

NEW HARVEST ANNUAL REPORT

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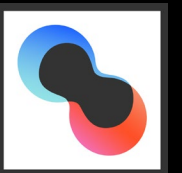


TABLE OF CONTENTS

Mission.....3

Impact.....7

Recognition.....19

Financials.....22

Community.....24

The Future.....28

** This report presents an overview of our accomplishments in the 2021 calendar year*

MISSION

Together, we're maximizing the positive impact of cellular agriculture

Since 2004, New Harvest has been defining the field of cellular agriculture. We are a field-building organization dedicated to reimagining the way we make animal products—using cells instead of animals. We fund and conduct original research to guide the development and governance of cellular agriculture toward realizing its promise of creating a new, just food system for a climate-changed world.



▲ Allison Esperanza, New Harvest Research Fellow, in the lab.

“Cellular agriculture is our once-in-a-lifetime opportunity to get a second chance at agriculture—to do things better and to learn from our mistakes.”

Isha Datar, Executive Director,
New Harvest, TED 2021

Connecting the dots

Cell cultured food is not just a technical fantasy. It's the means to an end that we're all invested in: a world where we need not slaughter and mistreat animals for food. So in the second year of COVID-induced disconnection, we rallied together to connect the dots between where we're going and how we get there. With the help of hundreds of supporters, we raised \$2.5 million to bridge the gap between cellular agriculture science and society.

The foundation of this bridge is of course the science that we have been supporting directly, as a research funder, since 2015. Last year, we reached our peak community size: 37 active researchers around the world, advancing the science behind cultured meat. Extending out from this foundation in research was our expansion into more collaborative work, which leverages the expertise of New Harvest staff to guide the collective advancement of the field.

The keystone of this bridge from science to society was articulating our vision of what it will take to maximize the positive impact of this transformative technology. In 2021, we took to the mainstage of TED to show that growing meat, milk, and eggs from cells is not just a substitute for animal protein. Cellular agriculture is much, much bigger: it is our once in a lifetime, second chance at agriculture. A chance to re-arrange the surface of our planet. A chance to build a new food system from scratch.

While 2021 saw us separated for another pandemic year, we came away feeling like our network had grown more than ever. But this time, not just to founders, funders, and academics, but to the constellation of individuals whose awareness and understanding of cellular agriculture will be critical to its success, like safety researchers, policymakers, and governmental scientists.

We welcome them into this journey, and thank you, our supporters, for forging the path alongside us.



Isha Datar, Executive Director



Funded
37 researchers,
our largest
cohort yet

Collaborated on 10
high-impact projects
with fellow non-profits,
NGOs, researchers and
government

Contributed to 12
academic grants for
cell ag, submitted
by research groups
around the globe

OUR
COLLECTIVE
PROGRESS

AT-A-GLANCE

Saw our largest return
on investment yet,
with the Kaplan Lab
at Tufts University
securing a landmark
\$10M grant for cell ag
from the USDA

507 donors
contributed
\$2,509,987
towards our
mission

Published
9 peer-reviewed
articles,
with 27 more
in-progress

1.7M views of our
cellular agriculture
TED talk



IMPACT



Our Programs

For the last 17 years, New Harvest has defined the field of cellular agriculture through groundbreaking research and creative programming that break down the silos between disciplines and sectors worldwide. This work is made possible thanks to visionaries like you.

As a field-building organization, we are the leading experts in identifying and addressing critical, neglected, issues that stand in the way of cellular agriculture’s progress. Our North Star is maximizing the positive impact of cellular agriculture. Our programs are how we get there. By combining academic rigor with inventive methodologies, we catalyze field growth, drive evidence-based policy and bring the community together to tackle shared challenges.

Together, we’re charting the course for getting these game-changing technologies out of the lab and into society.

**OPEN
RESEARCH**

Catalyze field growth
by funding neglected
research

**POLICY
ENGAGEMENT**

Drive evidence-based
policymaking through
research collaborations

**COMMUNITY
ALIGNMENT**

Break down silos
through creative
outreach

OPEN RESEARCH

Together, we catalyzed field growth by funding neglected research

Since 2015, we've been funding researchers on the frontlines of cultured meat science to pursue their passion of developing the critical, foundational research needed to propel this field forward. In 2021 we brought on twelve new research grantees and reached our biggest cohort yet: 37 active researchers around the world, supported and connected by New Harvest.

We ended the year pausing applications for our research grants to ask ourselves the difficult question: What research is neglected today?

A lot has changed in cellular agriculture since we started funding research six years ago. As the field has grown into a \$1B+ industry with 100+ companies, we've come to understand our responsibility as a nonprofit to not just build the field, but to build it with integrity. That's why we shifted our mission in 2020 to maximize the positive impact of cellular agriculture. Last year, this shift in focus inspired us to go back to the drawing board to re-envision our research granting program.

