Genetic selection to improve the performance of the insect-based bioconversion sector

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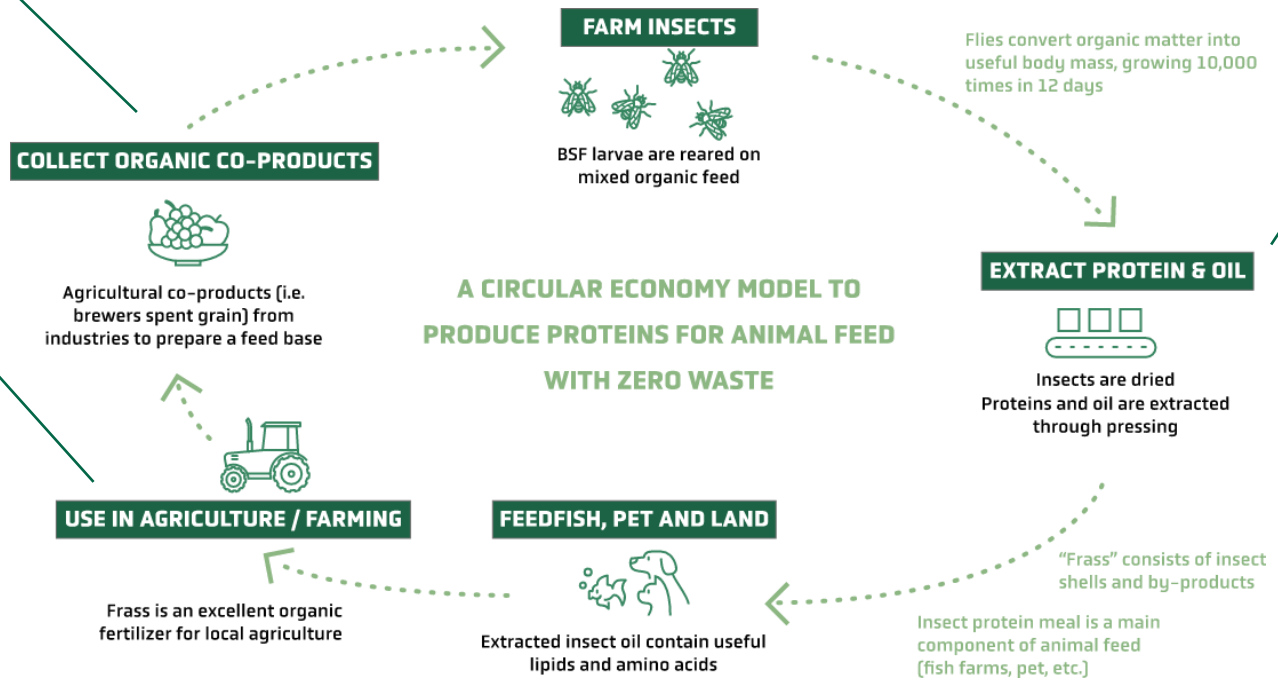
Insect circular economy and Genetic Improvement opportunities

Increase reproduction rates, production outputs and fitness rates

Produce dedicated lines for specific diet ingredients

Change content of protein vs fat vs other larval components

Improve industry sustainability



Customize product quality (Amino and Fatty Acids profiles, chitin content, etc) to specific markets

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Genetic selection key principles: Selection Goals

INCREASE INCOME

Yield raw ingredient
Increase protein content of animals
Increased reproductive capacity
Optimized survival rates

Population Average

DECREASE IMPACTS

Resistance to abiotic stress
Bioconversion efficiency

DECREASE COSTS

FCR (per raw ingredient)
Resistance to automated rearing systems
Health traits – pest resistance, genetic abnormalities.
Environmental stress resistance - %RH, T°C, NH_3

