

BugBox Ltd.

Mass Rearing & Production Technology to Produce Protein Powder & Other Sub Products from Edible Insects

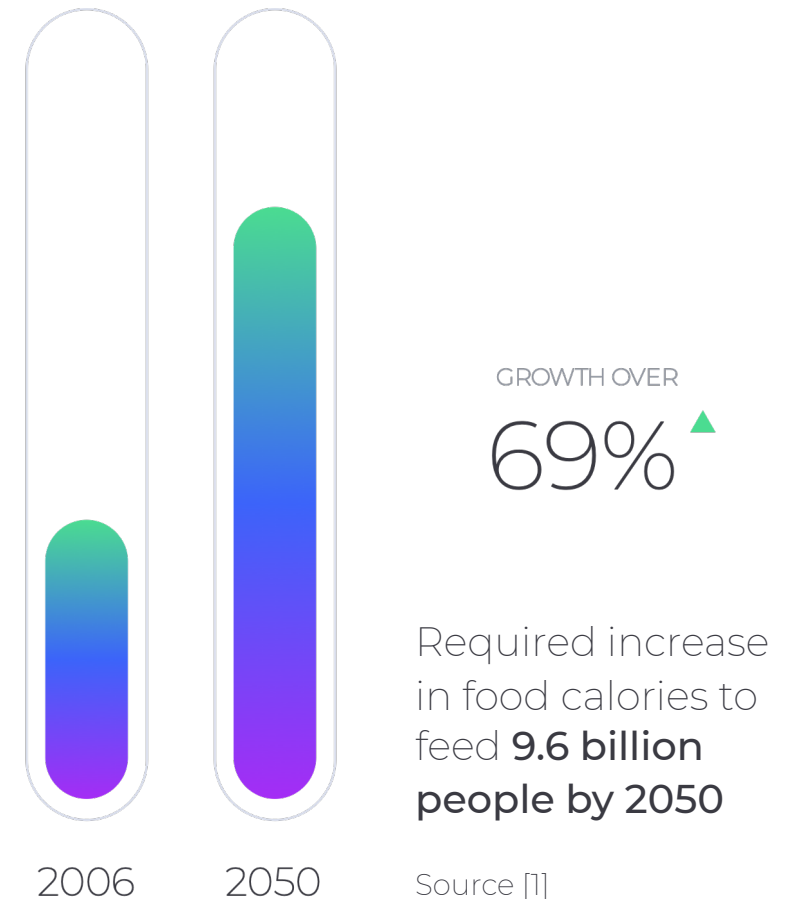
Presentation

Global market demand for meat is growing

Urbanization, population growth and a rising middle class lead to **greater meat consumption**

Even if food was distributed more evenly around the world, we still face a massive calorie gap between current food production, and food production required in the future.

At the same time, climate change will negatively impact global agriculture. In many areas, it already has.



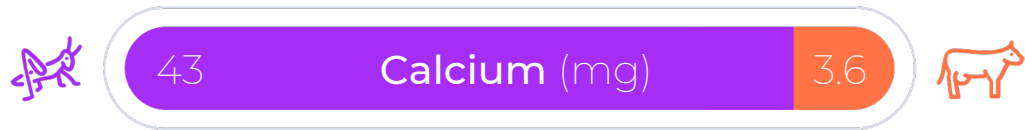
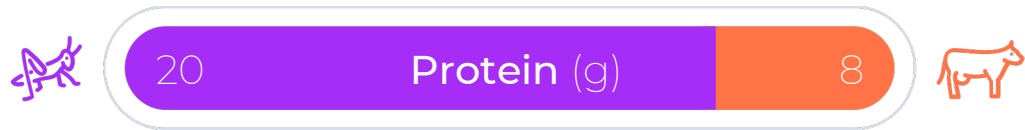
Animal based amino acids – only alternative are edible insects