What we realized is that we need to go beyond supporting research to advance technology, towards supporting research to advance technology into society. Starting in 2022, we will broaden the scope of our research funding to include opportunities for the social sciences—policy, law, anthropology, and so on—to tackle the socio-technical dimensions of cellular agriculture like safety, infrastructure, ownership, and ethics.

Making our research grants responsive to the evolving needs of the field is possible because of the folks, like you, who believe in our mission.



“New Harvest has given me the freedom to do the kind of science I want to do, rather than what another funding agency or my adviser wants me to do.”

Irfan Tahir,
New Harvest Research Fellow,
University of Vermont

Our Research Grants

Last year, your support empowered more researchers than ever before to address some of the most pressing questions confronting cellular agriculture today. *Thank you.*

By the numbers

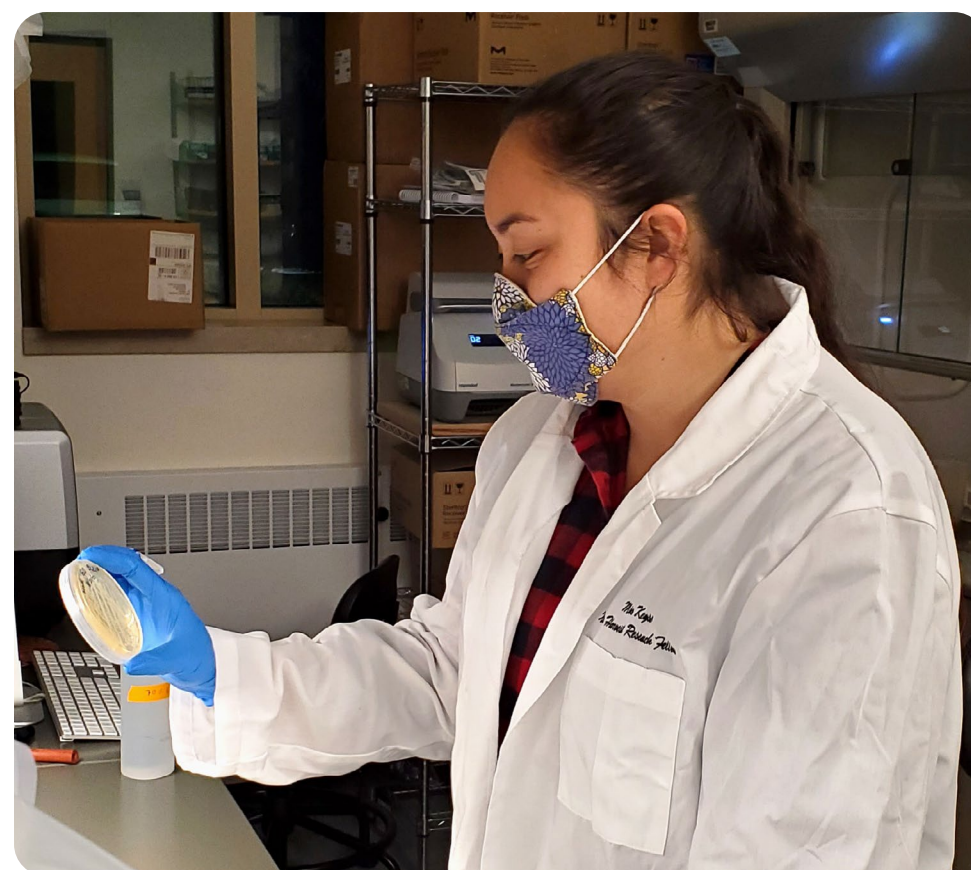
- \$1,008,343.47 in research grants distributed
- A community of 37 active grantees supported

Outcomes

- \$11,876,906 (at least) in public research funding for cell ag secured by labs receiving our catalytic funding
- 7 papers published by grantees, with 27 more in-progress

Grantee feedback

- 91% of grantees feel that New Harvest supports their professional development
- 100% of grantees would recommend their grant program to a colleague
- 100% of grantees feel that NH offers them a sense of community



▲ Mia Keyser, New Harvest Research Fellow, in the lab.

Crowdfunding Cell Ag

Starting in December 2021, New Harvest teamed up with Robert Downey Jr.'s FootPrint Coalition and the Experiment Foundation to allocate \$50,000 as seed funding to get cutting-edge projects off the ground. So far, this includes projects that tackle questions like: Can Thailand be a hub for cultured protein production? Or can we produce plant protein fibers to emulate whole cut cultured meat? Read more [here](#).



“I wouldn’t be where I am today without the financial, scientific, and emotional support of the entire New Harvest community.”

Natalie Rubio, New Harvest Research Fellow, Tufts University

Our Research Portfolio

Our research portfolio is so vast that it can be difficult to capture the breadth, depth and significance of the research we fund.

