



## XVI Feira Nacional do Camarão – FENACAM'2019

# Adjusting feed contents and feeding regime of tilapia to seasonal changes

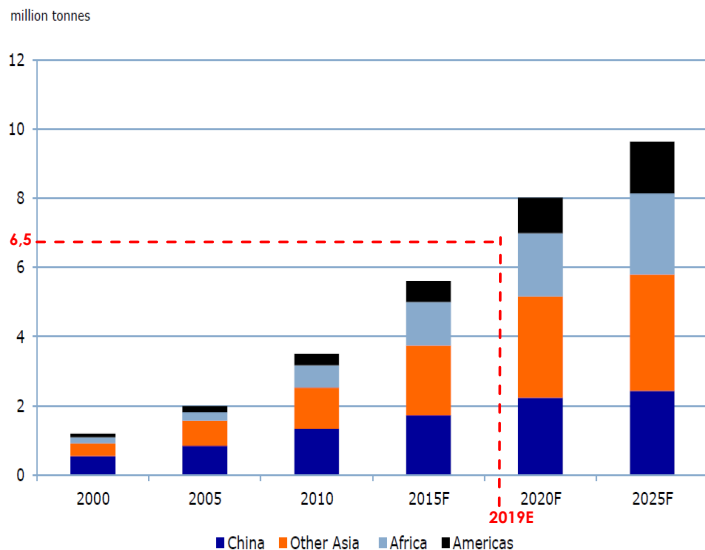
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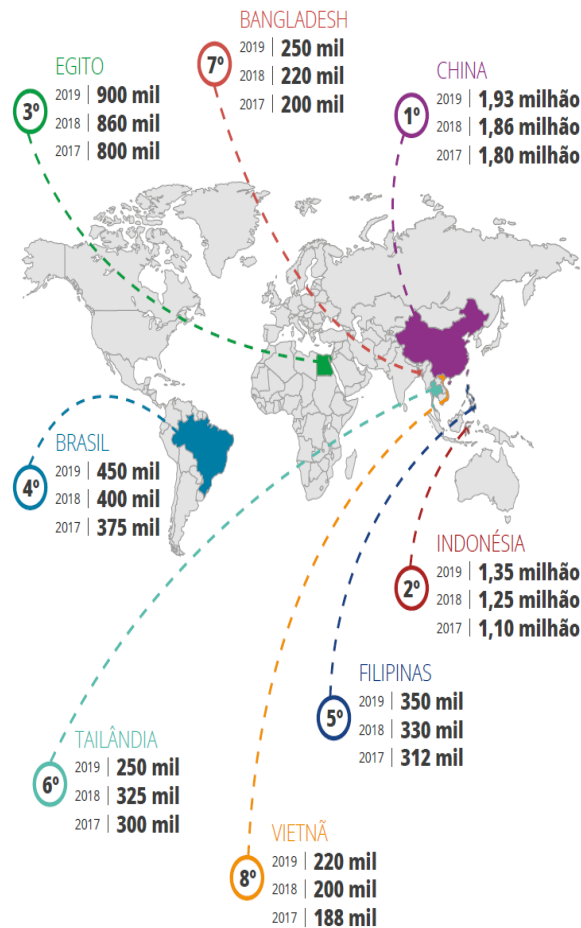