Insects are the most **effective & sustainable** source of nutrition



Animal based amino acids – ecological footprint

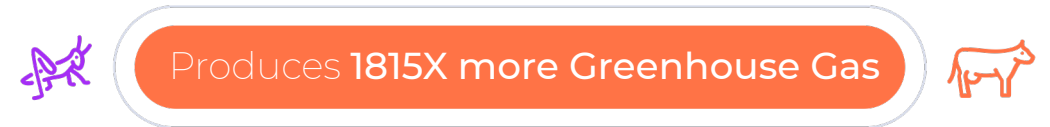
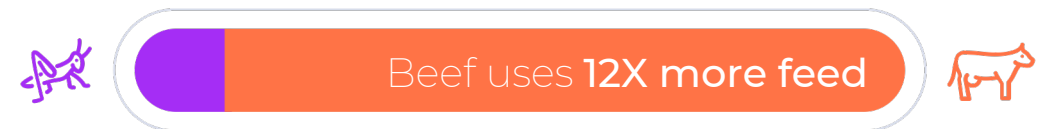
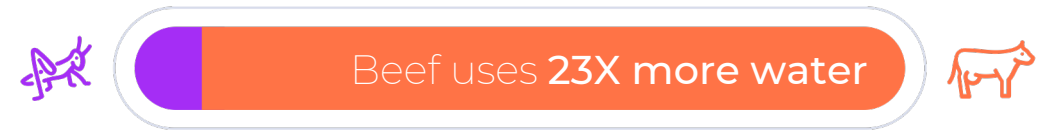
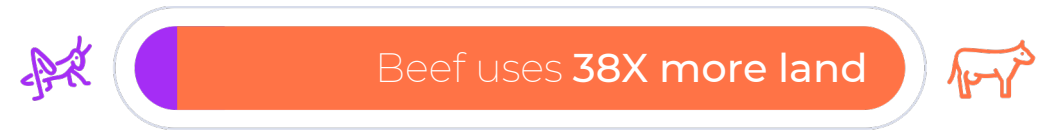
Nutrition