That's why we created a [research cheat sheet](#) last year, grouping projects into four deeply interconnected research questions. Here are just a few examples to illustrate how our researchers—and your support—are helping to advance the field on multiple fronts.

1. How can we make cell ag better for the planet? A: Reduce waste.

Three grantees are focusing on how to cut waste out of the supply chain in cell ag. Both Kai Steimetz and Ted O'Neil are finding ways to use recycled materials—like [agricultural byproducts](#) or [plant waste](#)—as low cost cell culture media! Outside of the wet lab, Dawne Skinner is developing a [computational model](#) to help companies identify ways to limit waste, reusing resources wherever possible.

2. How can we move beyond just burgers? A: 3D print it!

3D printing allows us to layer fat and muscle cells to create complex structures. Jannis Wollschlaeger is [3D printing cultured meat](#) to mimic the texture and composition of meat, and Alexis Garrett is using a [hybrid bioprinting approach to speed up the process](#)!

3. How can we make cultured meat cost competitive? A: Design more efficient growth factors

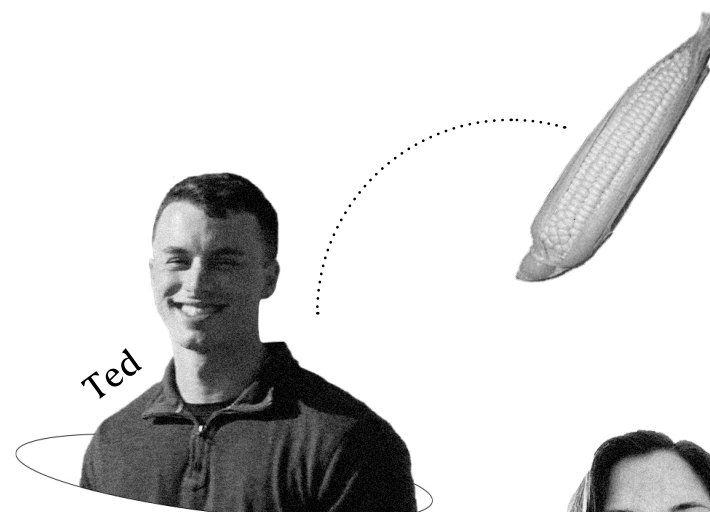
Growth factors (think: instructions for cells) account for more than 90 percent of cell culture media costs. Mia Keyser is developing [cost-effective growth factors](#) that are more potent, long-lasting, and easier to produce.

4. How can we get to market faster? A: Prioritize safety.

Samuel Peabody is identifying [potential harmful bacteria in the production process](#) to anticipate the demands of regulatory compliance and empower companies to mitigate risk.



Kai



Ted



Dawne



Jannis



Mia



Sam

Growing the Public Canon of Knowledge

New Harvest staff and grantees published nine peer-reviewed articles, with 27 more in the pipeline. Last year, we covered topics as far-ranging as how to grow beef on spinach leaves to how to scale up production of cultured fat.



1. [Milliscale Substrate Curvature Promotes Myoblast Self-Organization and Differentiation](#)
2. [Decellularized spinach: An edible scaffold for laboratory-grown meat Growing meat on spinach](#)
3. [Microvascular Tissue Engineering—A Review](#)
4. [Decellularized grass as a sustainable scaffold for skeletal muscle tissue engineering](#)
5. [Optimization of Muscle Cell Culture Media Using Nonlinear Design of Experiments](#)
6. [Perspectives on Scaling Production of Adipose Tissue for Food Applications](#)
7. [Rotational Digital Light Processing for Edible Scaffold Fabrication](#)
8. [Immortalizing Cells for Human Consumption](#)
9. [Food Safety Considerations and Research Priorities for the Cultured Meat and Seafood Industry](#)



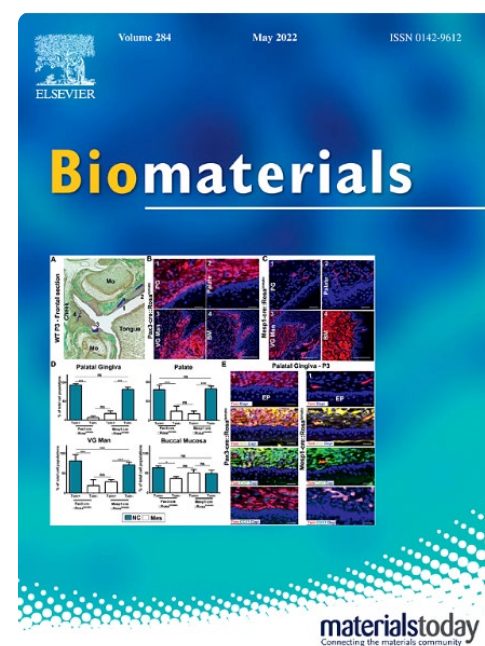
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2.



