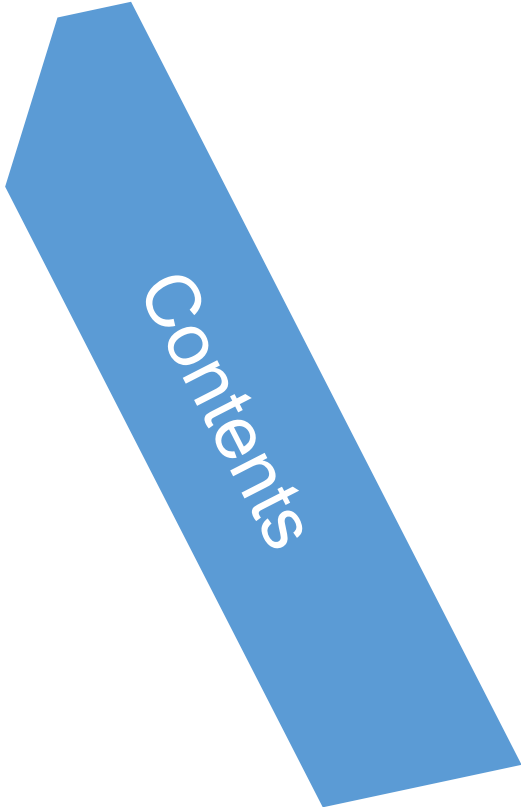


# Look beyond the feed itself to fishmeal alternatives

Cong Liu  
New Hope Group



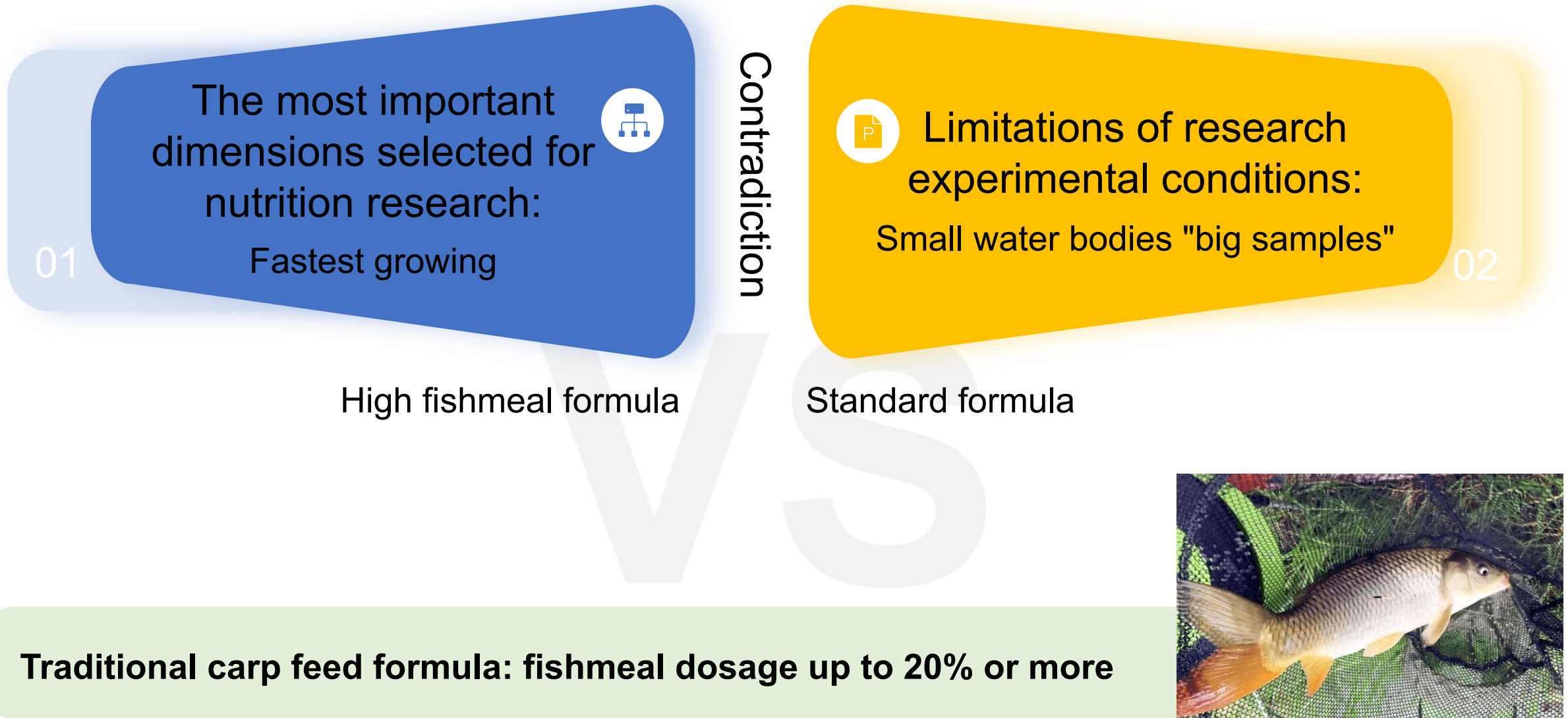
## Contents

Traditional nutritional feed research  
and formulation

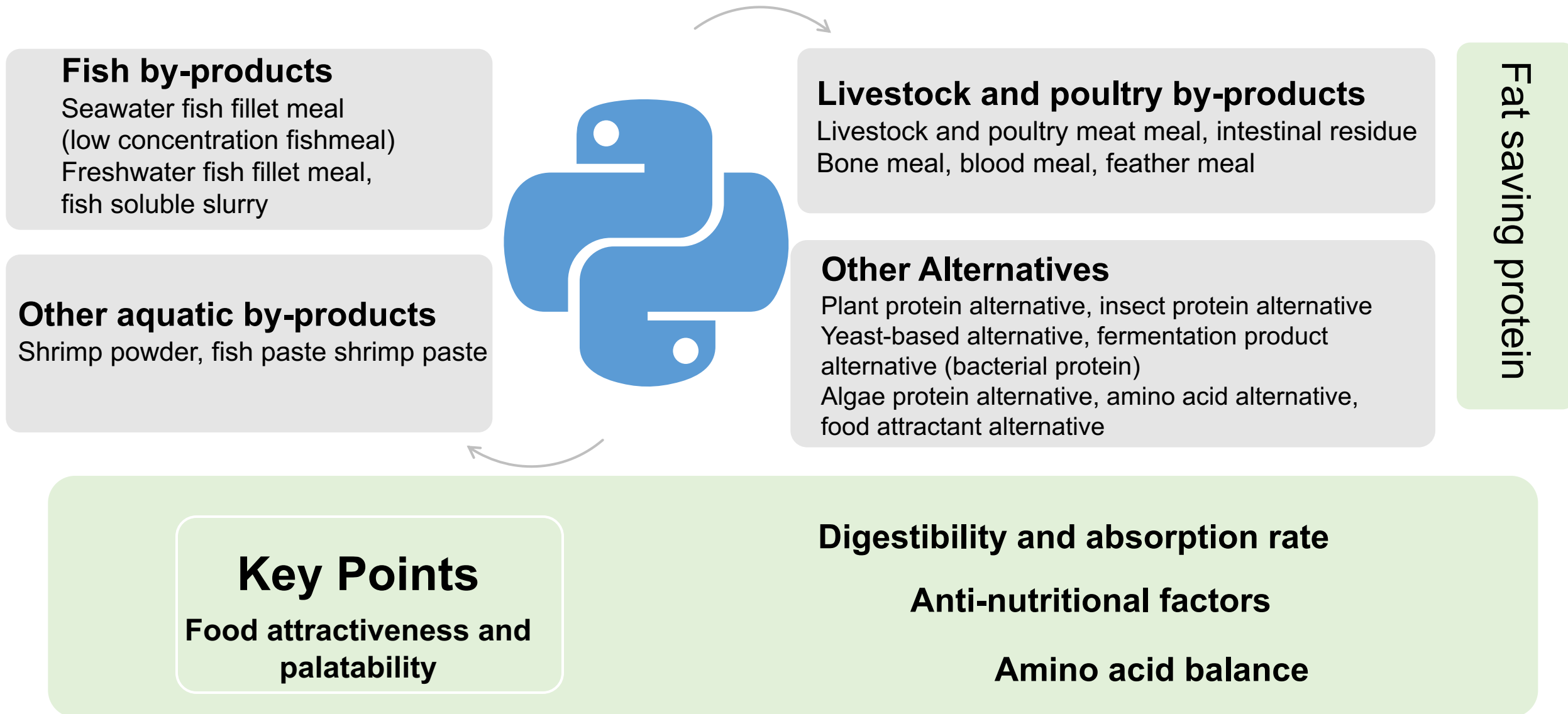
Fishmeal alternatives in aquatic feed

Look beyond the feed itself to  
fishmeal alternatives

# 1. Traditional nutritional feed research and formulation: Fishmeal and soybean meal type



## 2. Fishmeal alternative in aquatic feed



### 3. Look beyond the feed itself to fishmeal alternative1: Breeding species



Herbivorous fish

Omnivorous fish

Carnivorous fish

Purely carnivorous fish:

Mandarin fish, California Bass:  
1 million tons?

Seawater fish: 1 million tons?

Cold water fish: 100,000 tons?

Fish requiring strong  
enticement (picky feeders):

Shrimp: 1 million tons?

#### Personal opinion



In addition to seawater, cold water fish need high  
unsaturated fatty acids DHA, EPA - algae oil



The rest of the species of fishmeal, fish oil can be replaced  
(purely carnivorous fish to pay attention to other issues)



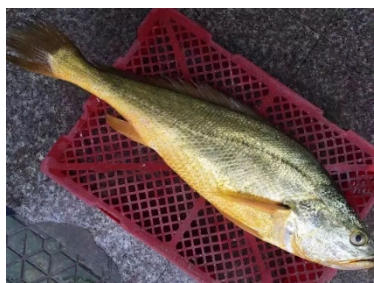
However, shrimp and picky eaters may experience  
slower growth



### 3. Look beyond the feed itself to fishmeal alternative2: Genetic breeding



Hybridization and different species  
Great differences in demand for fishmeal



Mandarin fish and its species  
Hybrid snakeheads  
Southern Largemouth Catfish  
Bleak



Selection and breeding of secondary generations progressively unknowingly

Carp  
California Bass



**Back to the traditional carp feed formula fishmeal dosage up to 20% or more of the problem**

### 3. Look beyond the feed itself to fishmeal alternative3: Consumer Market

- Consumer habits and consumer market:  
what kind of fish does the market need to be satisfied?



- Major consumers of million-ton fishmeal:  
salmon (rainbow trout and Atlantic salmon), shrimp
- China: if the traditional consumption habits of carp (with spines), mainly tetrahymena, are maintained, + fish balls and fish cakes - with the existing technology, fish meal can be completely eliminated
- Europe and America: Are omnivorous spinyless fish available to meet the demand?  
Such as spotted forktail and tilapia? Can smoked tilapia replace smoked salmon?  
Replacing carnivorous sea cold water fish species like salmon?







Thanks!!!