 30g Acheta Whole

 30g Beef

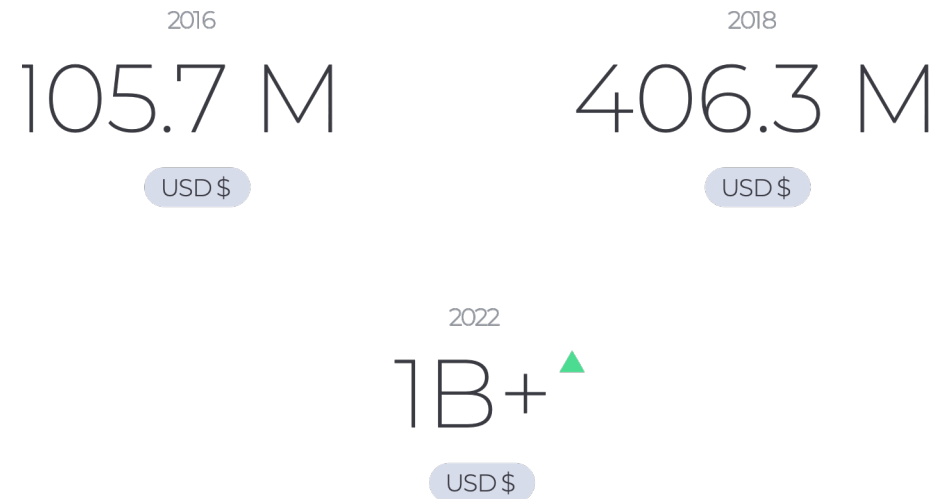
Environment



The edible insects market

Estimated growth up to 70%.
Achieving more than **\$1 billion by 2022**

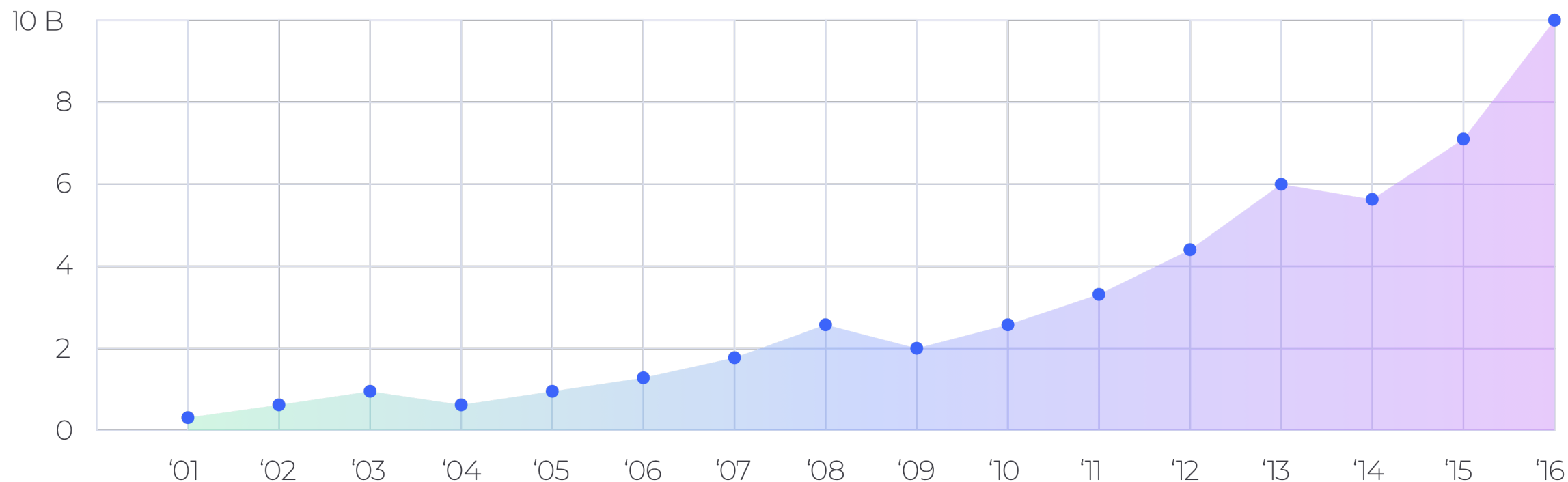
The highest growth will come from the sale of coated edible insects, which is projected to grow 85,3% between 2016 & 2021



China meat import

USD \$

Data: International Trade Centre



Global prices for insect protein powder for a food

Asia



2016 summer: **\$ 10-13 / kg**
2019 summer: **\$ 29 / kg**

Thailand Unique
Source [4.1]

North America



2016 summer: **\$ 49 / kg**
2019 summer: **\$ 100 / kg** ▲

ENTOMOFARMS
Source [4.2]

Europe



2016 summer: **€ 55 / kg**
2019 summer: **€ 330 / kg** ▲

KRECA / PROTI-FARM
Source [4.3]

Species farmed in artificial conditions for feed & food

for Feed

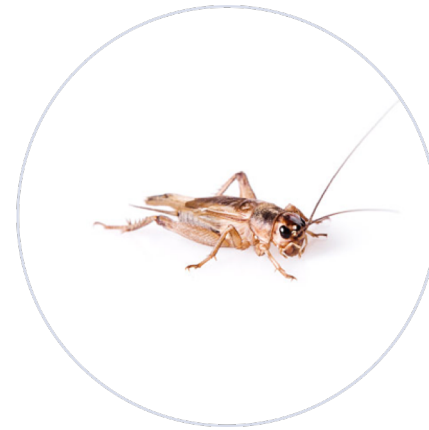


Mealworm
Tenebrio molitor

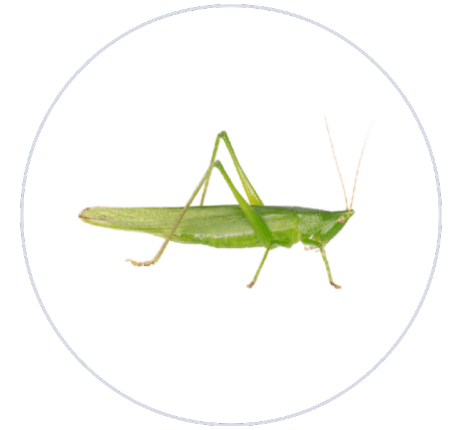


Black Soldier Fly
Hermetia illucens

for Food



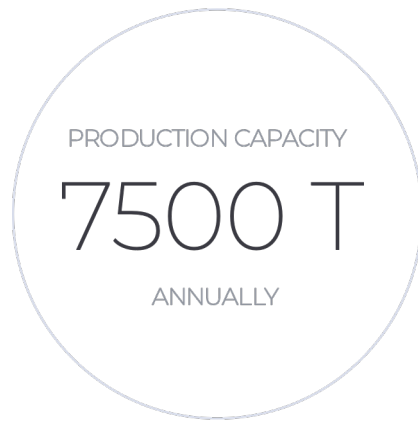
Crickets
Acheta domesticus
and other crickets



