cultivating pharmaceutical

proteins

using carbon dioxide

refined biomass through microalgae vertical farming

Solmeyea

have you ever considered how are we going to feed and cure

one billion

extra people in just 10 years from now?

According to the UN report's projections, the current world population of 7.3 billion is expected to reach 8.5 billion by 2030, 9.7 billion in 2050 and 11.2 billion in 2100.

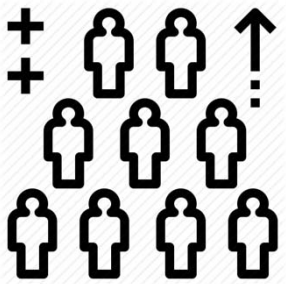
double faceted problem:

livestock revolution

climate change

+ 1bn

more people



+ 44%

livestock products' per capita consumption

+ 45%

animal feed protein needs (+100 millions tn)

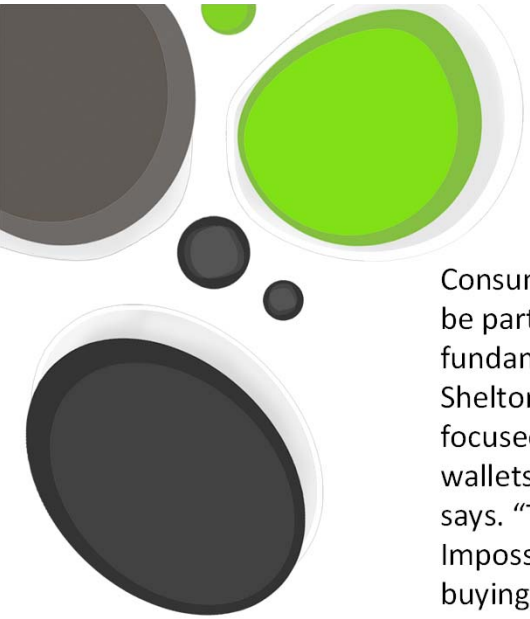
why now?

the emerging algae protein market is growing $10B (8% AGR) vs 5 years ago (1% AGR)

The dried biomass protein market is growing steadily. Public interest in alternative proteins as a food, feed, and fuel source is growing. In 2018 a law passed in the US making Algae a crop which provides more opportunity for new products.

the market demand for protein is unmet, products are inconsistent.

Key problems in farming these proteins is irregularity in the climate, seasonal variations, and non-standard agricultural processes which affect food supply and are causing a widening of demand-supply gap



Vegan substitutes for meat are at the forefront of food products that promise to help fight climate change

part of a climate-friendly lifestyle.

Consumers are worried about the planet and want to be part of a solution but they don't want to fundamentally change their lives, says Suzanne Shelton of Shelton Group, a communications firm focused on sustainability. "We are willing to align our wallets with where our values are if it's easy," she says. "That's the brilliance of Beyond and Impossible. It's not a change I have to make in my buying behavior."

