MATE

HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

On The Horizon

EATiP Aquaculture Project Dissemination Service

Genetic breeding approach to increase efficiency, cost reduction, and sustainability

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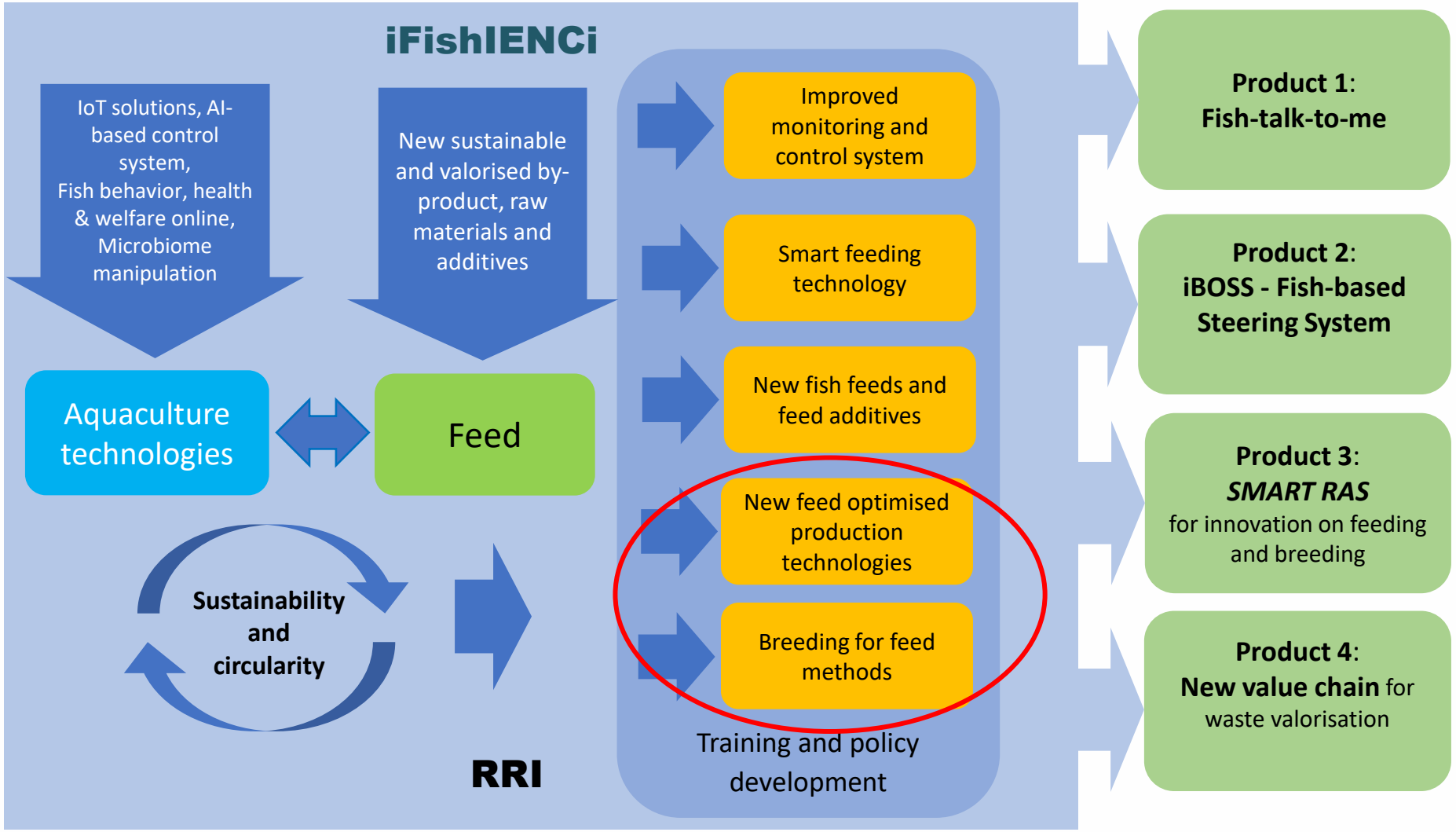
Goals of iFishIENCi H2020 project



INDUSTRY NEED

- Largest costs in fisheries: **feeding cost** (especially species requiring high protein content)
- **Capture based marine proteins and oils** (e.g., fish meal and fish oil) **should be decreased** in fish feeds.
- Using **cheaper and alternative protein and oil sources** (Processed Animal Protein, plant or microbial) would be beneficial.
- Increasing usage: soya bean, algae, and insect-based protein; plant or insect-based oil sources.
- Microbes and algae →**bioconversion of** agricultural or industrial **waste** into high-value proteins- and/or lipid sources in an industrial scale.

