

# Utilizing enzymatic microalgae hydrolysates for cellular agriculture



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## Introduction

UPSIDE Foods is working to produce chicken products to address the growing global food insecurity crisis.<sup>1</sup> Industrial scalability is limited due to the requirements of cell culture. Through collaboration with the company, we are working to supplement their existing media to drive costs down and improve cell viability.  
**AIM:** Supplement UPSIDE Foods existing cell media with algae hydrolysates.<sup>2</sup>

### Objectives:

- Decrease the cost of cultivating high-quality meat in a laboratory setting
- Produce a cell media that is:
  - Scalable
  - High-quality
  - Consistent

## Methods

### Amino Acid Analysis

- Microalgae Enzymatic Hydrolysis
- High Performance Liquid Chromatography (HPLC)

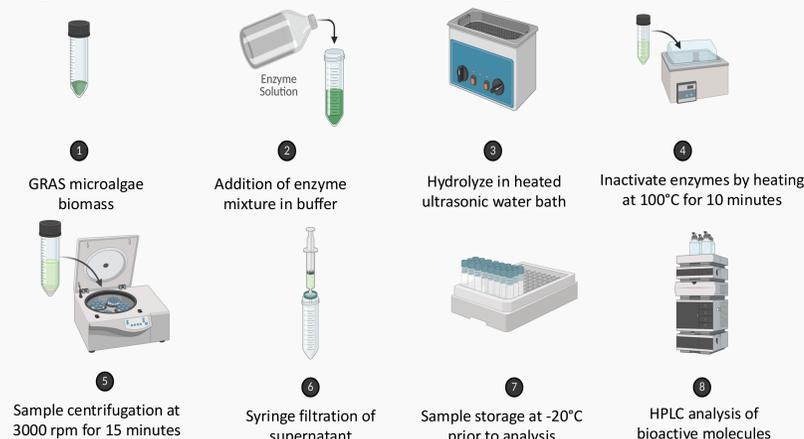


Figure 1. The microalgae hydrolysis procedure

### Terminal Growth Study

- Suspension Cell Culture
- Serial Cell Counts
- Cell Harvest and Assessment

## Results

Amino Acid Content for Treatment 1:3

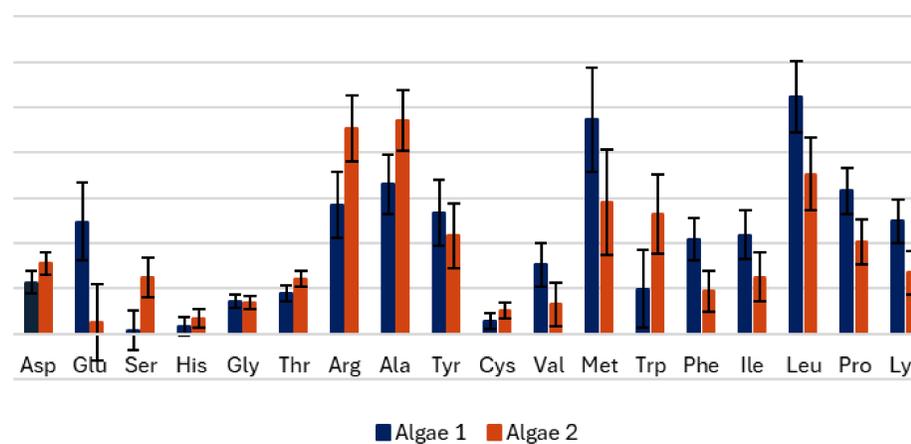


Figure 2. Amino acid profiles of algae 1 and algae 2 after a 90 minute enzymatic hydrolysis treatment.

Terminal Growth Study

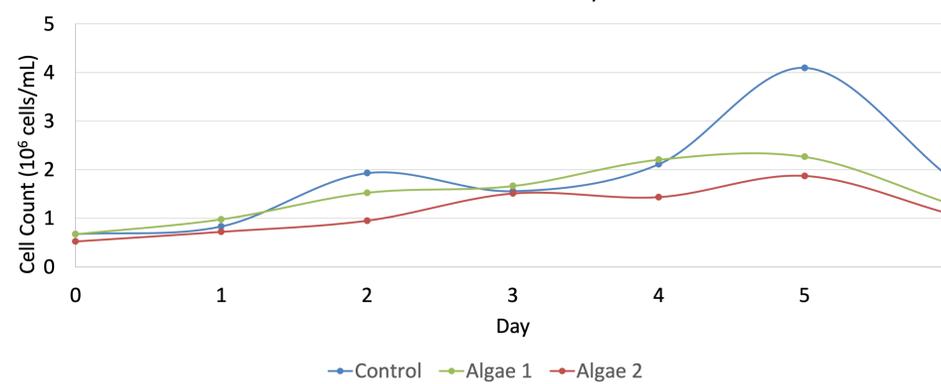


Figure 3. Terminal growth curve of UPSIDE standard media and media supplemented with algae 1 and algae 2.

Table 1. Packed Cell Weight, Population doubling time, and Growth Rate for cells grown in each sample of media (Control, Algae 1, Algae 2).

	C	ALG1	ALG2
Calculated Value (%PCW)	10.4	12	10
Population Doubling Time (hr)	87.47	83.81	106.37
Growth Rate (%)	23.06	24.06	20.32

## Conclusions

### Enzymatic hydrolysates of GRAS microalgae show promise as an additional nutrient source

- Eighteen amino acids needed for protein formation present were found in all treatment group
- Presence of all amino acids in testing indicates a potential to lessen production cost

### Algae supplemented media displayed similar production to UPSIDE standard

- Shared terminal growth curves between algae supplemented media and UPSIDE control indicates equal cell production
- Similar Packed Cell Weight, Population Doubling Time, and Growth Rate supports equal cell production
- Cell production is maintainable at lower cost with algae supplementation

## Impact

- Reduce cost of meat culture to allow for industrial scalability
- Produce consumer quality meat to provide additional protein sources and reduce global food insecurity

## References

- Human Food Made with Cultured Animal Cells | Food Safety and Inspection Service. <http://www.fsis.usda.gov/inspection/compliance-guidance/labeling/labeling-policies/human-food-made-cultured-animal-cells> (accessed 2024-04-23).
- Pena-Farfal, C. Speeding up enzymatic hydrolysis procedures for the multi-element determination in edible seaweed - ScienceDirect. <https://www.sciencedirect.com/science/article/pii/S0003267005009803?via%3Dihub> (accessed 2024-04-24).