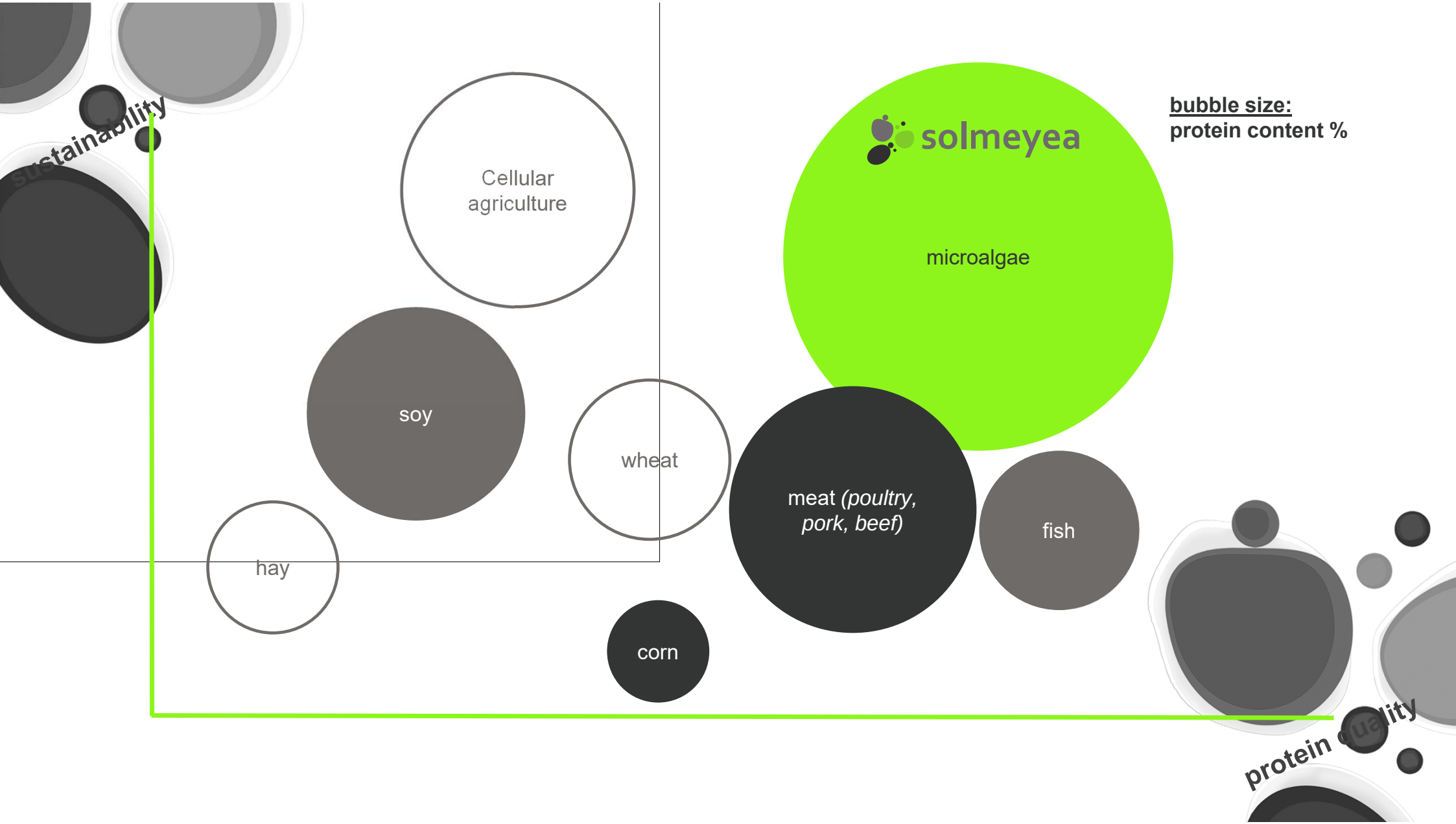
positively impact climate change

Plant-based proteins are unquestionably better for the planet than beef. A Beyond Burger generates 90% less greenhouse gases than a beef burger, according to its third-party life cycle analysis. Impossible's version, it says, emits 89% less.

Plant-based products aren't exactly natural. Impossible's primary ingredient is genetically-modified soy, grown with pesticides and fertilizers that have their own impacts

But alt-meat isn't the only way to lower protein-related climate impact. Poultry and pork both already have significantly lower greenhouse gas emissions than beef. "From a climate perspective, if people are eating chicken sandwiches instead of burgers, it's a huge win,

One thing climate experts agree on is that major dietary changes need to happen. Globally, agricultural practices need to be overhauled so that the same amount of land currently being used can produce even more food to feed a growing population


sustainability
Cellular agriculture
solmeyea
microalgae
bubble size:
protein content %
soy
wheat
meat (poultry, pork, beef)
fish
hay
corn
protein quality

Bloomberg Green

Where to Invest $1 Million Right Now

Five experts offer investment ideas to help fight climate change

Kathlyn Tan

Director, Rumah Group

From low-tech and high-tech plant-based meats that actually taste and feel like meat, to cultured meat (real meat grown without animals), to protein from microalgae — one has a diverse menu of opportunities to choose from. If these alternatives are able to compete on flavor, texture and convenience then scale and time have the potential to reveal investments that will perform on a global level.