Set the direction of the selection process

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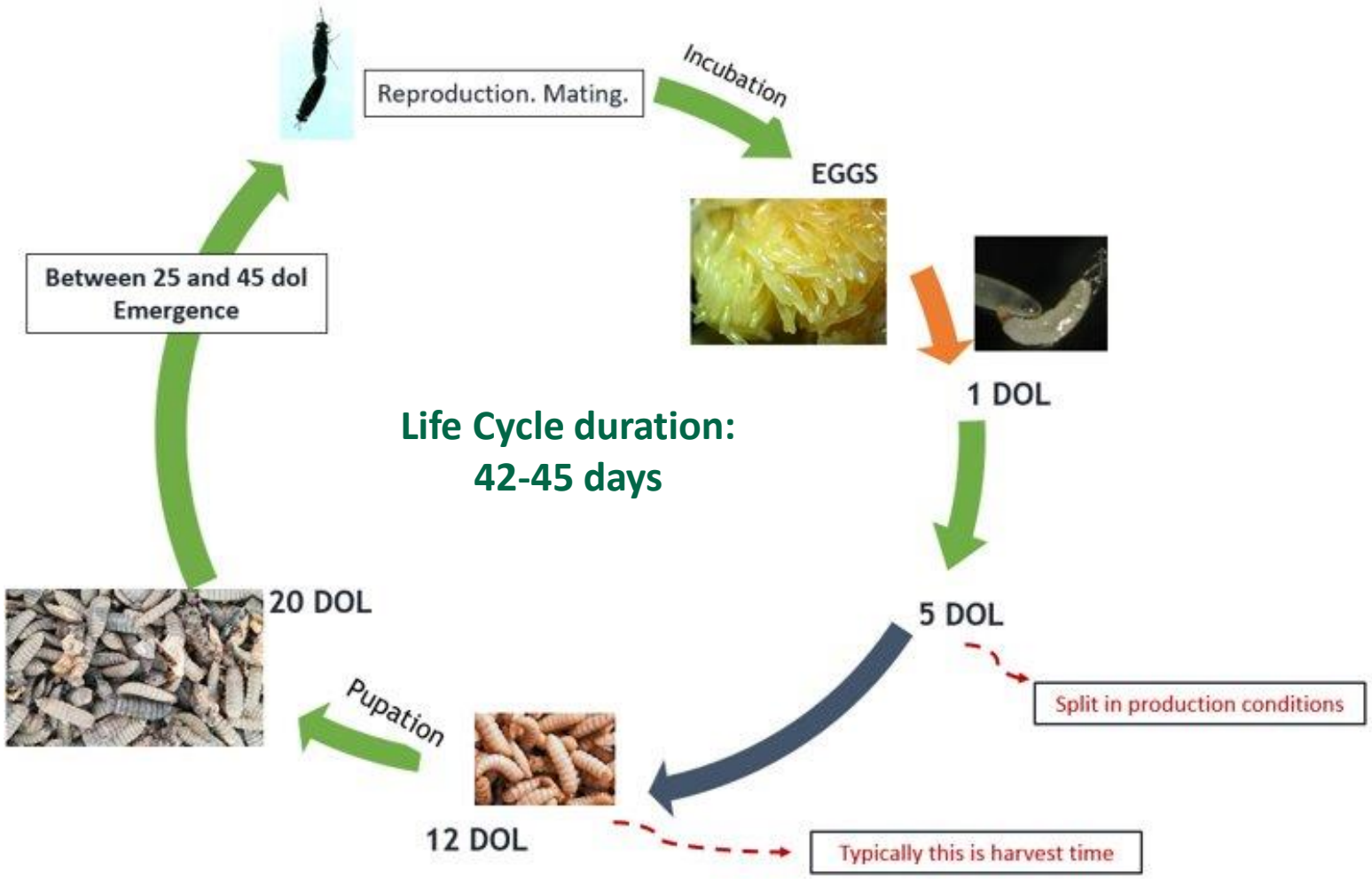
Genetic selection key principles: Generation interval



Life Cycle duration:
42-45 days

Each generation is a selection opportunity so the faster they come the more progress we make (eg. >9 years in horse!)