Grasshoppers
Ruspolia differens and
other grasshoppers

Key problem – **too much manual labor force!**

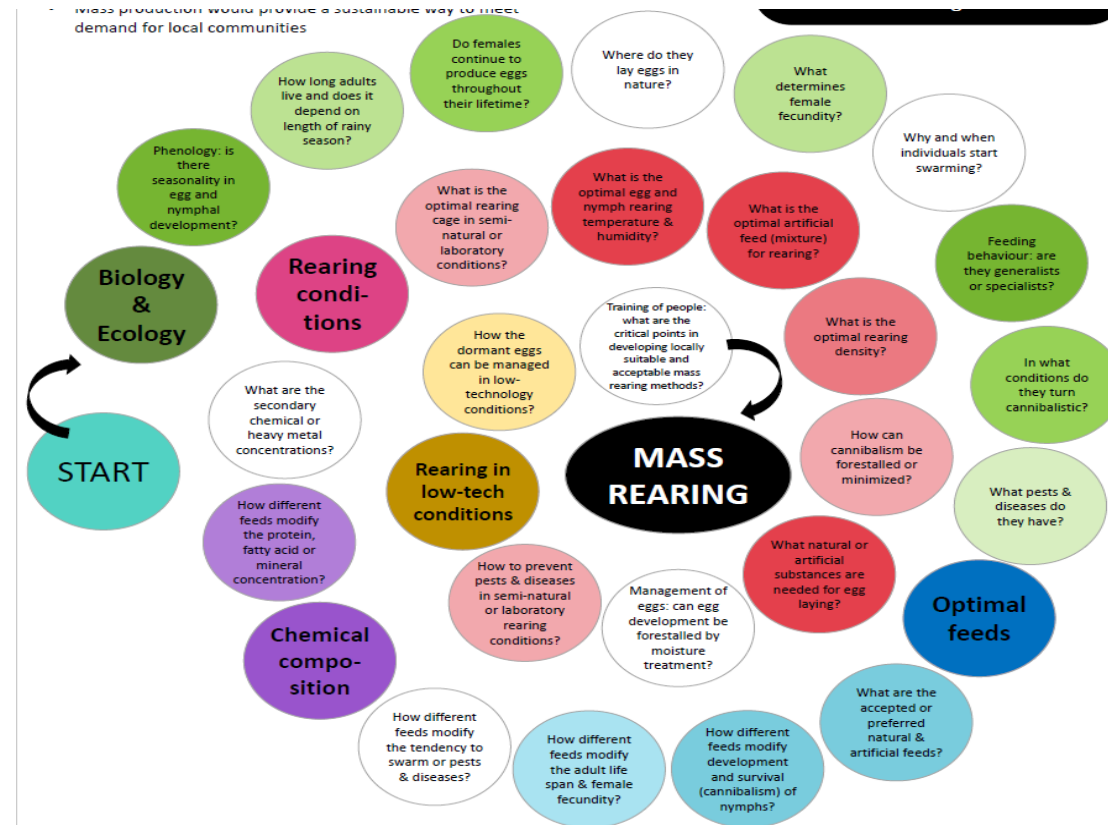
Usual (Thailand) method



annual production capacity of one farm - 375 kg/av



We know how to rear edible insects (*Orthoptera*) in big scales



Our technology creates insect industry standards

Business model

we sell, franchise or lease:

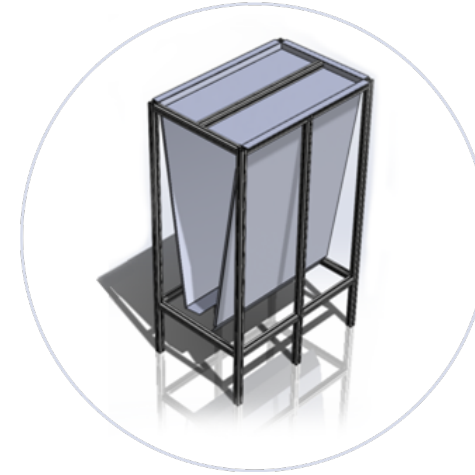
- fully automated edible insect mass-rearing & production FACTORY
- mass-rearing “REACTOR” ’s
 - fully automated
 - manually operated
- ecological bio-mass - insect powder & oil
- we collect all the data from sold factories

we charge monthly fee* for:

- maintenance
- software use

* fee is related on production capacity of factory

BugBox innovative solution – mass-rearing “REACTOR”



Autonomous & closed environment allows to control & standardize:

- watering
- feeding
- cleaning
- lights
- temperature/moisture system
- eggs laying & hatchery system
- extinction of insects
- transport to production
- weight

