This project provides much needed guidance for new initiatives, and strategies to remove roadblocks for the current private sector.

Why New Harvest?

Founded in 2004, New Harvest is the longest-standing nonprofit devoted to advancing cellular agriculture.

As a reputable and trusted partner of both industry, academia, and government, New Harvest is uniquely positioned to carry this project forward - the necessary stakeholders are already within our network, the issues and challenges are already visible across our collaborative projects, our long-running research programs have helped us identify gaps in academia, and a recent listening campaign with 64 individuals across the industry have helped us identify their shared challenges.

Our project team consists of global experts in cellular agriculture who have perspective from the technical and non-technical sides of the cell ag industry, as well as the academic and policy sides of cellular agriculture. They bring on-the-ground experience in the field coupled with technical expertise to this important work.

Timeline

Feb-May 2022	Stakeholder engagement, research, preparation of deliverables
May - July 2022	Completion of website and blog post, media outreach Submission of textbook chapter
Q3-Q4 2022	Outreach and socialization of project with key stakeholders

Our Team

Core Team Member	***Role***
Isha Datar, Executive Director, New Harvest	*Project Sponsor, Cellular Agriculture Expert*
Dwayne Holmes, Director of Responsible Research & Innovation, New Harvest	*Project Lead, Cellular Agriculture Expert; Academia, Industry*
Lejjy Gafour, CULT Food Sciences	*Cellular Agriculture Expert; Industry, Incubator, Venture Capital*
Yadira Tejeda-Saldana, Research Collaborations Director, New Harvest	*Cellular Agriculture Expert; Academia, Policy, Canada*
Avery Parkinson, Executive Director, Cellular Agriculture Canada	*Cellular Agriculture Expert, Canada*

Additional Stakeholders

Dr. Ajay P. Malshe, Professor of Mechanical Engineering at Purdue University	*Leading a cellular agriculture supply chain project supported by the Foundation for Food and Agriculture Research*
Dr. Elaine Corbett, Director, Sector Innovation and Programs, Ontario Genomics	*Leading cellular agriculture funding initiatives in Canada and support for large scale synthetic biology research infrastructure in Canada*
Francis Dodds, Editorial Director, Burleigh Dodds Science Publishing	*Leading editorial process of a cellular agriculture textbook in partnership with Professor Mark Post (Maastricht University, The Netherlands), Professor Che Connon (Newcastle University, UK) and Dr*

	Chris Bryant (University of Bath, UK)
Irfan Tahir, New Harvest Research Fellow	*Cellular Agriculture Infrastructure Textbook Chapter Project Manager*

Budget

Detailed budget available upon request.

Your Participation

We are seeking support from like-minded foundations to fund this initiative. We are hoping to raise **$255,112** total from two to three different funding sources.

This project would provide the project funder with broad visibility on the cellular agriculture space, transferable learnings on nascent industry-wide issues, and create a time and space for the funder's and NH's leadership to connect on ways of working together moving forward.