



TRUTH BE SEEN

A THANK YOU TO SOME
OF OUR PARTICIPANTS

REPORT

Industrializing Cell-Based Meat: What Will It Really Take?

SIMULATION RESULTS

More than 30 private ventures have launched to attempt to industrialize cultivated meat, a technology which aims to produce real meat much more efficiently by making it directly from cells. At least six of these ventures are devoted to fish. Unfortunately, it appears that those championing the lean startup private investment model have significantly underestimated the research and development needed to industrialize cell-based meat, leading one insider to share, “The field is a decade away from any profitable revenue, and that is starting the clock from when a serious effort is undertaken.”

To help launch the first scientifically sound effort in cell-based fish, we ran two simulations with global experts. The first focused on “scaffolding,” a component of the manufacturing solution for producing cell-based fish. The second focused on the entire production solution, including scaffolding. The results are eye-opening.

DR. STEVE KATTMAN

Senior Director at Sana Biotechnology

DR. DARREN PLAYER

UCL (UK)

DR. LISA MAVES

Seattle Children’s Research Institute

DR. REZA OVISSIPOUR

CR & Virginia Tech

DR. YADIRA TEJEDA SALDANA

Co-founder and Executive Director at Cellular
Agriculture Canada (Canada)

DR. ALEC S.T. SMITH

CR & Institute for Stem Cell and Regenerative
Medicine (University of Washington)

DR. ALESSANDRO BERTERO

CR & Institute for Stem Cell and Regenerative
Medicine (University of Washington)

DR. DAVID MACK

CR & Institute for Stem Cell and Regenerative
Medicine (University of Washington)

DR. GREG POTTER

Clean Research

DR. JEAN-BAPTISTE DUPONT

(France)

MR. JEANOT MUSTER

CR & Institute for Stem Cell and Regenerative
Medicine (University of Washington)

MR. ABHIRATH KUMAR

Clean Research & Lever VC

MR. ALAIN ROSTAIN

Clean Research

SIMULATION 1

INDUSTRIALIZING SCAFFOLDING: WHAT WILL IT REALLY TAKE?

On August 25th, Scientists from Clean Research (CR) and the Good Food Institute (GFI) collaborated to deliver a three-hour workshop on scaffolding at the Industrializing Cell-Based Meat Conference 2020.

20 workshop participants, composed of scientists, technologists and engineers, participated in the simulation.

- All were given a presentation by Dr. Alec S.T. Smith and Dr. David Mack on the biology of the Extracellular Matrix, the biological parallel for the scaffolding needed to produce cell-based fish. It's essentially what the cells attach to and live/transform in.
- Participants were then presented with the current landscape of scaffold use in cultivated meat by Dr. Elliot Swartz, from the GFI.
- Presenters were then asked to consider, with speed-to-market as the highest priority, what a scaffolding solution for the simplest full-tissued meat might take. The goal was stated as having "a solution for scaffolding that fits the needs of a future commercial-scale facility that produces 500 tons of fish fillet meat a month and is substantially less resource-intensive than traditional animal agriculture."
- In addition to providing input on where research and development efforts should be focused, participants provided ballpark estimates. Highlights from the 20 responses:

Q: What odds do you give that our goal is theoretically achievable, as a percentage from 0 to 100%?

Odds of Success



Q: Let's assume a solution is achievable and it's possible to budget for the scaffolding work. There is some US\$ number that would have you think 'This should be sufficient funding.' What is this number?"

\$1.37B
(average)

\$500M
(median)

SIMULATION 2

INDUSTRIALIZING FULL-TISSUED CELL-BASED MEAT: WHAT WILL IT REALLY TAKE?

On September 9th, 14 senior scientists with deep expertise across many of the fields needed to develop cell-based meat attended a virtual workshop hosted by Clean Research in which they participated in a simulation.

- Similarly to August 25, participants were given presentations on the biology of the Extracellular Matrix and the current landscape of scaffold use in cultivated meat.
- They were asked to consider, with speed-to-market as the highest priority, what developing the technology to industrialize cell-based lean fish meat (likely the simplest full-tissued meat) might take. The goal was stated as "a solution that fits the needs of a future commercial-scale facility that produces 500 tons of fish fillet meat a month and is substantially less resource-intensive than traditional animal agriculture."
- In addition to input around the science and technology, participants provided ballpark estimates. Highlights from the responses:

Q: What odds do you give that our goal is theoretically achievable, as a percentage from 0% to 100%?

Odds of Success



Q: Let's assume a solution is achievable. There is some US\$ number that would have you think 'This should be sufficient funding.' What is this number? **Notably, only one participant estimated the cost at less than \$1 billion.**

\$3.56B
(average)

\$1B
(median)

- The raw response data can be accessed here: <https://www.surveymonkey.com/results/SM-SRK5KXSH7/>

CONCLUSION

Honest conversations are required in order to begin. With the value of the global meat market estimated in the trillions of dollars, cell-based meat, even at a cost of several billion \$, has a good chance of being much more sustainable (and profitable) than the meat it replaces. For comparison, the official cost to build the Large Hadron Collider at CERN was \$13.25 billion, with the actual cost likely closer to \$50 billion. Despite higher than anticipated development costs, cell-based meat not only makes sense, it is an urgent priority. Moreover, as the simplest cell-based meat to manufacture, lean fish meat should be the first focus [\[see our published peer-reviewed paper\]](#).

If a lean venture startup development model can't get the job done, what will? First, we need a more realistic approach that seeks to understand what it will take to give this field a fair chance, with speed to a solution the # 1 priority, and designing from there. A superlative collaboration methodology promises to dramatically improve our odds of success and speed, while lowering long-term costs. Even with daunting numbers and challenges, we must begin.

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"The sensible response to this information is to think through how we will raise the several billion dollars needed to industrialize cell-based meat, rather than avoid the conversation and not give the field a chance."

ALAIN ROSTAIN, Executive Director

Supporting Materials:

[The Extracellular Matrix: Biology](#)
[The current landscape of scaffold use in cultivated meat](#)
[Simulation 1 Setup and Prompts](#)
[Simulation 2 Setup and Prompts](#)

CLEANRESEARCH.ORG

T +1 754 222 2470

E truth@cleanresearch.org