# Market & Context

# TILAPIA PRODUCTION WORLDWIDE

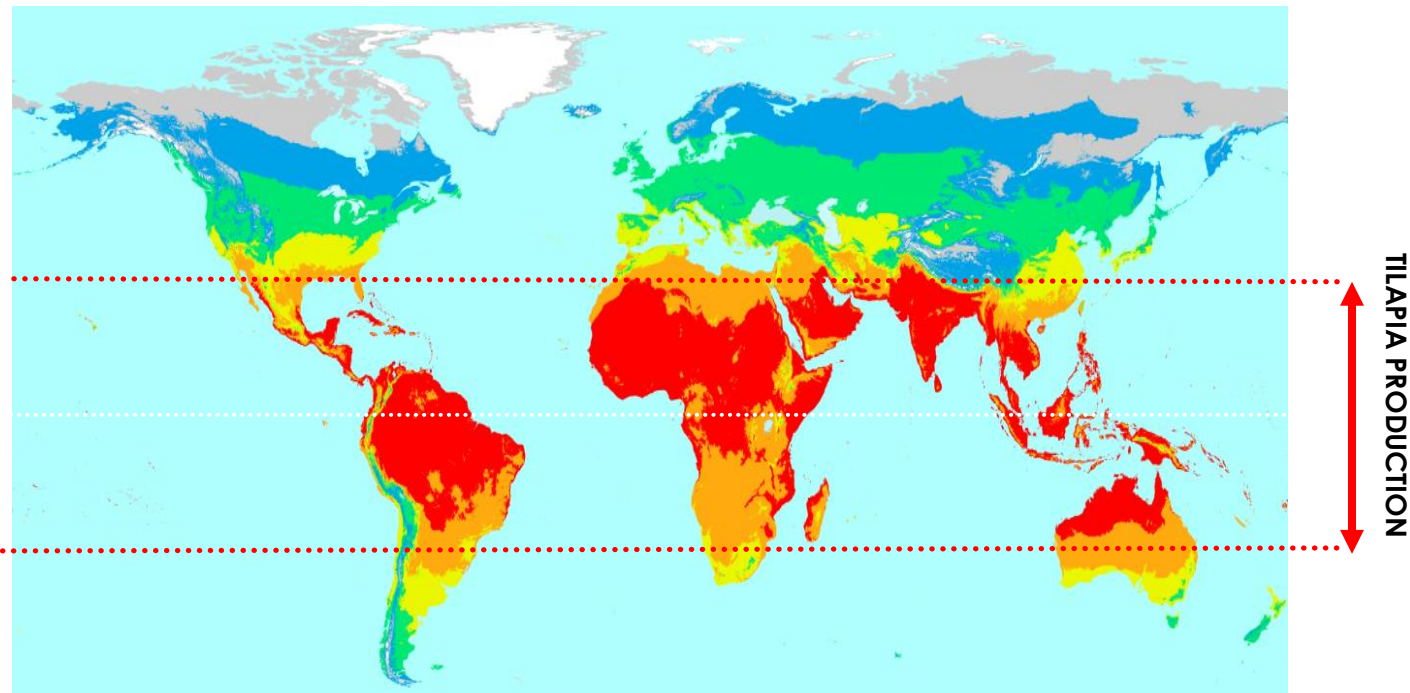


**2019E: 6,5 million tons**



# GLOBAL THERMAL ZONE & TILAPIA PRODUCTION

Limited to the tropical region

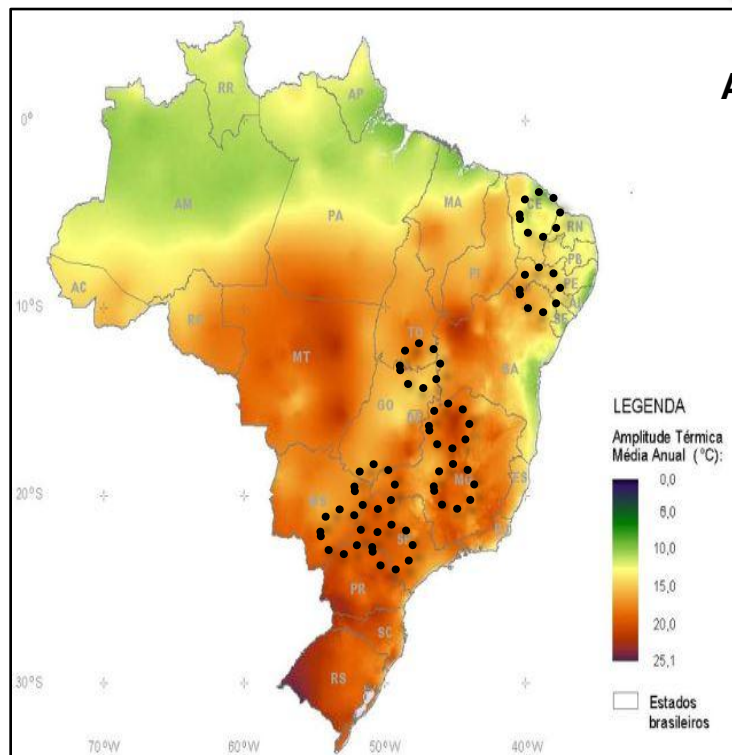


# AIR TEMPERATURE VARIATION - BRAZIL



 Tilapia farming areas

**FEED & FEEDING RATE  
ADAPTATION TO CONDITIONS**



**Notion of feed formulation & Nutrient digestibility  
to properly assess seasonal changes**

## MORE THAN 10 YEARS OF RESEARCH TO IMPROVE TILAPIA NUTRITION KNOWLEDGE

TO MEASURE EFFECTIVELY  
INGREDIENT DIGESTIBILITY