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POLICY ENGAGEMENT

Together, we collaborated on research to inform policymaking

With the drafting of our new strategic plan in 2020, New Harvest began to move beyond being simply a science funder towards operating like a research institute with external and internal expertise and projects. Last year, we doubled down on this new identity by solidifying our role as a research-oriented, scientifically credible thought leader and becoming the go-to experts in several international collaborative projects geared toward advancing cellular agriculture.

Over the span of 2021, our newly hired Research Collaborations Director Dr. Yadira Tejeda-Saldana onboarded ten collaborative projects. These projects brought together academics, government agencies, nonprofits, international NGOs, and visionaries like you. We started to do work beyond that of a research funder into that of an expert organization. As the ecosystem has begun to self-organize, New Harvest was called upon to have seats at incredibly influential and important tables that would dictate the trajectory of this technology out of the lab and into society. Powered by community support, this work expanded so quickly that we hired a second collaboration-focused research director, Dr. Dwayne Holmes, by the end of the year.

Thanks to you, we were able to invest more time into research collaborations geared toward driving innovation and producing the public data needed to educate policymakers and the public.



“New Harvest acts as a network hub that ensures university researchers work with industry in a way that helps to move forward these critical technologies ... they are willing to ask critical questions around policy changes needed to remove roadblocks for the industry. They’ve helped us advise government on how to best support this new innovation ecosystem.”

Lenore Newman, Food and Agriculture Institute, University of the Fraser Valley

Collaboration Highlights

XPrize: Feed the Next Billion is a multi-year, \$15M competition that incentivizes teams to produce chicken breast or fish fillet alternatives that replicate or outperform conventional chicken and fish in access, environmental sustainability, animal welfare, nutrition, as well as taste and texture. Last year, New Harvest joined the competition's advisory board, offering insights and support in the design and execution of the competition.



“Cell ag is one of the most promising scientific developments in human history, and no organization has done more to cultivate (couldn't resist!) this burgeoning industry than New Harvest.”

Caroline Kolta,
Program Director,
XPRIZE: Feed the Next Billion

Cellular Agriculture in Canada: Last year, New Harvest joined the National Engineering Biology Steering Committee and consulted with Ontario Genomics to prepare their report on cellular agriculture in Canada. The 55-page report, published in November 2021, provides step-by-step instructions for how the Canadian government can seize a \$12.5 billion opportunity in cellular agriculture. Being the longest-running cellular agriculture non-profit, now with a Canadian branch, we were able to bring our thought leadership to the table and weigh in on critical unmet needs to advance the field in Canada.



Academic Grants: We supported twelve different grant projects geared toward stewarding cellular agriculture in the right direction in 2021. One of the standout experiences was teaming up with the University of Fraser Valley Food and Agriculture Institute on a grant to investigate how cellular agriculture can empower communities to strengthen local food security. This Future Skills Centre Shockproofing Canada grant has led to other collaborations with the FAI team about the social implications of cellular agriculture, helping to inform our work realizing our mission of maximizing the positive impact of this technology.



Our Safety Roadmap for Cultured Meat and Seafood

Comprehensive **REVIEWS** in Food Science and Food Safety

COMPREHENSIVE REVIEWS IN FOOD SCIENCE AND FOOD SAFETY | [Open Access](#) | 

Food safety considerations and research priorities for the cultured meat and seafood industry

Kimberly J. Ong , Jeremiah Johnston, Isha Datar, Vincent Sewalt, Dwayne Holmes, Jo Anne Shatkin

First published: 10 October 2021 | <https://doi.org/10.1111/1541-4337.12853>

In 2021, we celebrated a major milestone in our ongoing safety work with the publication of [our open-access paper](#), “Food safety considerations and research priorities for the cultured meat and seafood industry,” in the journal *Comprehensive Reviews in Food Science and Food Safety*.

Written in collaboration with Vireo Advisors, the paper charts a path forward for how we can demonstrate the safety of cultured meat. It’s the culmination of a series of workshops we held in 2020 with 50 leading companies, who shared previously unpublished details about their manufacturing process. No non-disclosure agreements were signed throughout the initiative, making this the first example of collective action in cellular agriculture history.

The paper has already opened several doors with key policymakers, regulators, safety researchers, and international NGOs. We had the opportunity to participate in an informational webinar for the Organisation for Economic Co-operation and Development Working Party for the Novel Foods and Feeds to share an overview of cell-cultured animal food products and our safety initiative. The paper has since been cited in the latest [United Nations Food and Agriculture Organization food safety report](#), which goes to show how critical this research is to establishing cell ag as a viable solution to meet our global sustainable development goals.

“Transparency about how cell-based products are made is crucial for both regulatory and commercial acceptance. Working with New Harvest, we’re co-creating credible information in the public domain as the critical first step toward reducing uncertainty and demonstrating safety.”