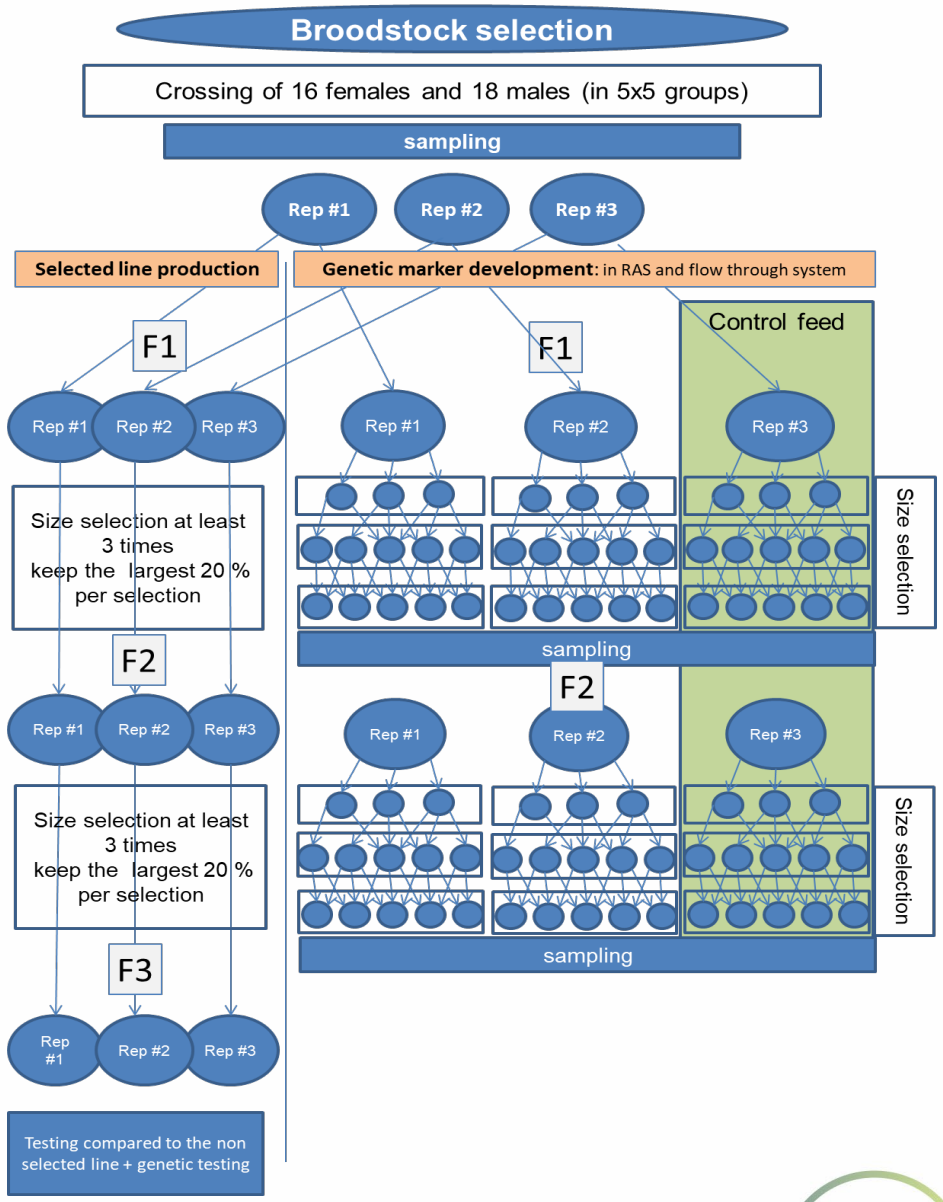
SOLUTION

- Large amounts of soy meal in the diet (over 50%) **decrease the growth** in farmed fish species (e.g. common carp, Nile tilapia, sea bream, Atlantic *salmon, rainbow trout*).
- Selection-based rainbow trout studies: survival rate, mean body weight and biomass can be **improved after a single generation** of selection.
- **Genetic selection is suitable to select adapted populations utilizing a plant-based diet**.
- **African catfish** is a great model to test new feeds and a genetic selection based breeding program.