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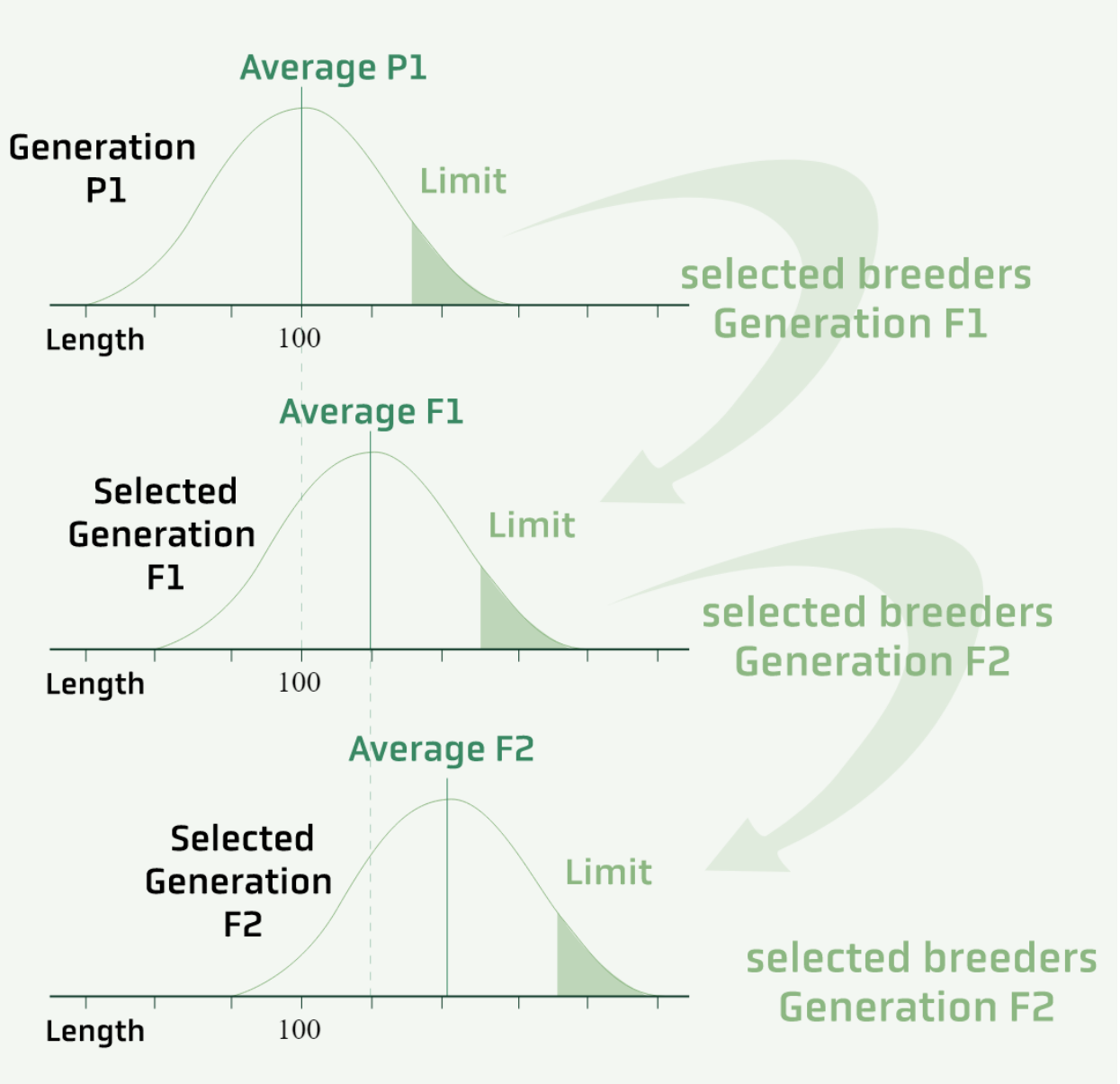
Genetic selection key principles: Selection intensity



Only the best of the best of the best of … pass their genes to the next generation