Jo Anne Shatkin, President,
Vireo Advisors

COMMUNITY ALIGNMENT

Together, we deepened the dialogue through creative outreach

Fueled by your support, New Harvest ramped up our commitment to advancing the public conversation about cellular agriculture through credible, evidence-based insights last year. As always, our goal in all of our communications is to avoid the overpromising that we often see around disruptive technologies. From the TED mainstage to the pages of *The Counter*, we shared a complex vision of the future of cell ag and called out the limits of the market. After all, the point of cell ag isn't simply to make new products for people to consume. Instead, it's to use this tech to "disrupt" animal agriculture and build a more just, democratic food system.



▲ New Harvest team members, Breanna Duffy, Research Operations and Outreach Director, and Meera Zassenhaus, Communications and Media Manager, at the 2021 Cultured Meat Symposium.

“@IshaDatar gave the best TED talk so far. Never heard someone make the case for #plantbased diets better ... Cell-based foods is opening up a new era of abundance and #foodie innovation.”

Sarah Shewey, former TED Talks producer, on Twitter

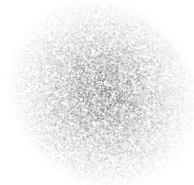
Our TED Talk

Last year, New Harvest [took cellular agriculture to the TED mainstage](#) to introduce newcomers to the concept and to paint a more thorough picture of the future that these technologies could afford us. It was important for us to represent the field as accurately as possible. So we consulted with 49 cell ag leaders in preparing the talk for projections of cost and for imagery. It was truly a collaborative effort. By the end of 2021, the video had garnered almost 2 million views, allowing us to share our vision for a more just and sustainable food system with our biggest audience yet.



“There’s a real chance that cellular agriculture could fail, and it won’t be because the science doesn’t add up. It’ll be because we didn’t think about what ownership should look like, or IP protection, or governance or policy ... we’re going to have to be very careful and thoughtful about what this technology needs around it so we can maximize the positive impact that it will have on this world.”

Isha Datar, Executive Director,
New Harvest, TED Talk 2021



New Harvest in the News

Isha Datar, New Harvest Executive Director, discusses the importance of **supporting the public sector and envisioning a new IP regime** for cellular agriculture in “Lab to Table.”

THE NEW
REPUBLIC

Allison Esperanza, New Harvest Research Fellow, compiles a **timeline of claims made by companies and organizations for when cell-grown meat will hit the market** in “Is Lab Meat About to Hit Your Dinner Plate?”

Mother Jones

Andrew Stout, New Harvest Research Fellow, provides an expert opinion **on the importance of working with different cell lines** in “The hunt for the master cow that will feed the world.”

WIRED

Isha Datar makes **the case for public cellular agriculture funding** in “Secrets and pies: the battle to get lab-grown meat on the menu.”

The
Guardian

Meera Zassenhaus, New Harvest Communications and Media Manager, in conversation with the artist behind **Ouroboros Steak, a design kit that asks users to grow their own cells into meat** in “Consensual Consumption.”

Biodesigned

Isha Datar **weighs in on the feasibility of cultured meat** in “Lab-grown meat is supposed to be inevitable. The science tells a different story.”

The
Counter

Ezra Klein **recommends New Harvest as a high impact charity** devoted to ending our dependence on factory farming in “We Will Look Back on This Age of Cruelty to Animals in Horror.”

The New York Times

[click the logos above to read more]

RECOGNITION

Recognition of our approach

When we started our research fellowship program in 2015, our thesis was simple: If New Harvest takes the leap and funds cultured meat research, then we can generate the data and expertise to win big time government grants. Our thesis was validated in a big way last year when the Kaplan Lab at Tufts University, seeded with funding from New Harvest, won a \$10M grant from the United States Department of Agriculture to establish the first ever National Institute for Cellular Agriculture.

Since 2016, we’ve invested \$1M into the Kaplan Lab—our biggest investment in a single laboratory. Over the years, we’ve supported six New Harvest grantees investigating everything from how to grow cell-cultured caterpillar steaks to how to tailor the nutritional profile of beef. This means we saw our investment multiply tenfold with a single government grant—all thanks to the long-term vision and commitment of our giving community.

This is the first time a government agency that typically funds livestock research gave cultured meat the time of day—and we believe this will be the beginning of a greater influx of government funding for cellular agriculture, leading to true establishment of this field at the institutional level.

\$902,583 from
New Harvest
to fund 6
researchers



\$10M from
USDA to form
the National
Institute
for Cellular
Agriculture

“If you had told me five or six years ago that we would have the size and activity in cellular agriculture that we have today in our lab, I would’ve said “no way.” We have New Harvest to thank for this incredible rate of growth.”