Jeffrey Gitterman

Co-founding partner, Gitterman Wealth Management

Water, sustainable infrastructure and climate-screened real estate as well as waste management and recycling are our top themes. We're hyper-focused on climate right now.

The World Resources Institute **“menu for a sustainable food future”** explores ways to reduce food waste, increase production, restore forests and wetlands, increase the fish supply and reduce greenhouse gas emissions from agriculture

WRI Proposes ‘Menu of Solutions’ to Achieve Sustainable Food Systems

ANA MARIA LEBADA
Thematic Expert for 2030 Agenda for Sustainable Development (Romania)
27 August 2019

SHARE THIS

17 July 2019: A World Resources Institute (WRI) publication proposes a five-course ‘menu of solutions’ to ensure food security for 10 billion people by 2050 without increasing emissions, fueling deforestation or exacerbating poverty. The report underscores that the global food system must undergo “urgent change” to ensure adequate food for everyone without destroying the environment.

‘The World Resources Report: Creating a Sustainable Food Future’ was produced by WRI in partnership with the World Bank, UN Environment Programme (UNEP), UN Development Programme (UNDP), and France’s Agricultural Research for Development (CIRAD) and National Institute for Agricultural Research (INRA). Many of the report’s findings use the new GlobAgri-WRR model, which quantifies how much every proposed “menu item” can help increase the availability of food, avoid deforestation, and reduce greenhouse gases (GHGs) emissions. The publ also identifies policies, innovations, and incentives that can take the propos solutions to scale.

The report highlights three gaps that need to be closed to achieve sustainable f systems: a 56% “food gap” between what was produced in 2010 and food that needed in 2050; a nearly 600 million-hectare “land gap” (an area nearly twice t of India) between global agricultural land area in 2010 and expected agricultur expansion by 2050; and an 11-gigaton “GHGs mitigation gap” between expec emissions from agriculture in 2050 and the level needed to meet the Paris Agreement.

To close these gaps, the publication calls for major adjustments in the product food and in people’s consumption, and gives policymakers, businesses, and researchers a roadmap for measures spanning wild fisheries management to be consumption. The report explores a 22-item “menu for a sustainable food future,” which is divided into “five courses” that together could close the three identified gaps.

They include: (1) Reduce growth in demand by cutting food loss and waste, eating healthier diets, and more; (2) Increase food production without expanding agricultural land area via yield gains for both crops and livestock; (3) Protect and restore natural ecosystems by reducing deforestation, restoring peatlands, and linking yield gains with ecosystem conservation; (4) Increase fish supply by improving aquaculture systems and better managing wild fisheries; and (4) Reduce GHGs emissions from agricultural production through innovative technologies and farming methods.

The report argues that shifting consumption patterns, increasing the productivity of crops and livestock, and improving the efficiency of inputs like fertilizers could significantly reduce emissions and the demand for land while raising agricultural incomes. In addition, the text notes that maintaining global warming below a 1.5°C increase above pre-industrial levels would require reforesting more than 585 million hectares made available by these demand- and supply-side efficiency gains. [World Bank Press Release] [Publication: The World Resources Report: Creating a Sustainable Food Future] [Executive Summary]

SDGS

- 2. ZERO HUNGER
- 12. RESPONSIBLE CONSUMPTION & PRODUCTION
- 13. CLIMATE ACTION
- 14. LIFE BELOW WATER
- 15. LIFE ON LAND

ISSUES

Biodiversity, Sustainable

They include: (1) Reduce growth in demand by cutting food loss and waste, eating healthier diets, and more; (2) Increase food production without expanding agricultural land area via yield gains for both crops and livestock; (3) Protect and restore natural ecosystems by reducing deforestation, restoring peatlands, and linking yield gains with ecosystem conservation; (4) Increase fish supply by improving aquaculture systems and better managing wild fisheries; and (4) Reduce GHGs emissions from agricultural production through innovative technologies and farming methods.