TO DESIGN FEED  
ON DIGESTIBLE NUTRIENTS



TO MEET  
FISH REQUIREMENT

TO DRIVE MORE EASILY FISH  
PERFORMANCE  
IN DIFFERENT CONDITIONS



# NOTION OF FEED FORMULATION AND NUTRIENT DIGESTIBILITY



☛ Feed is composed of different ingredients



☛ All ingredients are complex mixture of nutrients you can also find:

- A Potential presence of antinutrients
- Ingredients with imbalanced nutrients

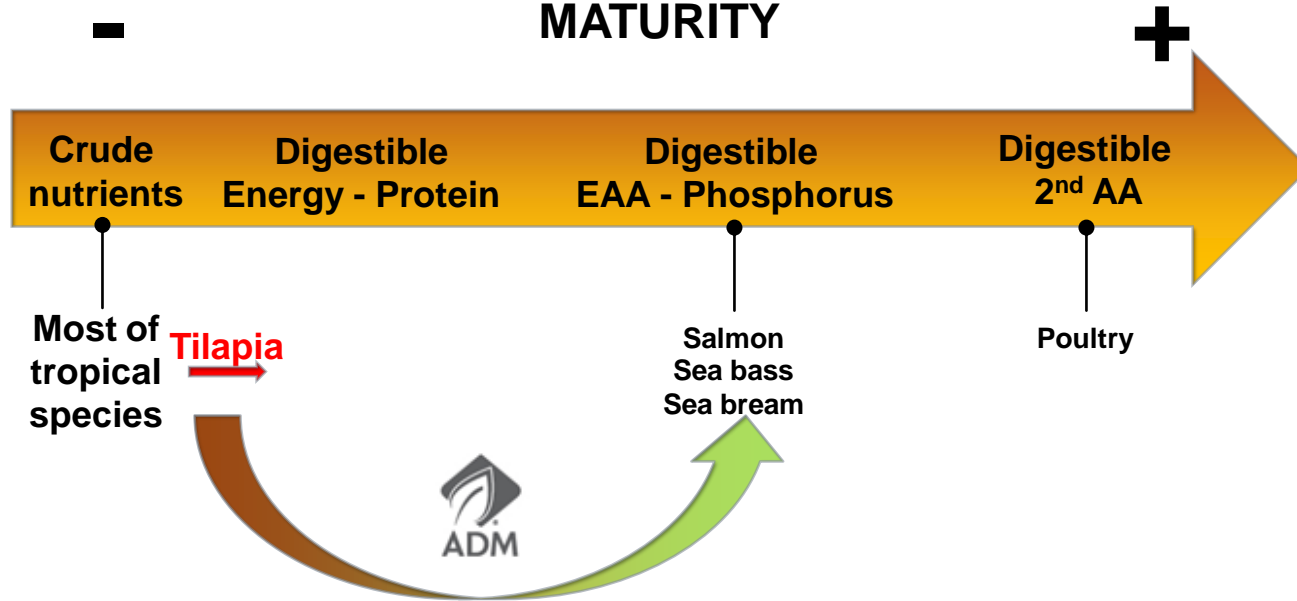
☛ For a dedicated farmed specie, nutritionist must know nutrient digestibility of each raw material to meet the requirement of the animal.