David Kaplan, Chair of Biomedical Engineering, Tufts University

Recognition of our impact

In 2021, we were one of a handful of charities recommended by the Animal Charity Evaluators. ACE is an independent research organization that assesses the effectiveness and impact of nonprofits working to improve the lives of animals. Since 2014, ACE has reviewed more than 500 charities to determine their effectiveness in helping animals. We were a Standout Charity from 2015-2017, and are honored to have ACE's stamp of approval once again. Read the full review [here](#).

Recognition of our values

One of our core values is integrity in everything. We recognize the power and responsibility that we hold—as a funder, as a thought leader, as a public voice—and we are committed to honesty, honor, and truthfulness in everything we do. In 2021, we received high grades for accountability and transparency by independent charity evaluators like Charity Navigator and Guidestar.

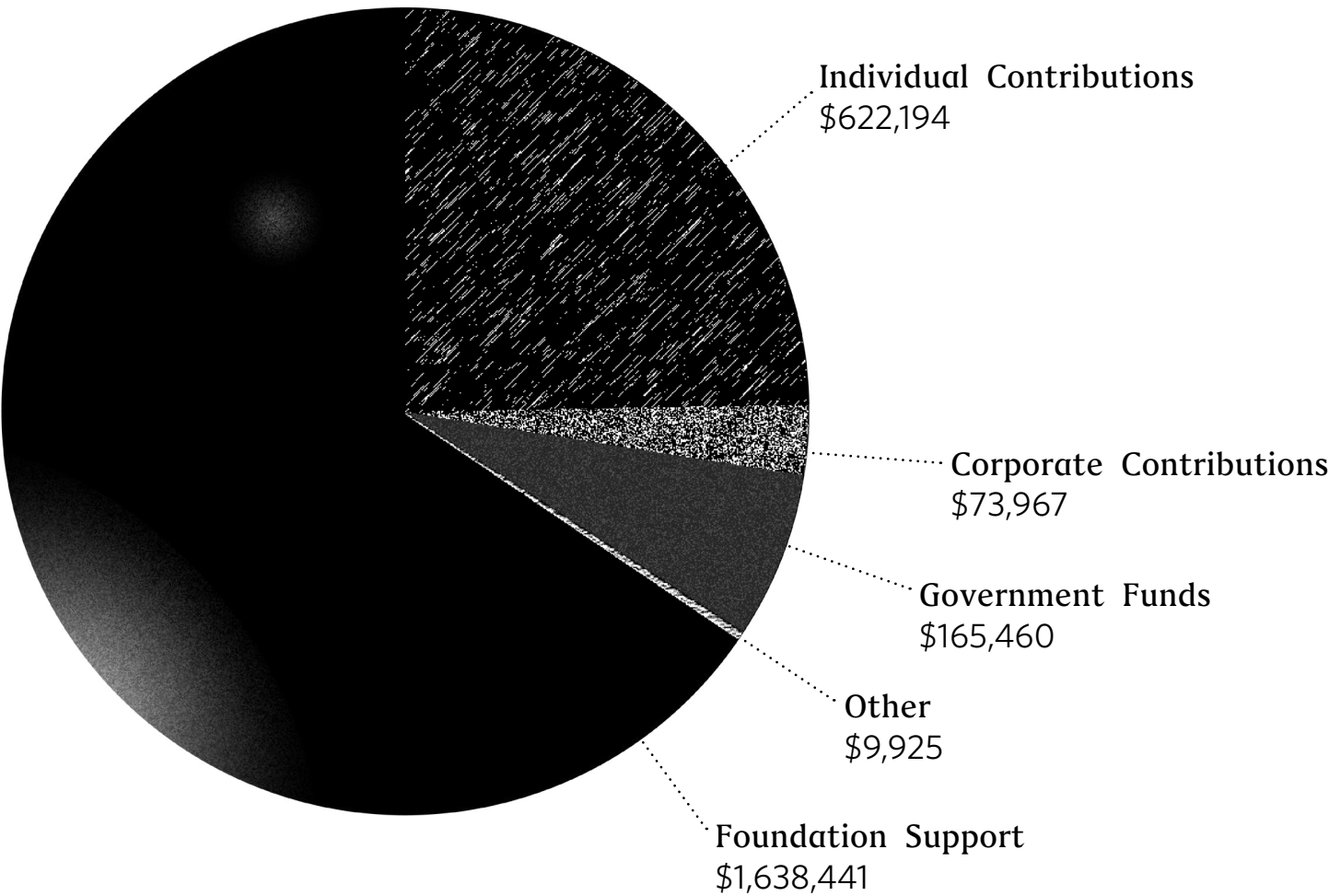


“New Harvest is more directly focused on building the scientific community and funding the research to make cellular agriculture possible. It’s directly focused on the technical challenges of cultivated meat. If those aren’t solved, then all the lobbying efforts in the world won’t matter.”