- up to 100 000 insects in one REACTOR (10m³)
- production - 1,2T/annually (WW)
- suitable for different (*Orthoptera*) species
- easy cleaning, sterile
- durable
- no side effects to insects
- cost effective solution
- **one FTE can operate up to 100 reactors**

Our own software runs all automated systems

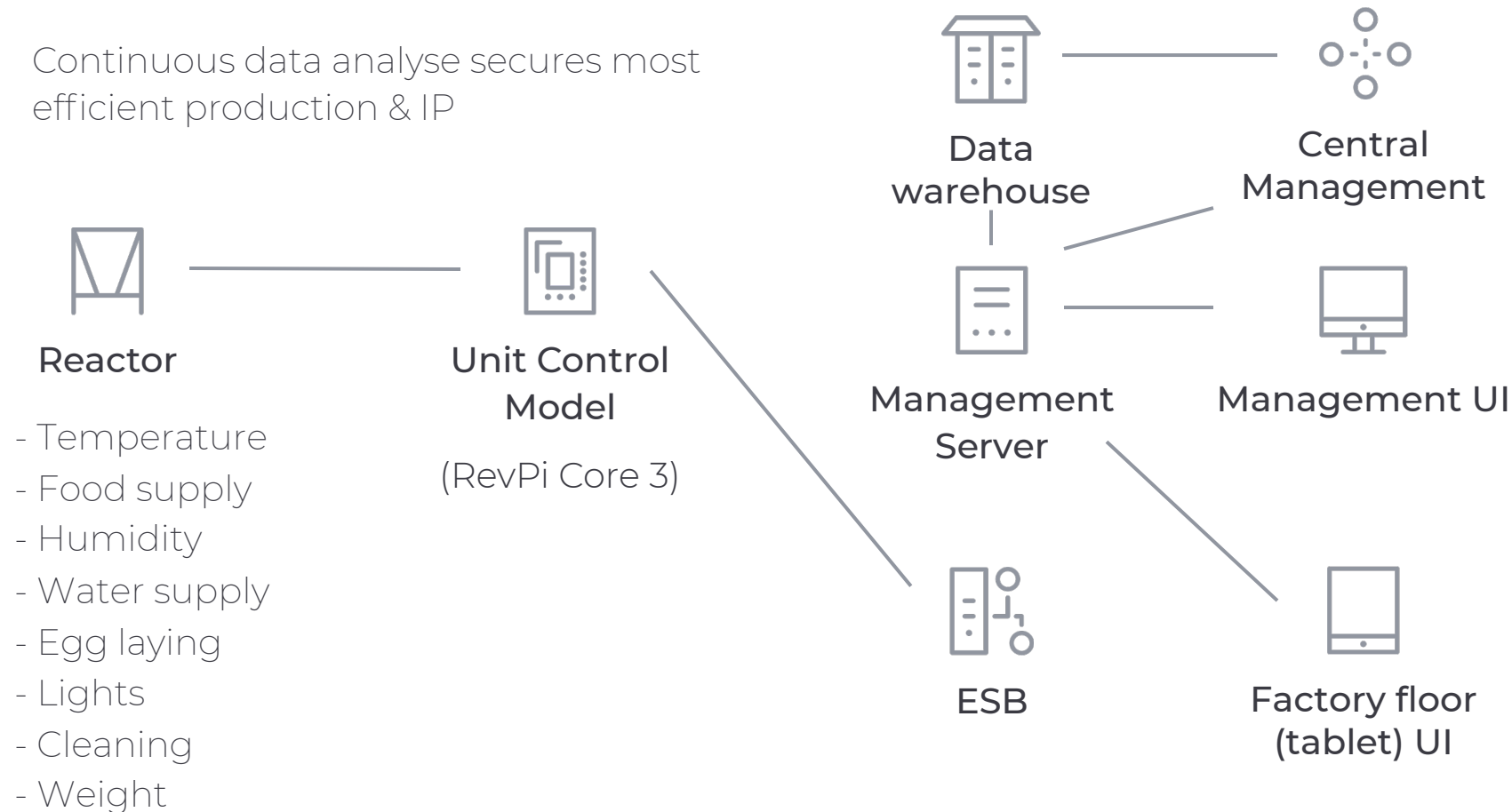
- every rearing REACTOR
- hatchery
- entire rearing farm