# IMPROVE OUR KNOWLEDGE IN TILAPIA NUTRITION



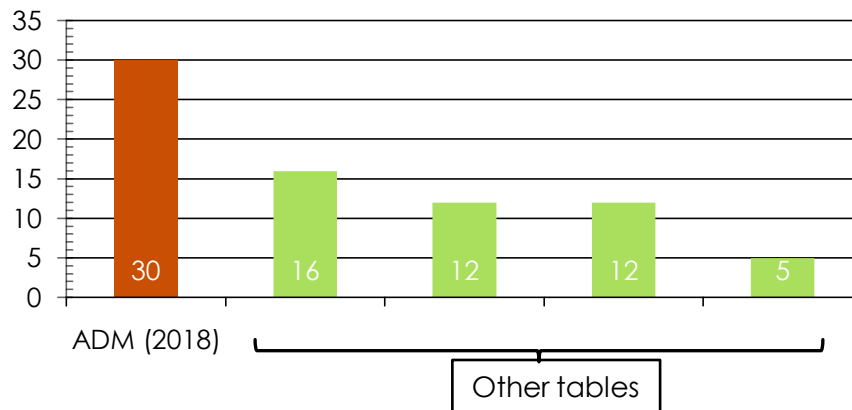
## NUTRITIONAL KNOWLEDGE MATURITY



# IMPROVE OUR KNOWLEDGE IN TILAPIA NUTRITION



**Number of RM nutritionally described on Tilapia**



**1/ ADM TABLE IS MORE CONSISTENT**

**2/ ADM USED THE SAME METHODOLOGY FOR ALL THE RM**

**3/ ADM HAS THE CAPACITY TO USE ITS HUGE LIVESTOCK RM DATA BASE TO ENRICHED TILAPIA TABLE**

# Our option to measure digestibility

# ADM RESEARCH CENTERS

## VIETNAM



## BRAZIL



# METHODOLOGY USED



- Principle :

- 2 types of feed are produced : a basal diet & a tested diet containing 30% of the ingredient tested and 70% of the basal diet
- An indigestible tracer is incorporated in the feed.
- The increase of the tracer concentration compared to the nutrient allows to quantify the loss of the nutrient in the faeces, consider as the absorption of the nutrient by the animal



**VIDEO**







# FEEDSTUFF & NUTRIENTS ASSESSED !



Wheat, Corn, Wheat flour, Millet,  
Cassava, Broken rice, Wheat bran, Corn  
DDGS