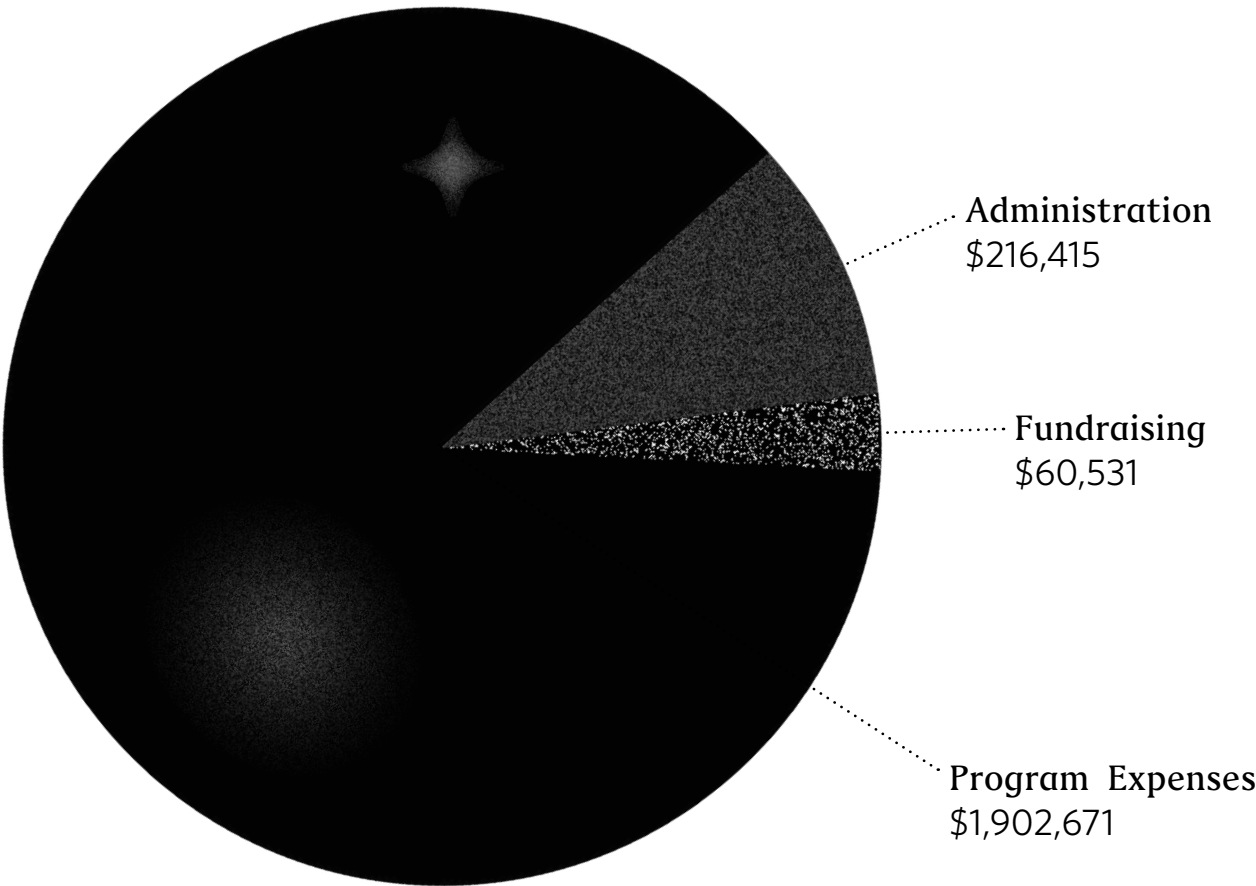
Ezra Klein, Columnist,
New York Times

FINANCIALS

In 2021, we **raised \$2,509,987**—thanks in no small part to you



In 2021, we **invested \$2,179,617** to drive our mission forward*



New Harvest publishes our audited financial statements annually on our website [here](#). We always welcome questions about our funding sources and allocation of resources.

*Excludes unrealized investment income of \$1,822,000 identified in our audited financial statement



COMMUNITY

Meet the Staff



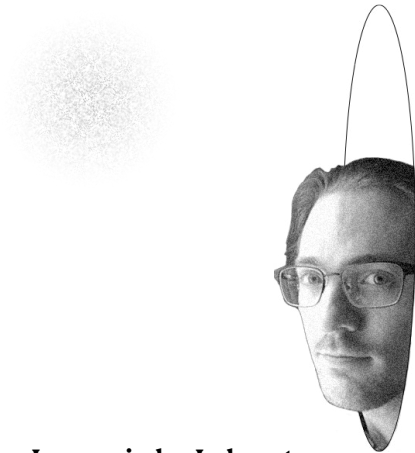
Bre Duffy
Research Operations
and Outreach Director