ACTIONS

Publication

REGIONS

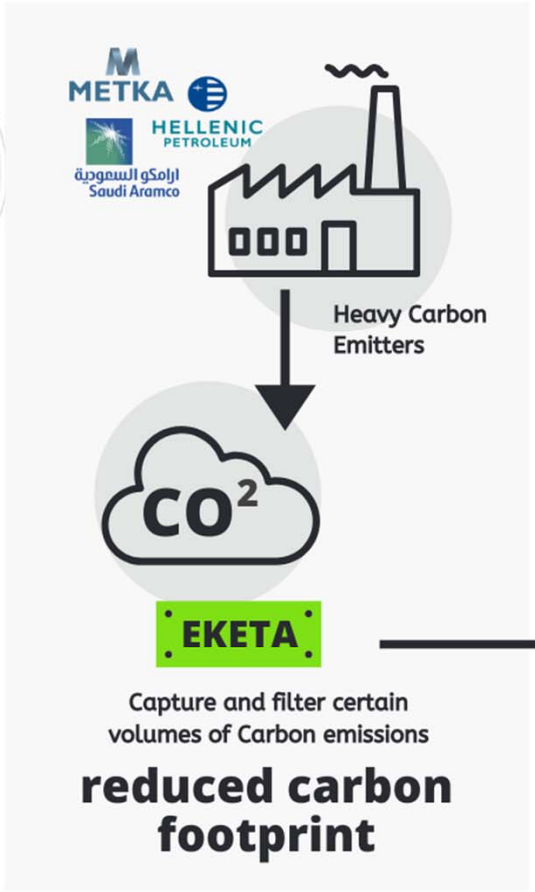
Asia, Europe, Southern Asia

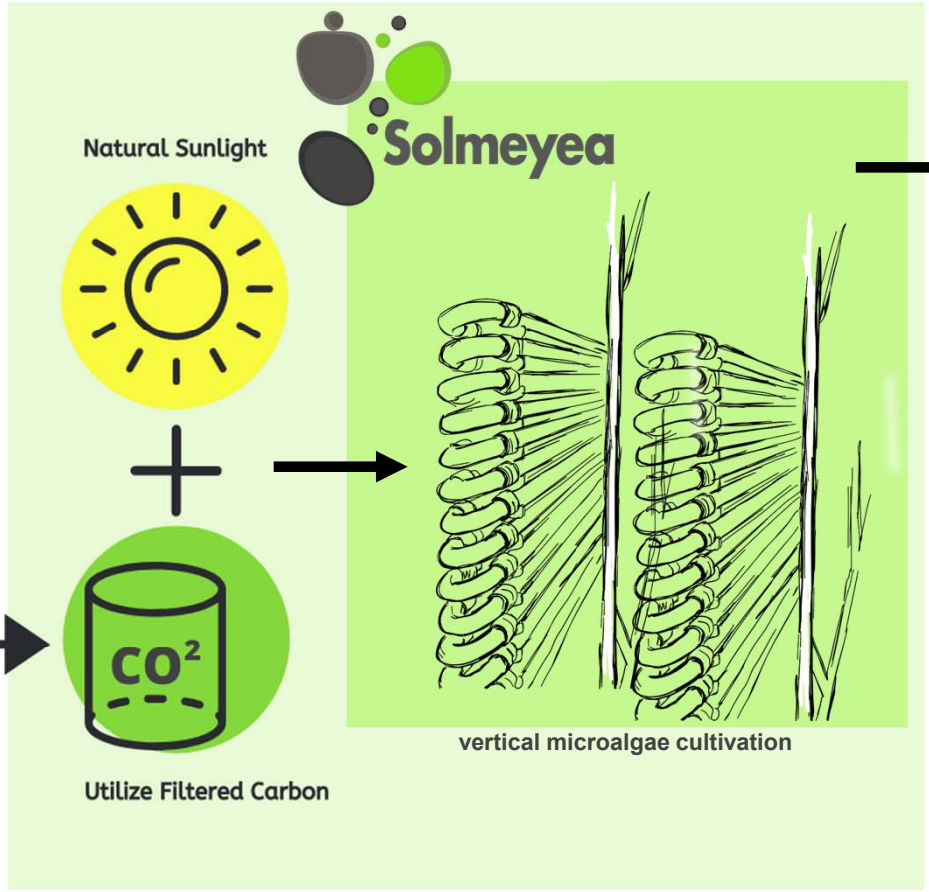
SHARE THIS

Proudly serve
9 of the 17 SDG’s

- more food & feed
- transparent & safe
- industries’ integration
- CO_2 utilization
- protein demand equilibrium
- CO_2 capture
- blue growth / fish feed
- animals’ feed supplements
- key stakeholders with us

sustainable high value pharma proteins through CO2 utilization





pharma

- phycocyanin
- astaxanthin
- carotenoids

BAYER
gsk GlaxoSmithKline
Johnson & Johnson

usecases

Other potential use cases of sustainable high-value proteins include:

fertilizers | food | feed

Downstream Process

Protein Extraction Methods

- Mechanical (High-pressure cell disruptor)
- Enzymatic methods
- Grinding
- Chemical treatment
- Ultrasound-Assisted Extraction
- Pulsed electric field
- Microwave-assisted extraction

Downstream Process

Protein Isolation

- Precipitation (alkaline/acid)
- Membrane Filtration
- Nanofiltration
- Ultrafiltration
- Microfiltration

Outcome

Lectins
Anticancer, antiviral activities, anti-inflammatory, anti-adhesion properties

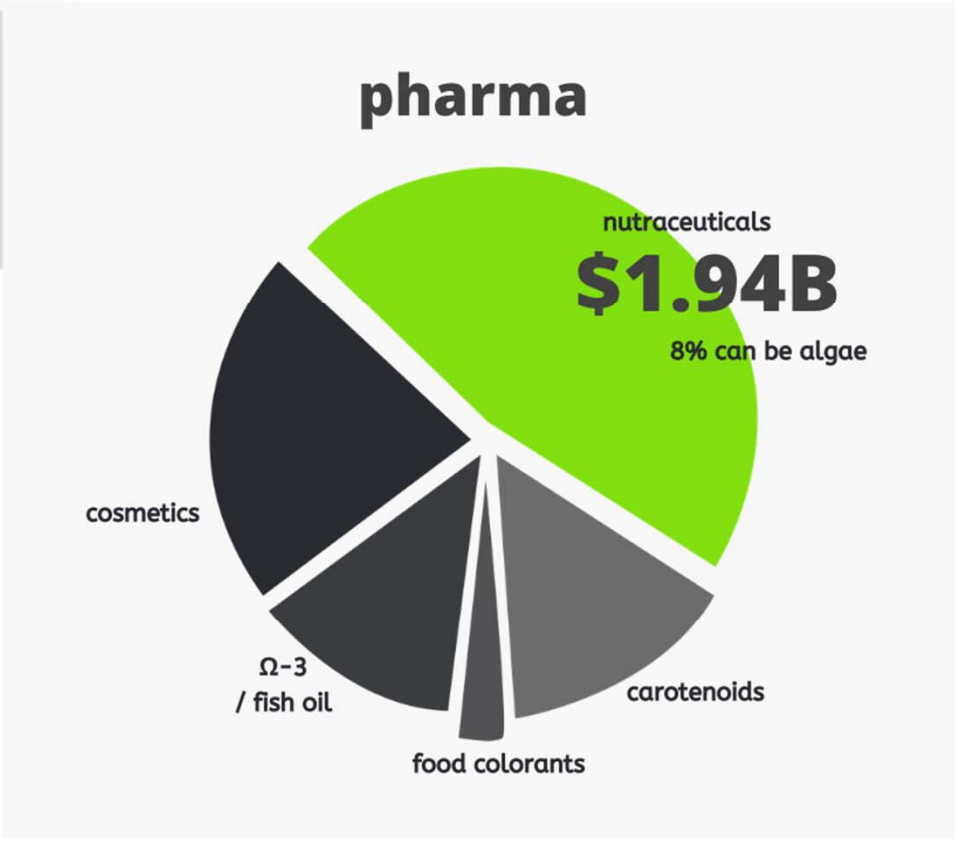
Phycobiliproteins
phycoerythrin, phycocyanin

