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PRINSUS Spin-off

TRANSFORMING MARINE INVASIVE SPECIES INTO SUSTAINABLE AQUAFEEDS



Funded by
the European Union

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MEET VALIAS PROJECT

Transforming marine invasive species into sustainable aquafeeds



AN ALTERNATIVE WAY OF EXPLOITING THE INVASIVE FISH OF THE GENUS LAGOCEPHALUS. PRODUCTION OF FISHMEAL FOR USE IN THE DIET OF MEDITERRANEAN FARMED MARINE SPECIES

WHY FISHMEAL...

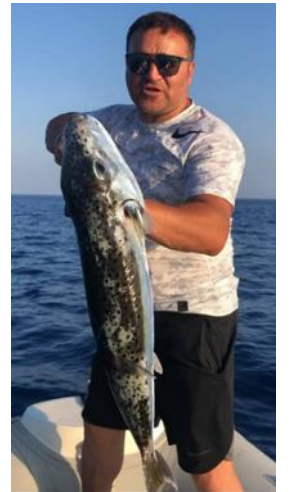
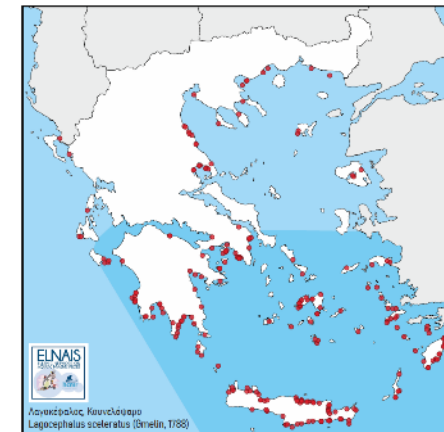
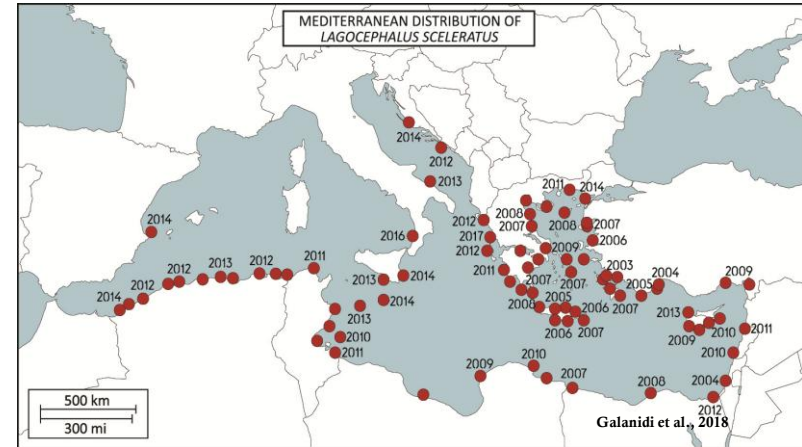
- Aquaculture in the Mediterranean sea is one of the most dynamic primary production industries
- Fish meal is the nutritionally the most valuable ingredient in aquafeeds

The ability to produce locally fishmeal with a consistent composition, high nutritional value and competitive price will have multiple benefits for fisheries, aquaculture and the environment



WHY LAGOCEPHALUS...

- Widespread spread throughout the Mediterranean
- Abundant in Greece
 - Quantities >50% of total catch
 - Up to 235kg/km²
- Human consumption is prohibited in EU
- Damages to fishing gear
- Reduction in native species catches and biodiversity due to lagocephalus predation

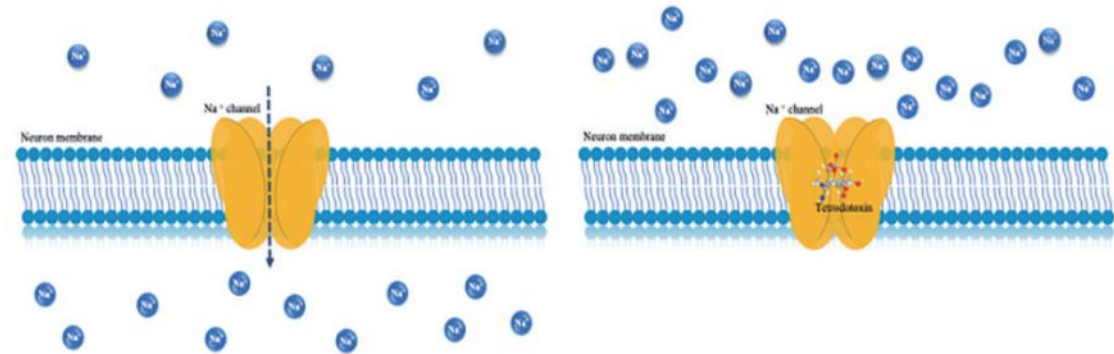
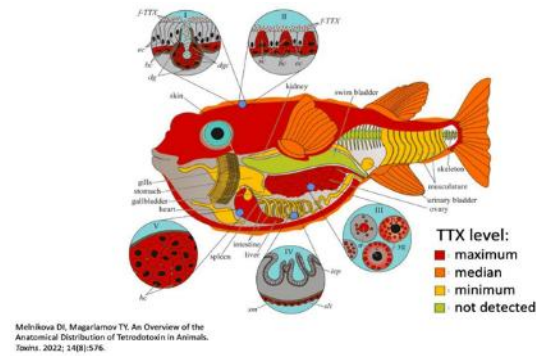