Dwayne Holmes
Director of Responsible
Research & Innovation



Isha Datar
Executive Director



Jeremiah Johnston
Research Program Director



Lanto Hariveloniaina
Executive Assistant



Meera Zassenhaus
Communications and Media Manager



Michela Caffrey
Content Production Manager



Morgan Ziegelski
Science Communications Intern



Paige Wilcoxson
Chief Operating Officer



Stephanie Bailey
Development Manager



Yadira Tejeda-Saldana
Research Collaborations Director

The Board:
Andras Forgacs
John Pattison
Karien Bezuidenhout
Scott Banister
Vince Sewalt
Isha Datar
Paige Wilcoxson

Meet the Grantees

Research

Fellows

| | |
|-----------------------------|---|
| Alexis Garrett..... | University of Nebraska, Lincoln |
| Allison Esperanza..... | University of Bath |
| Andrew Stout..... | Tufts University |
| Boštjan Vihar..... | IRNAS |
| Cameron Semper..... | University of Calgary |
| Dawne Skinner..... | Dalhousie University |
| Frea Mehta..... | Technical University of Munich |
| Irfan Tahir..... | The University of Vermont |
| Jannis Wollschlaeger..... | Reutlingen University |
| Jernej Vajda..... | University of Maribor, IRNAS |
| John Yuen..... | Tufts University |
| Jordan Jones..... | Worcester Polytechnic Institute, Boston College |
| Kai Steinmetz..... | University of Auckland |
| Lily Westerhoff..... | University of Bath |
| Luka Banovic..... | IRNAS |
| Mia Keyser..... | University of Colorado Boulder |
| Natalie Rubio..... | Tufts University |
| Ricardo Gouveia..... | Newcastle University |
| Richard Thyden..... | Worcester Polytechnic Institute, Boston College |
| Samuel Peabody..... | Texas Tech University |
| Scott Allan..... | University of Bath |
| Sophie Letcher..... | Tufts University |
| Stephanie Kaweck..... | University of California, Los Angeles |
| Ted O’Neill..... | University of California, Davis |
| Vanessa Haley-Benjamin..... | Newcastle University |
| Zachary Cosenza..... | University of California, Davis |

Seed

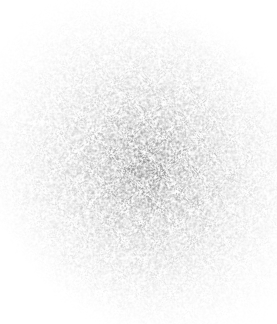
Grantees

| | |
|-----------------------|---|
| Ashton Davis..... | University of California, Los Angeles |
| Brodie Peace..... | University of Melbourne |
| Jake Marko..... | Worcester Polytechnic Institute, Boston College |
| Julian Cohen..... | Tufts University |
| Lisa Musgrove..... | The University of the Sunshine Coast |
| Nina Strasky..... | McGill University |
| Shravya Mukka..... | Pennsylvania State University |
| Vicky Andriessen..... | University of Auckland, University of Twente |

Dissertation

Awardees

| | |
|-----------------------|--|
| Bianca Datta..... | MIT Media Lab |
| Micheal McLellan..... | The Jackson Laboratory, Tufts University |
| Varsha Rao..... | University of Colorado Boulder |



Long Haul Generosity

In 2021, we saw our giving community grow like never before, united by our shared vision to end our dependence on animal agriculture. We welcomed a record-breaking number of first-time donors, bringing our total donor count to 1427—an increase of 30 per cent! Cultured meat is a moonshot, and we know it won’t happen overnight. So thank you for dreaming big and joining us for the long haul!

Foundation Partners



Corporate Donors

Merck KGaA | Finless Foods | Meatable | Peace of Meat
Aleph Farms | Upside Foods | Avant Meats | Boston Meats
Future Meat | Clara Foods | Gourmey | New Age Meats
Higher Steaks | Shiok Meats | Artemys | Because, Animals
Biomilq | BlueNalu | Bond Pet Foods | Novel Farms | NuProtein
Orbillion | OneBio | Tiamat | Vow | WildType
Cultured Decadence | Defined Bioscience

Community Donors

In 2021, we were supported by 507 visionary individuals, including 102 monthly donors.

“It took a long time to domesticate animals; it will also take some time to domesticate cells. I’m in it for the long haul!”

Natalie Rubio, New Harvest Research Fellow and monthly donor

THE FUTURE

Thanks to your support in 2021, we are one step closer to making cultured meat a reality—an idea that was pure science fiction just a handful of years ago.

And we're not just talking about developing new products on store shelves. We're talking about seizing a once-in-a-lifetime opportunity at a second chance at agriculture. This is revolutionary work, and you are on the vanguard.

By working together with our global community of supporters and research collaborators, we can ensure this transformative technology delivers on its promises to make the world a better place for people, the planet and animals. Your visionary support is vital to the realization of our mission. **Thank you.**