3 Rice bran quality

3 SBM sources, Sunflower meal,  
Rapeseed meal, Coprah meal, Palm meal

3 Fish meal quality

Poultry meal, MBM, Hemoglobine; Bone  
meal

ADC ENERGY



ADC PROTEIN



ADC AA



ADC PHOSPHORUS



2 feather meal quality

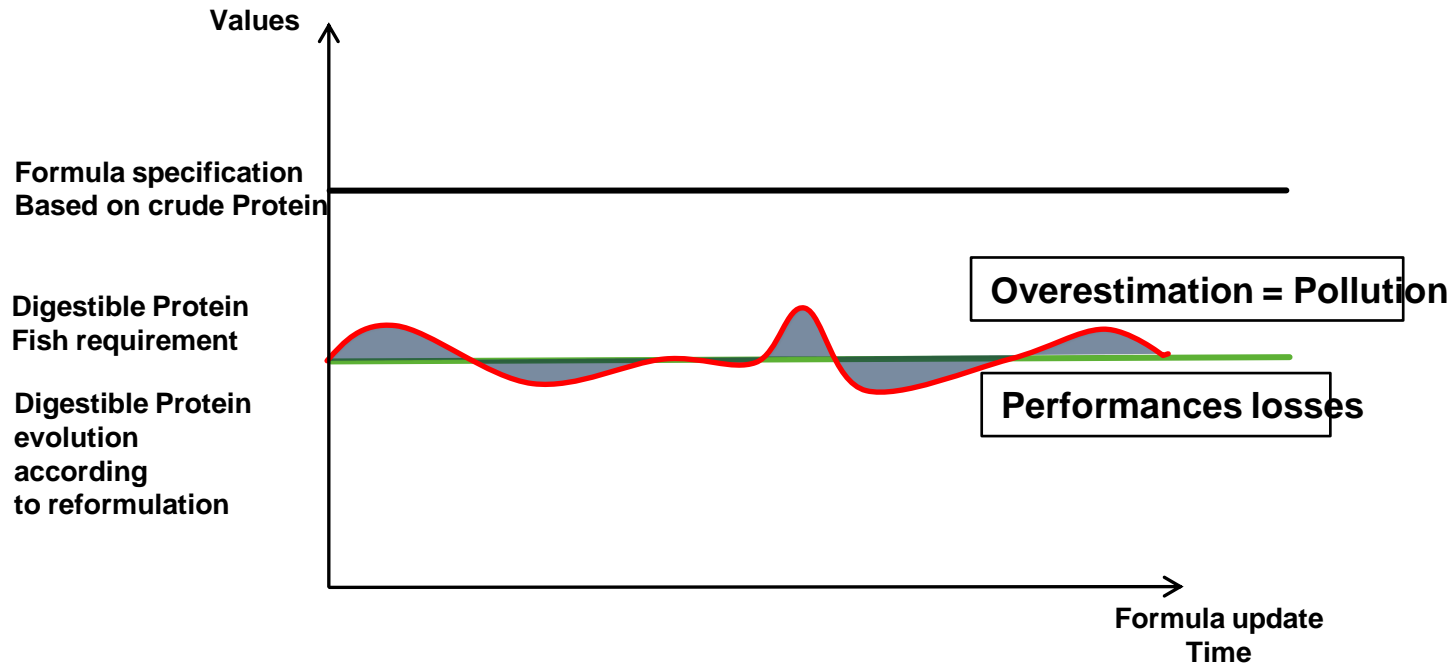
**What are the benefit to measure digestibility ?**



# BENEFIT #1: FORMULATION STABILITY ASSURANCE



## Example : Formulation on crude protein Evolution of values according to formulation update



## BENEFIT #2: WASTE REDUCTION



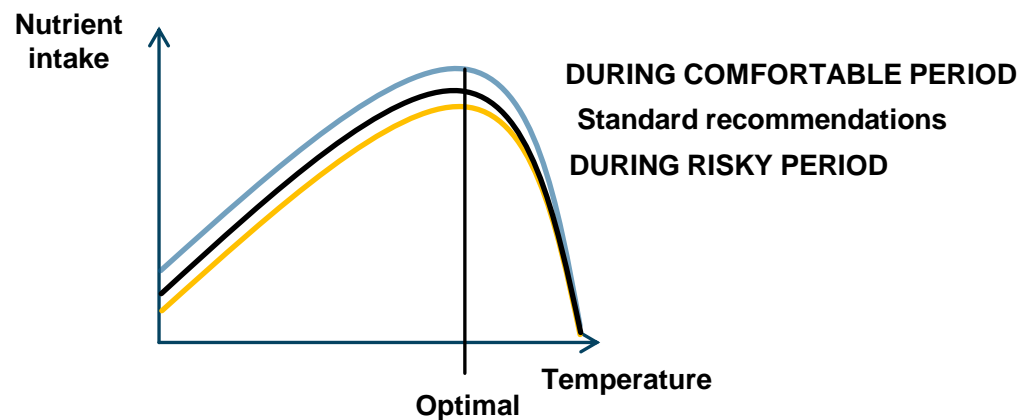
# BENEFIT #3: NOTION OF NUTRIENT INTAKE



To answer fish requirement  
To better drive performances



We need to consider quantity of  
DE – DP – DAA intake per day !



Feeding tables have to be adapted to **feed nutrient value & conditions**  
(t°C, DO, Fish size & Health)