Thanks to its reproductive prolificacy, maximum pressure is applied

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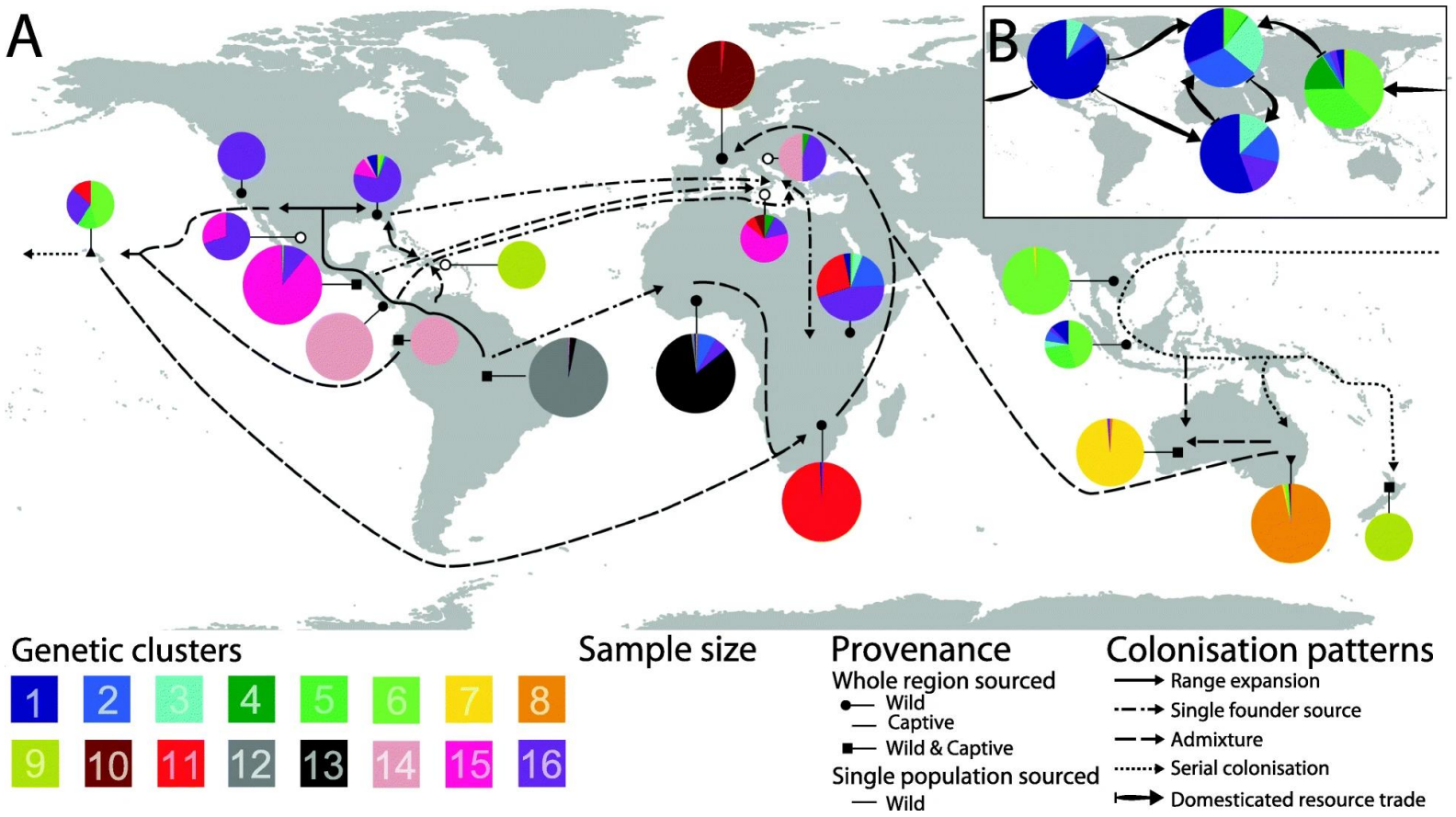
Genetic selection key principles: Genetic variability