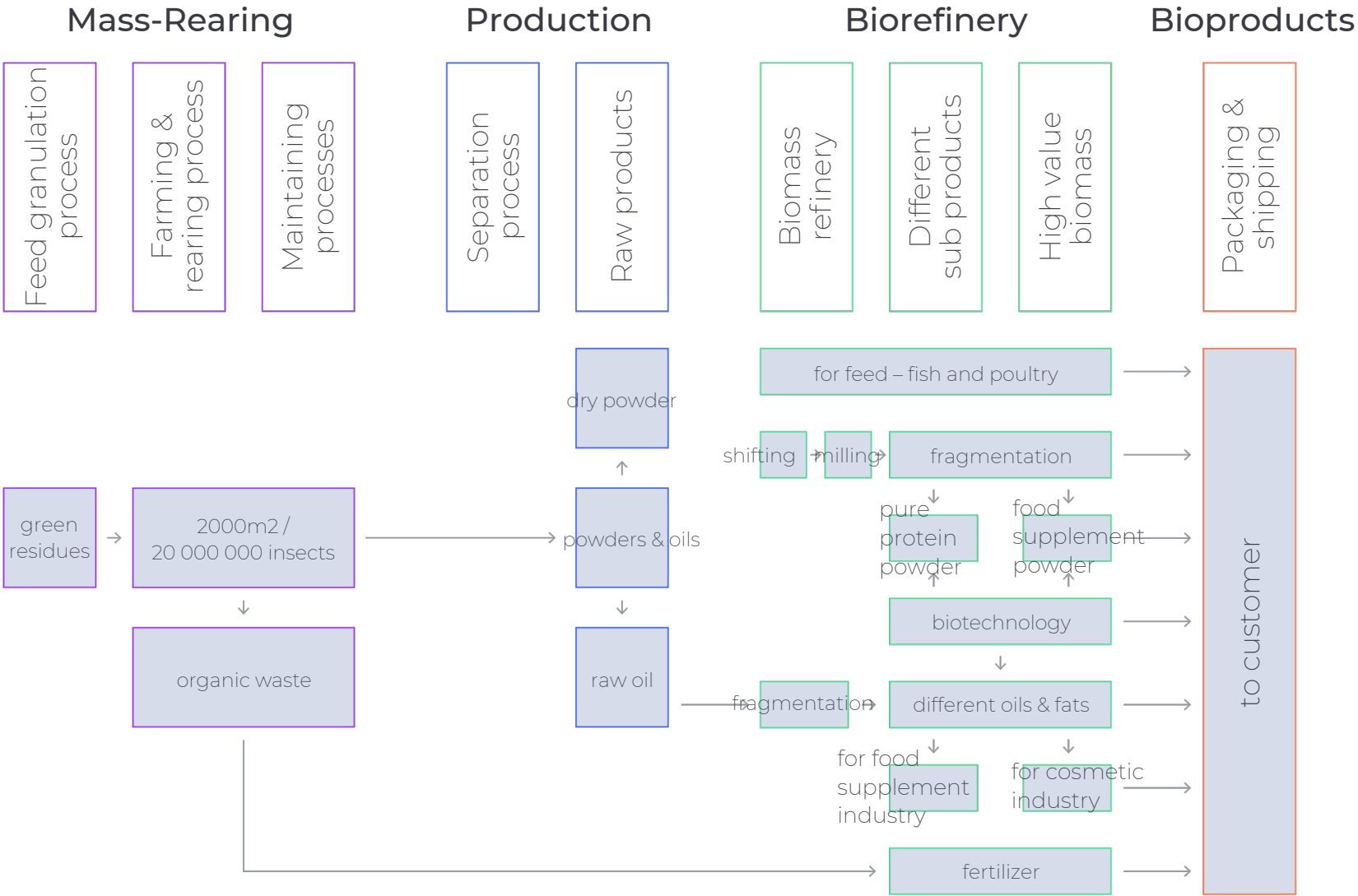
- **it's easy to scale** - up to 1000 reactors
- **software secures IP for technology**

We measure everything!