# Growth trials to check the reliability of our Digestible Nutrients

# ZOOTECHNICAL TRIALS TO ASSESS FORMULATION WITH DIGESTIBLE NUTRIENTS



## 12 zootechnical trials on TILAPIA to evaluate reliability of Digestible Protein, Digestible Energy, Ratio DP/DE

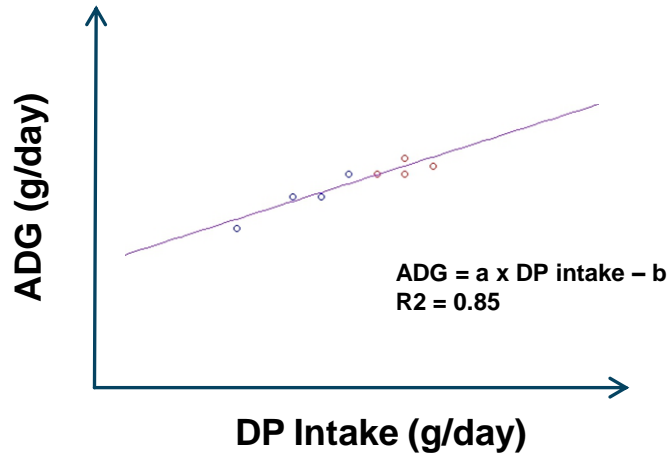


**BRAZIL**  
**5 TRIALS >300G**



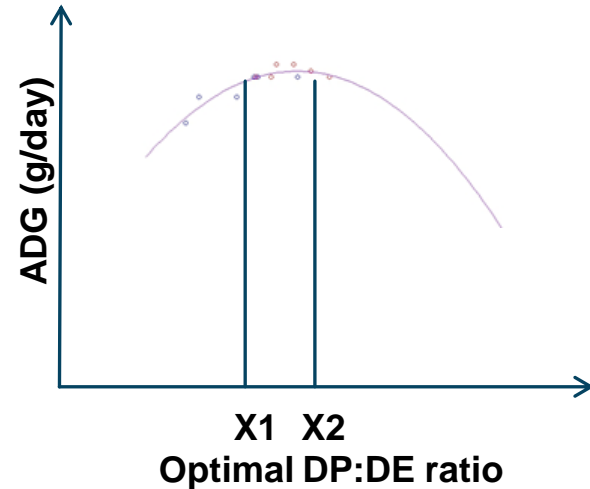
**VIETNAM**  
**3 trials <150 g**  
**4 trials >300 g**

# YOUNG STAGES (<150G) : RESULT OF META-ANALYSIS

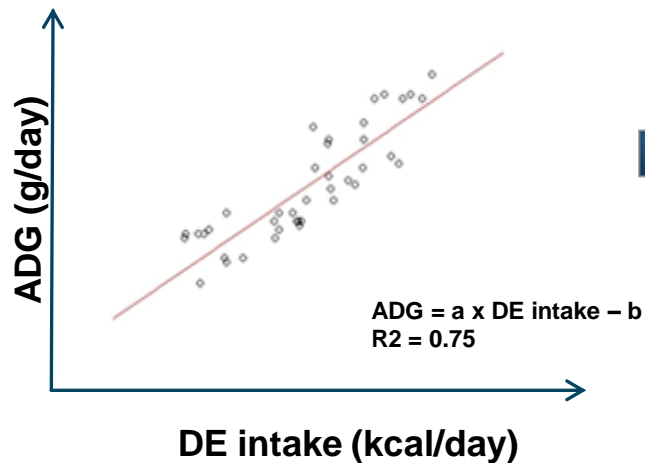


- DP as the growth driver is confirmed
- Protein retention in young stages is more efficient than for larger fish

$ADG = -a + b \times DP:DE - c \times (DP:DE)^2$   
 $R^2 = 0.84$

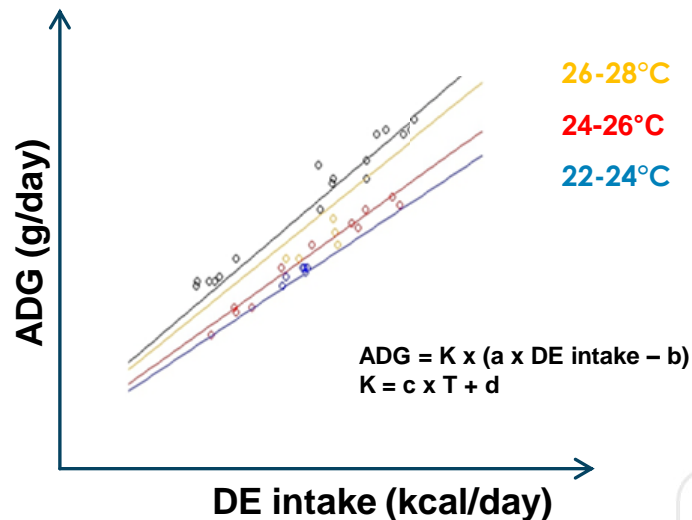


# Grow out stages (>300g) : Result of Meta-analysis



- Growth of bigger fish (>150g) depends mainly of DE intake
- Lower protein retention than young stage.