Kaya, C., Generalovic, T.N., Ståhls, G. *et al.* Global population genetic structure and demographic trajectories of the black soldier fly, *Hermetia illucens*. *BMC Biol* **19,** 94 (2021). https://doi.org/10.1186/s12915-021-01029-w

The more genetic variability, the more opportunities for selection of interesting combinations

Hermetia Illucens **genome is large (>1.01 Gb) compared to other dipterans and has very significant variability across all continents and between wild and captured populations**

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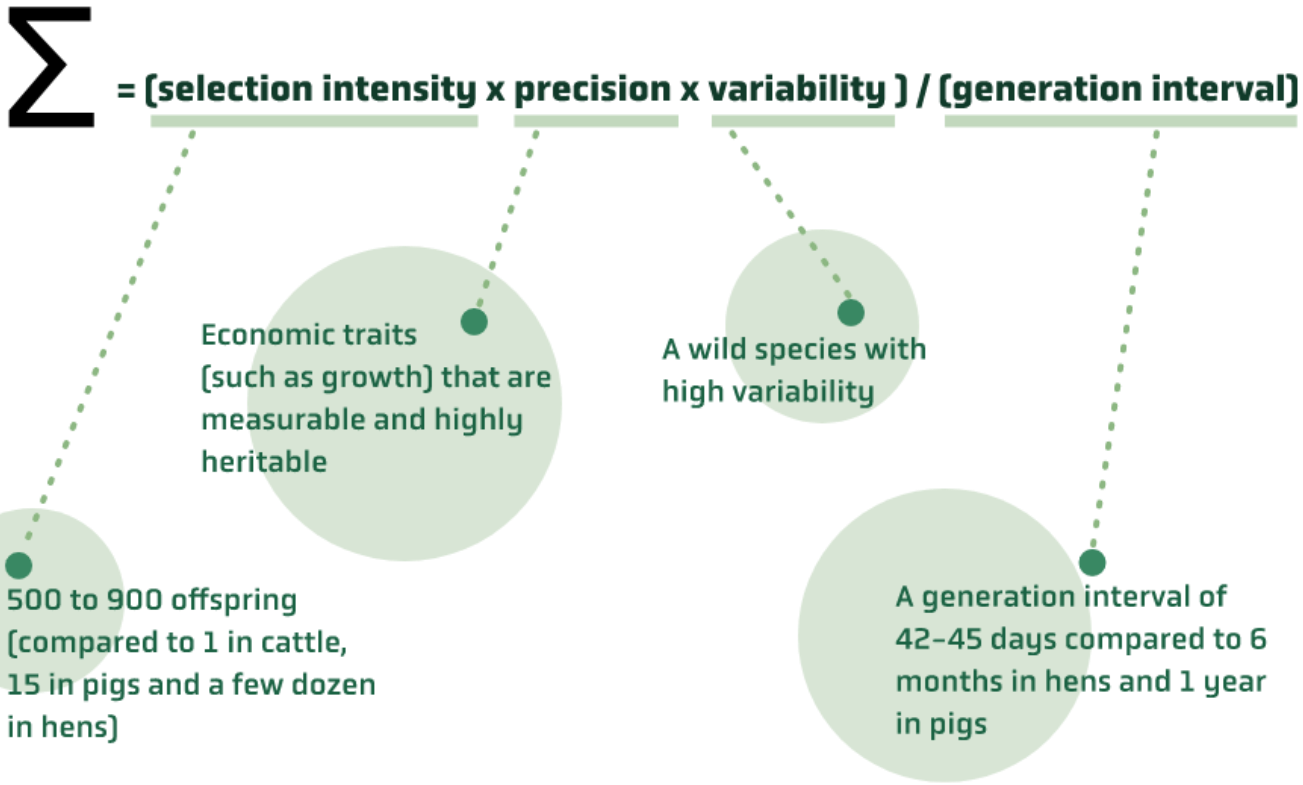
Genetic selection in BSF



Overall Genetic Progress:
All components are favourable for very significant impacts on profitability and sustainability in our industry