African catfish (*Clarias gariepinus*)

UNDERLYING MAGIC

- A **growth rate** and **feed utilization** based **broodstock selection program** was started,
- Three generation crossing and selection program,
- **African catfish** were selected (half-industrial scale, flow-through system),
- Commercial (control) feed and a low fish-meal experimental feed were tested.
- Size selection was performed repeatedly in different generations.



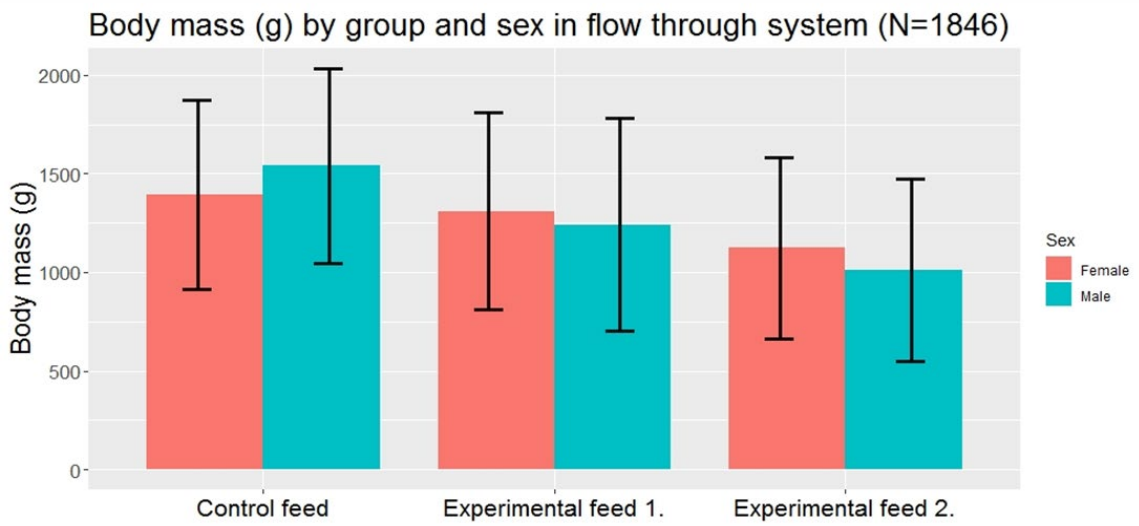
TARGET MARKET

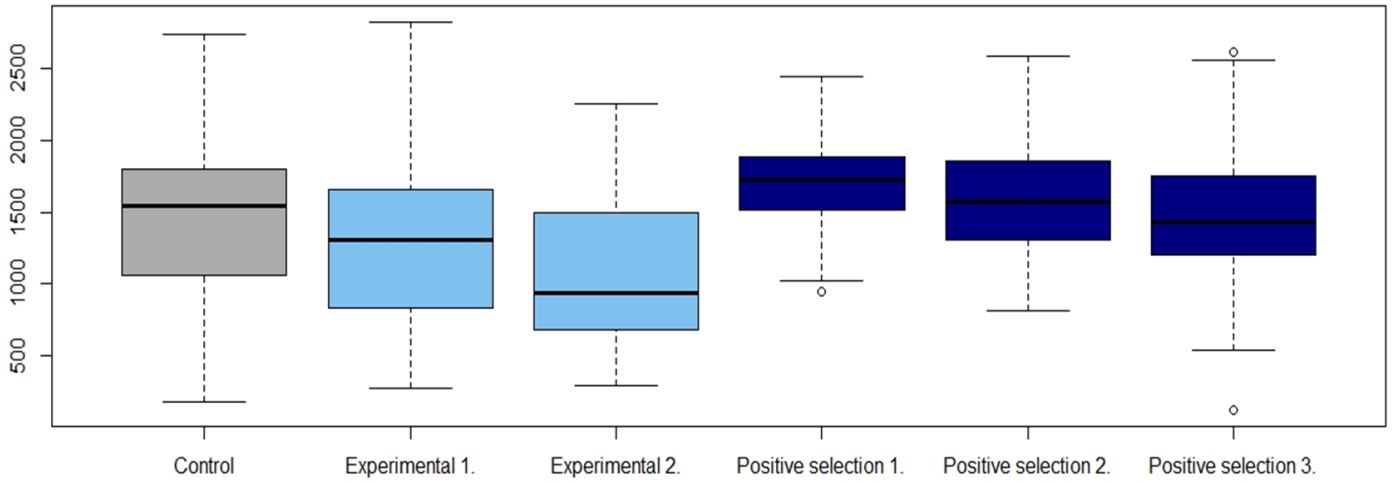
Our long-term goals:

- **Create an African catfish line selected for a low fish-meal feed, with similar or better growth rate than those fed with conventional feed.**
- **It could reduce production costs and provide more sustainable farming methods.**
- **Isolate genetic markers for the prediction of phenotypic traits, and marker-assisted selection in the near future.**

RESULTS and IMPACT

Body mass is influenced by sex in F1 generation
→ utilization of different feeds might have been affected by sex.

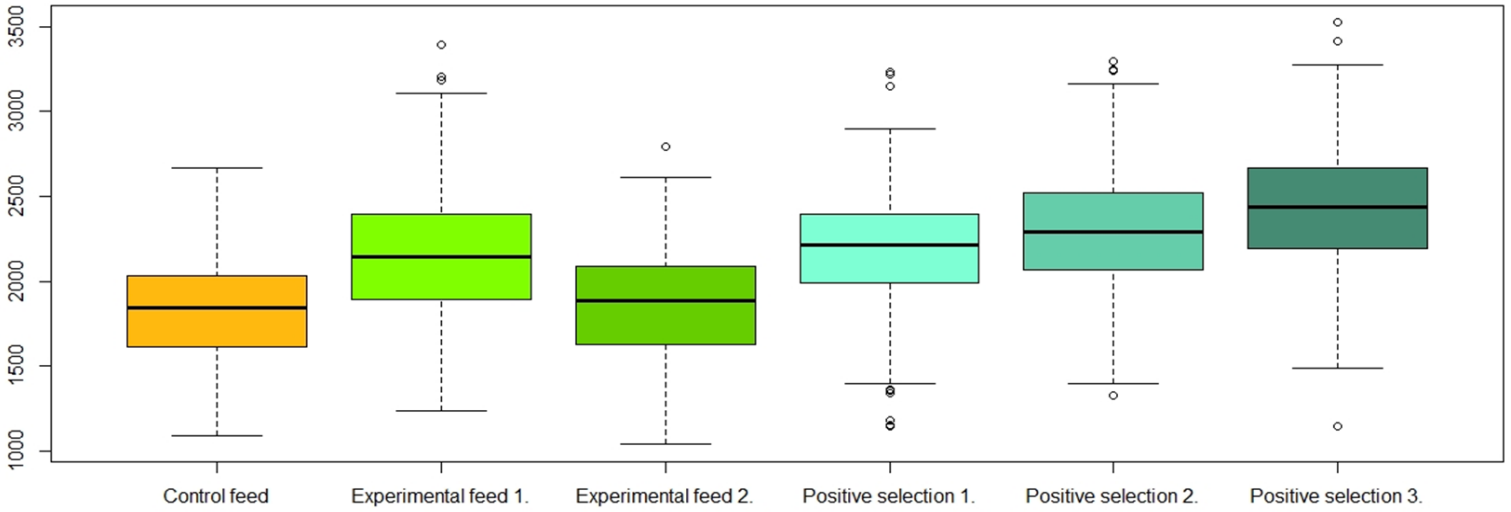




Body mass distribution in F1 generation.

→low fish-meal diet had a lower growth rate compared to the control group in the F1 generation.

CURRENT STATUS



Body mass distribution in F2 generation.

growth rate: the selected lines grew significantly faster, fed with both the control and experimental feeds.

The calculated average gain was around 14% in the F2 generation

Current conclusions

- Genetic selection had a positive effect on growth rates.
- Meat utilization is effected by the sex of the fish.
- F3 generation investigations and genetic marker identification is in progress.
- We can conclude already that the selected F2 lines better utilize both the „conventional” and „alternative protein source” feeds which makes the new line commercially more attractive.

THANK YOU!

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