**DEFINITION OF EQUATION  
TO PREDICT OPTIMAL « DE » INTAKE  
TO FINETUNE GROWTH  
ACCORDING TO TEMPERATURE**



# Reliable data from trials = Concrete Application in South of Brazil



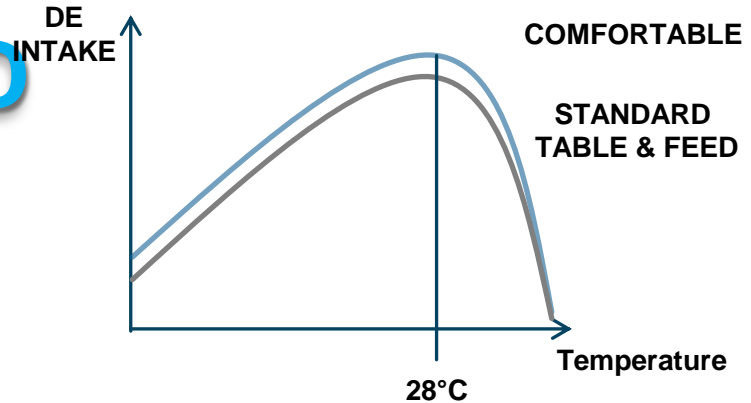
# Between June & September



- Low risk of disease on grow out stage
- Concentration of Energy (low DP/DE ratio) in the feed to enable the fish to fully express its potential
- To prepare the fish when temp are low with low feed intake

## SEASON COLD FEED

TEMP VARIABILITY : 18 to 28°C



To boost growth when period is comfortable !

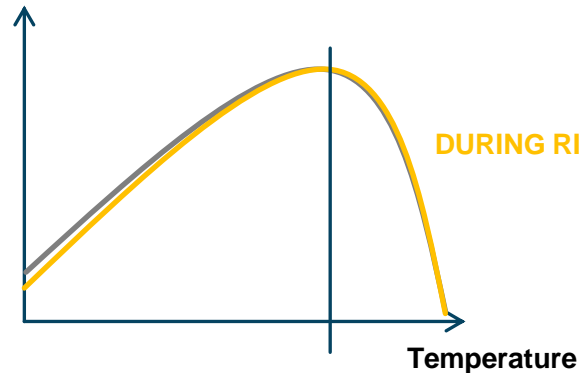
# Between November & March



- Temperature are rising during spring period with potential fast variation  
=> Streptococcus risk is medium but continuous
- To maintain DE INTAKE decreasing feeding table = Reduction of the food bowl to decrease the risk of digestive diseases  
=> Growth is reasoned

SEASON **HOT**  
FEED

DE intake



With medium pressure but continuous



To maintain growth and survival during more stressful period !

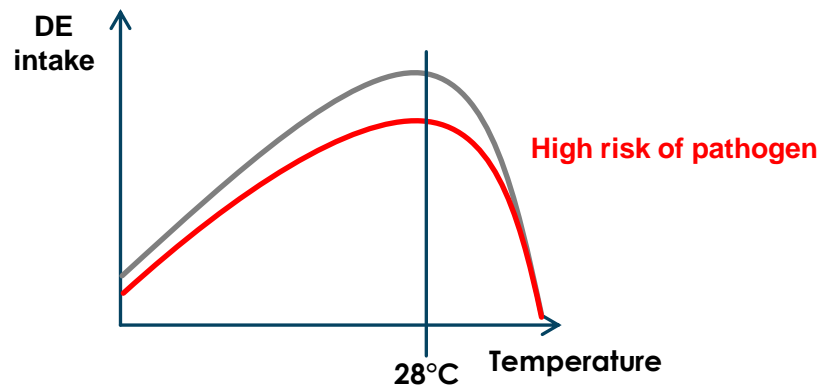
# October & Challenging period



- Survival is the main priority
- Feeding rate has to be limited to avoid any overfeeding and waste
- Specific feed with high DP/DE ratio with very digestible ingredients
- Reinforced in vitamins, minerals, hepatocare & specialties to strengthen the fish

## REINFORCE FEED

Strong variation of temperature  
Other events  
(Strepto – Francisella – Parasite..)