Phycocyanin
Anti-inflammatory & antioxidant.
Used in Post-chemo drugs, anti-aging, sunscreen.

Bioactive Peptides

Enzymes
(e.g. proteases, lipases, superoxide dismutase)

market analysis and size



TAM (total addressable Market): **$24B**

SAM (serviceable addressable market): **$1.94B**

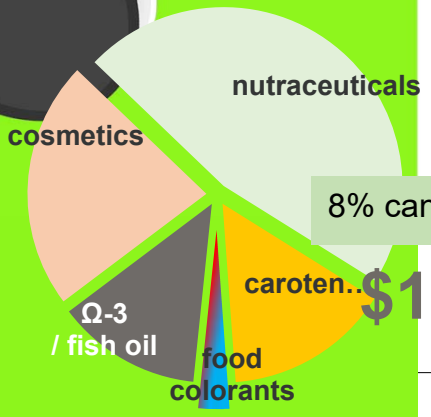
Target Market: (in 5-7 years) **1.24% ~ $23M**

supplemental Market analysis

TAM (Total Addressable Market): $177B

$24B

pharma



8% can be algae

$1,94B

$38B

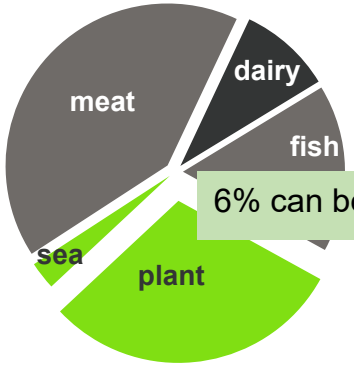
animal feed additives

5% can be algae

$1,9B

$115B

human food supplements



6% can be algae

$6,9B

SAM (Serviceable Addressable Market): $10,74B

Target Market: 1.3% ~ $110M (in 5-7 years)