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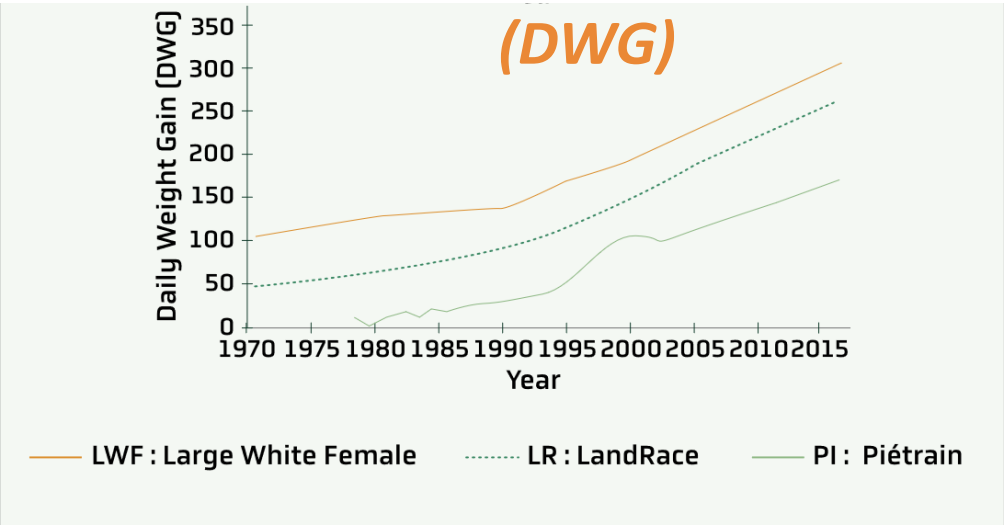
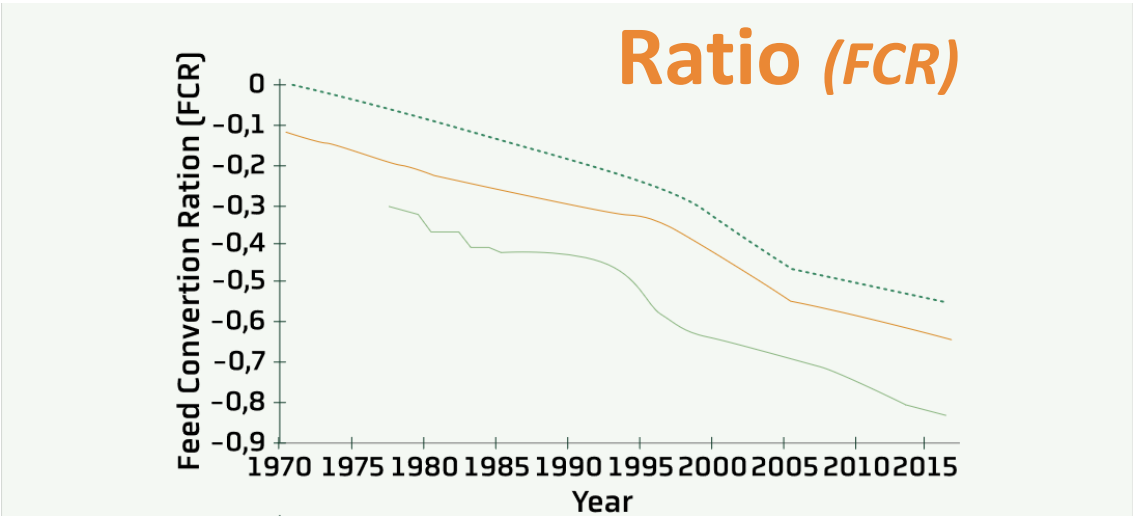
Impacts on zootechnical performance

Genetic improvement impact in other farmed animals: a swine example

Daily Weight Gain *(DWG)*



Feed Convertion Ratio *(FCR)*



Genetic improvement impact in BSF: early results example:

- between x1.20 and x2.00 larval body weight per year
- between –5.0% and –10% FCR decrease per year