Factory & “REACTORS” are **fully controlled by own software**

Continuous data analyse secures most efficient production & IP





Winner of *ClimateLaunchpad* Estonian competition 2016



Core team

Erlend Founder
CEO

Heikki Co-founder,
entomologist,
Prof. of East Finland
University, Finland

Philip biologist, East-African
business development
Prof. of Makerere
University, Uganda

Tõnis engineer,
“REACTOR” & production
line development, factory
automatization

Siim IT architect,
software development for
automatization

Kätrin nutritionist, CFFT expert,
B2C product development

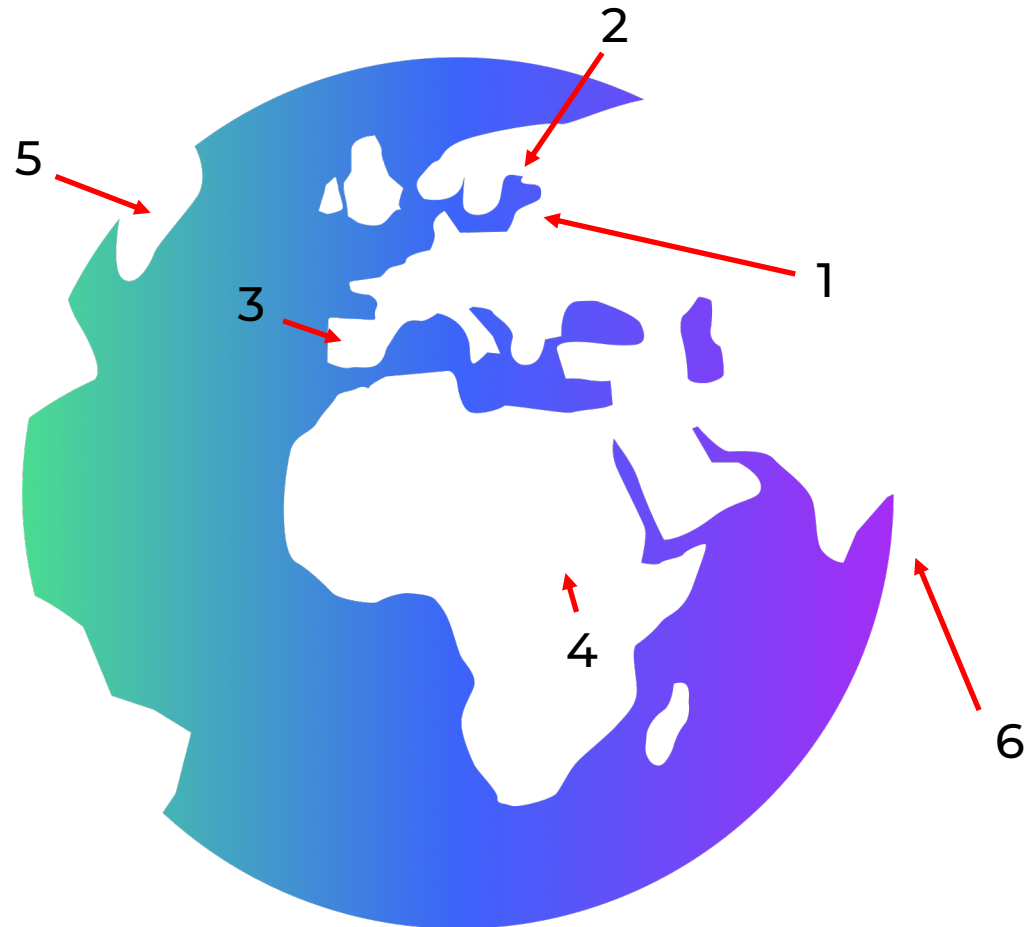


Investors & Advisors

**Paulo
Andrez** former president of EBAN
(European Business Angel Network)

**Ivar
Siimar** former president of EstBAN
(Estonian Business Angel Network)

Our current R&D locations



1. ESTONIA
R&D center, technology solutions,
software development
2. FINLAND
entomology research & test center
3. PORTUGAL
first planned experimental rearing
plant & factory
4. UGANDA
entomology research & tests field
laboratory
5. CANADA
cooperation partner for B2C products
6. INDONESIA
cooperation partner for rearing

Insect powder based B2C products developed by *BugBox*

Ready recipes:

- cookies
- gingerbread
- wholegrain snacks
- morning crisps
- white chocolate with crickets etc