annually harvesting

The Netherlands

45 million acres of crop

nominal value of 1,700 €/ acre for its end products

Israel

6 million acres of crop

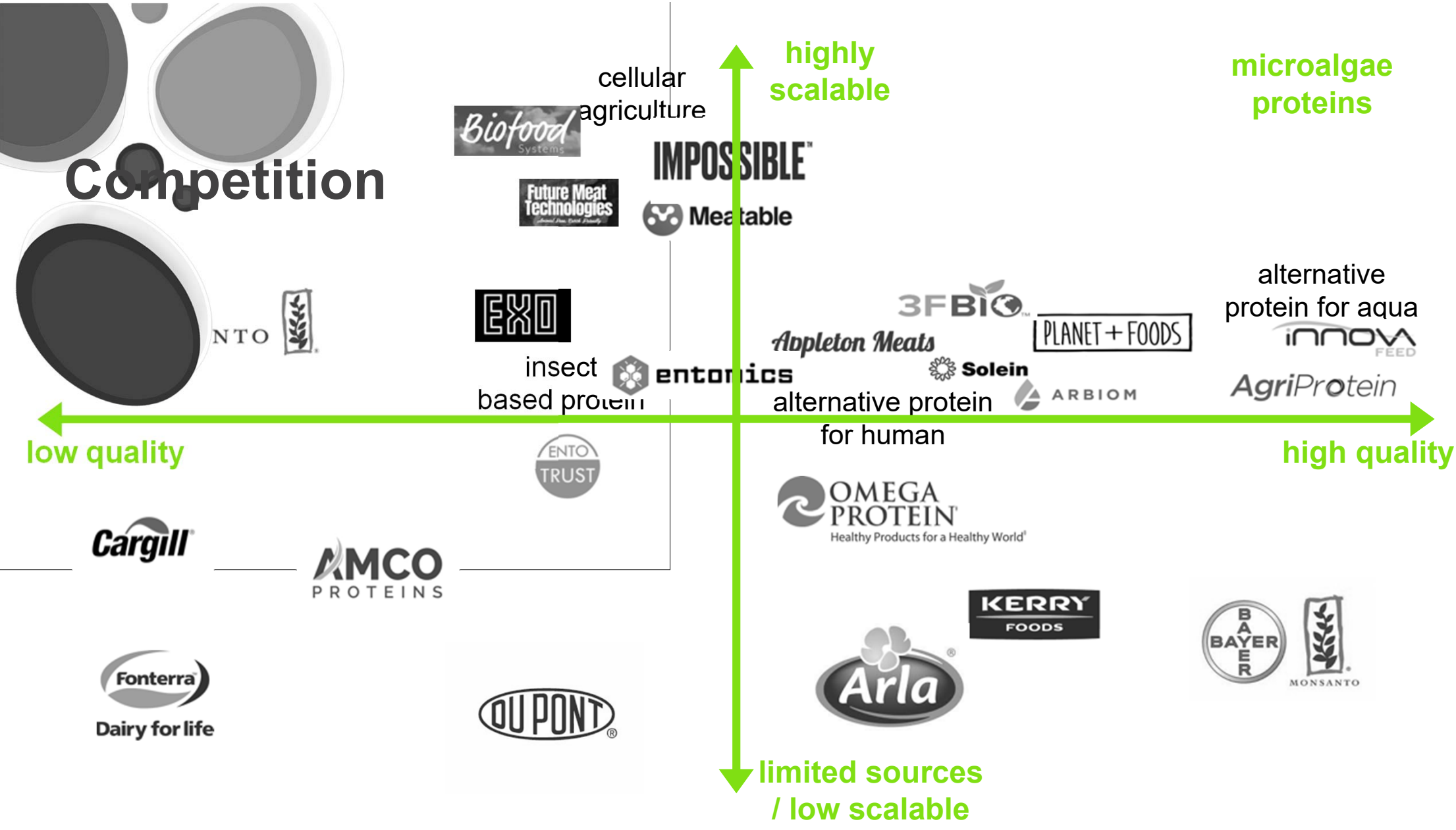
nominal value of 1,200 €/ acre for its end products

Greece

37 million acres of crop

nominal value of 190 €/ acre for its end products

nominal value of 1,130 €/ acre for its end products


Competition
highly scalable
microalgae proteins
cellular agriculture
Biofood Systems
IMPOSSIBLE
Future Meat Technologies
Meatable
EXO
3FBIO
PLANET + FOODS
alternative protein for aqua
Appleton Meats
Solein
entomics
insect based protein
ARBIOM
AgriProtein
alternative protein for human
low quality
high quality
ENTO TRUST
OMEGA PROTEIN
Healthy Products for a Healthy World
Cargill
AMCO PROTEINS
KERRY FOODS
Arla
BAYER
MONSANTO
Fonterra
Dairy for life
DUPONT
limited sources / low scalable

Thank you

www.solmeyea.com

Solmeyea