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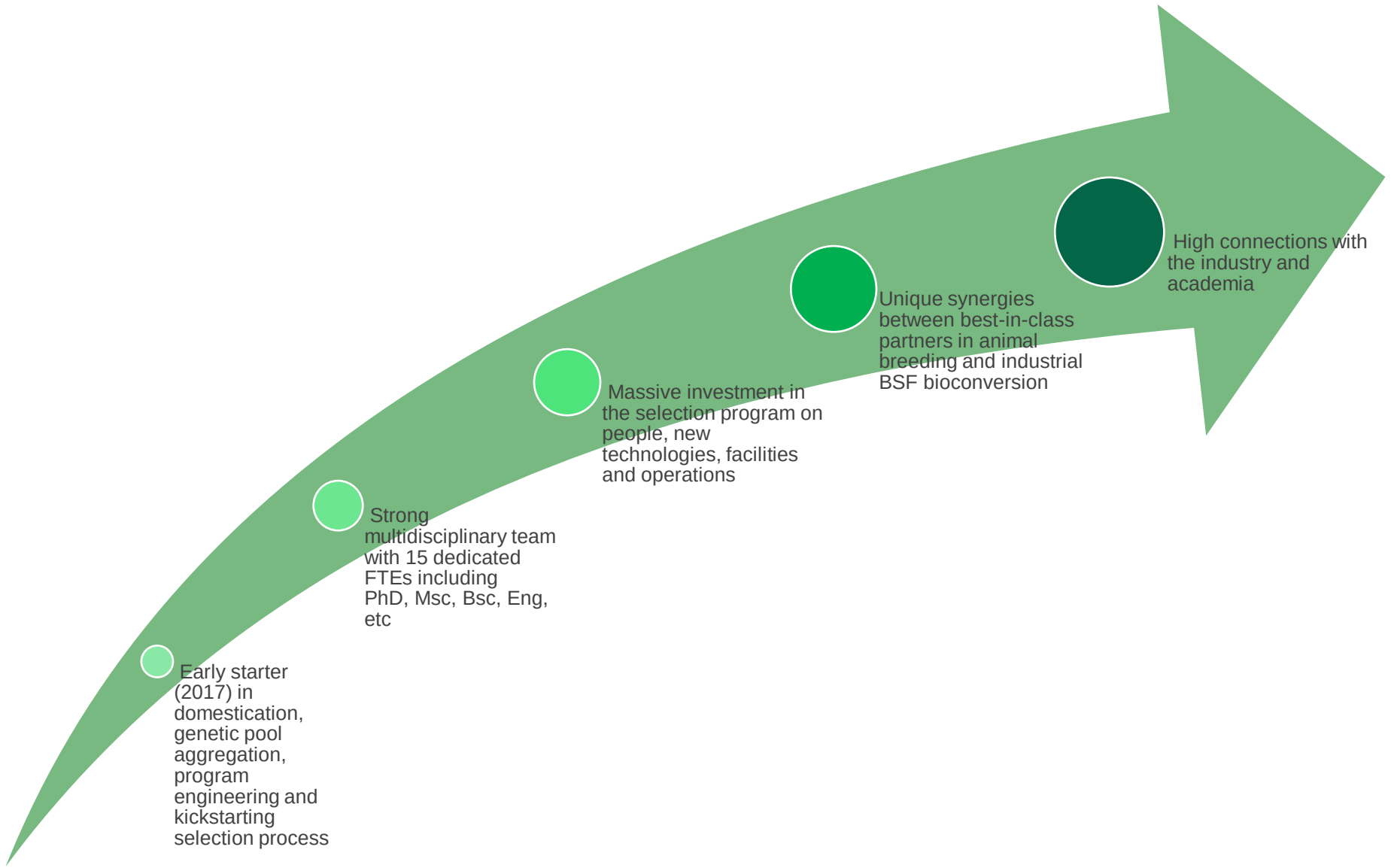
FlyGenetics Key Success Factors



Market Entry : End of 2022

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Thank you!

More about FlyGenetics:

www.fly-genetics.com

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