**Creation of a reinforce feed to support the fish during a challenging period !**

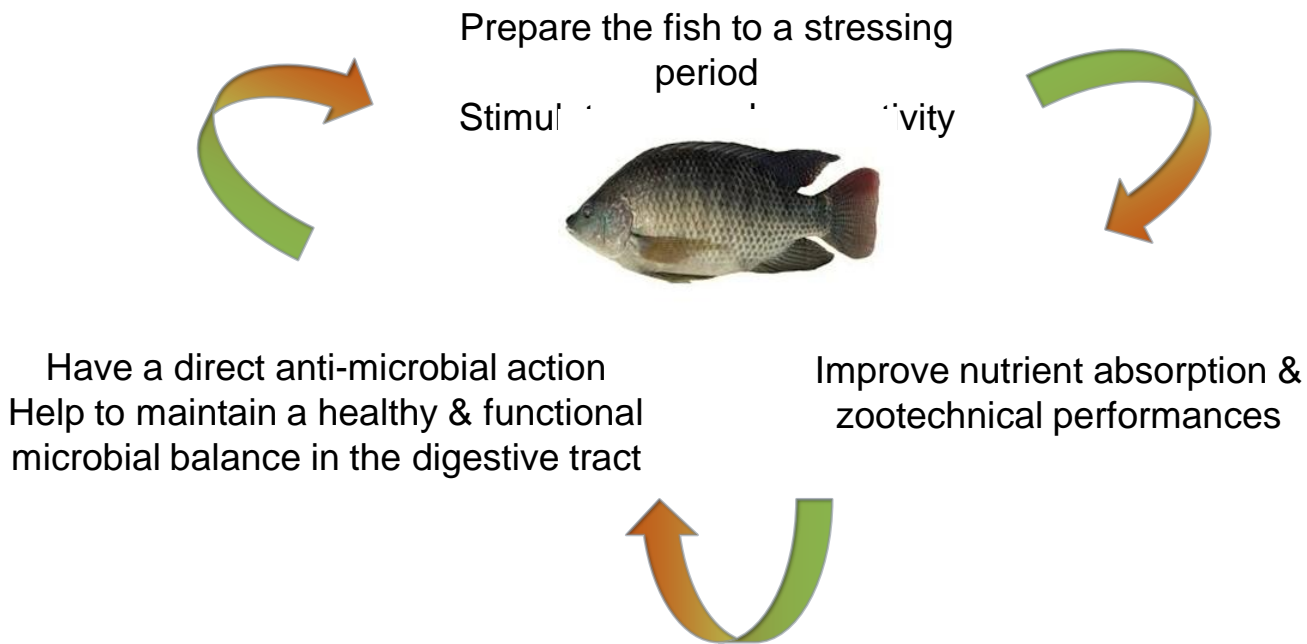




# REINFORCEFEED



## BLEND OF ADDITIVES



# TAKE HOME MESSAGE



**HOW TO BETTER ANSWER TO THE  
MARKET  
IN A MORE & MORE COMPETITIVE  
CONTEXT ?**

**HOW TO BETTER ANSWER TO FARMERS  
LOCATED IN DIFFERENT ENVIRONMENTAL  
CONDITIONS ?**

**IMPROVING OUR KNOWLEDGE  
IN NUTRITION & SPECIALTIES**

**MEASURING EFFECTIVELY THE NUTRIENT  
DIGESTIBILITY OF INGREDIENTS**

**TESTING & DESIGNING SOME FEED  
USING THESE NUTRIENTS & SPECIALTIES**

**TO MEET  
FISH REQUIREMENT**

**TO DRIVE MORE EASILY FISH  
PERFORMANCE**



**MUITO  
OBRIGADO !**