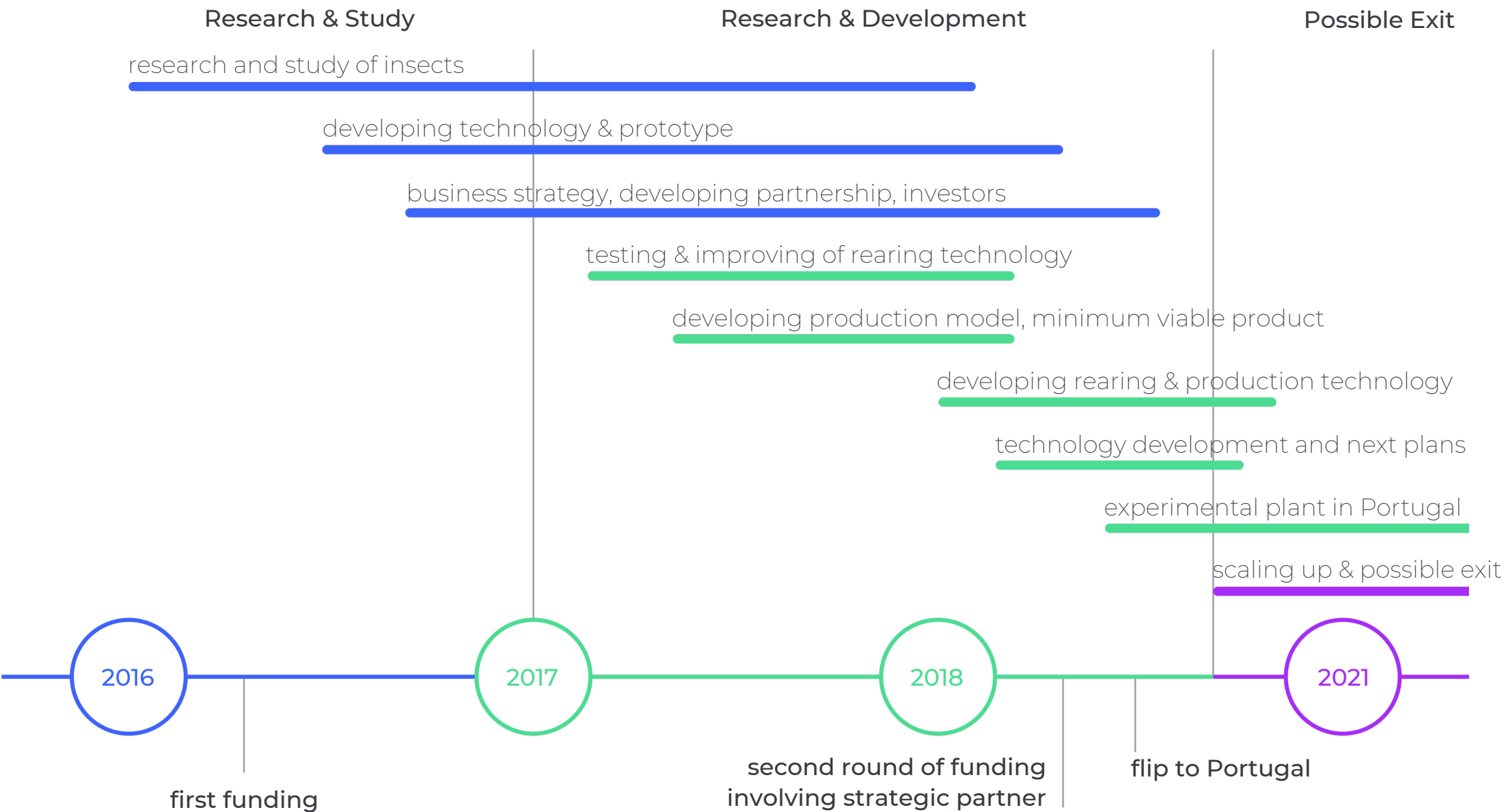
Under development:

- pasta products
- pet food
- fish & poultry feed



Timeframe

BugBox Ltd.



Contact

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Sources

Source [1]: <http://ow.ly/rpfMN>

Source [2]: <https://arcluster.com/global-edible-insects-market-projected-to-grow-70-percent-through-2016-2021/>

Source [3]: <https://www.statista.com/statistics/882321/edible-insects-market-size-global/>

Source [4.1]: <https://www.thailandunique.com>

Source [4.2]: <https://ca.entomofarms.com/collections/cricket-powder>

Source [4.3]: <https://www.krecafood.com/insect-powder/crickets/>

Source [5]: FAO 2013 & BugBox

Source [6]: BugBox/JIFF

<http://www.wageningenacademic.com/doi/abs/10.3920/JIFF2017.0018>

Source [7]: Wageningen University 2016