Need to find viable solutions immediately

TETRODOTOXIN (TTX)

Mode of action

- Sodium channel blocking (VSGCs)
- Inhibition of sodium ion influx into neuronal cells
- Acute health effects in animals and humans



SMALL-SCALE PRODUCTION OF FISHMEAL

- Collection of Lagocephalus individuals at different time periods
- Small-scale production of fishmeal

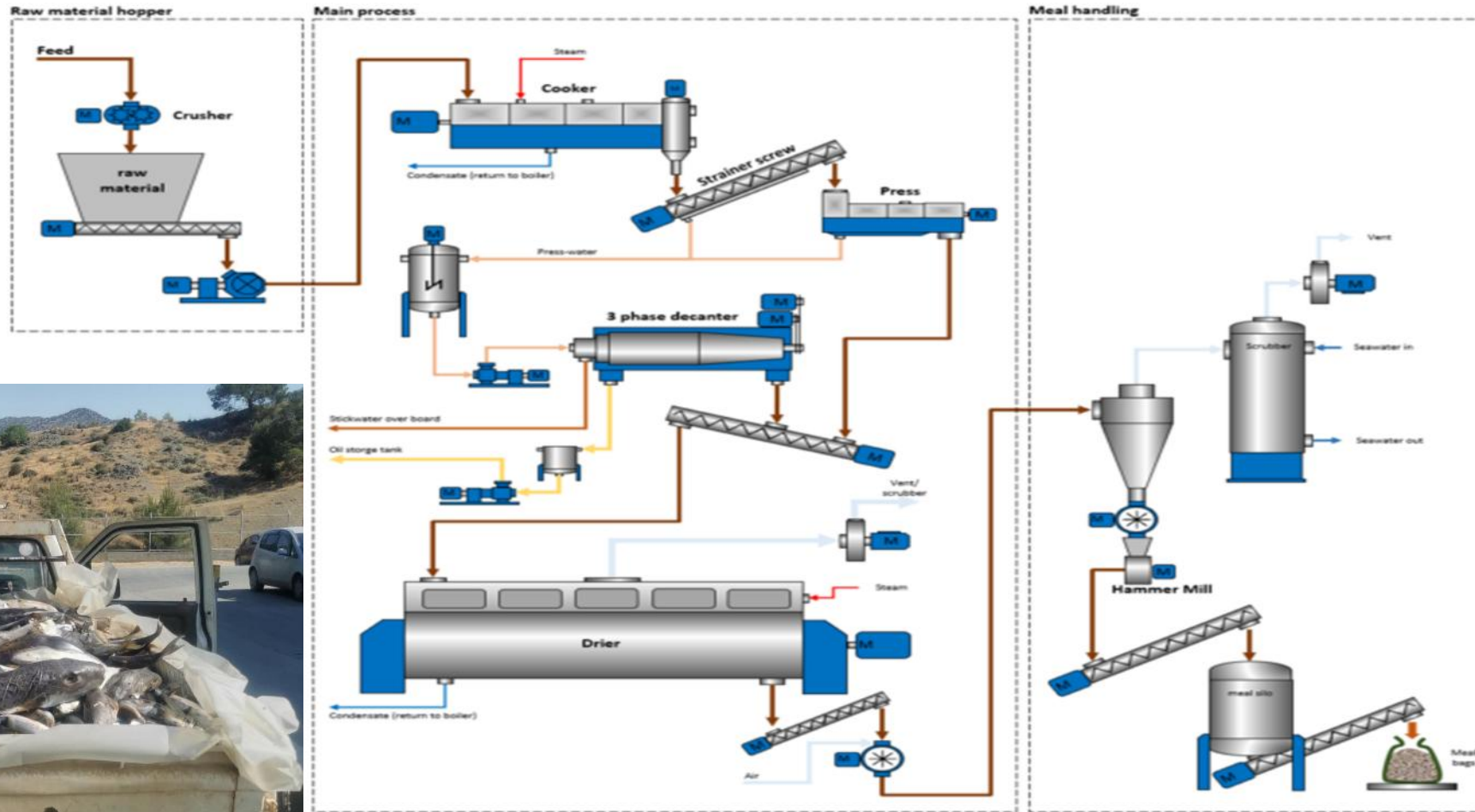


SMALL-SCALE PRODUCTION OF FISHMEAL

Cooking Drying Grinding



LARGE -SCALE PRODUCTION OF FISHMEAL



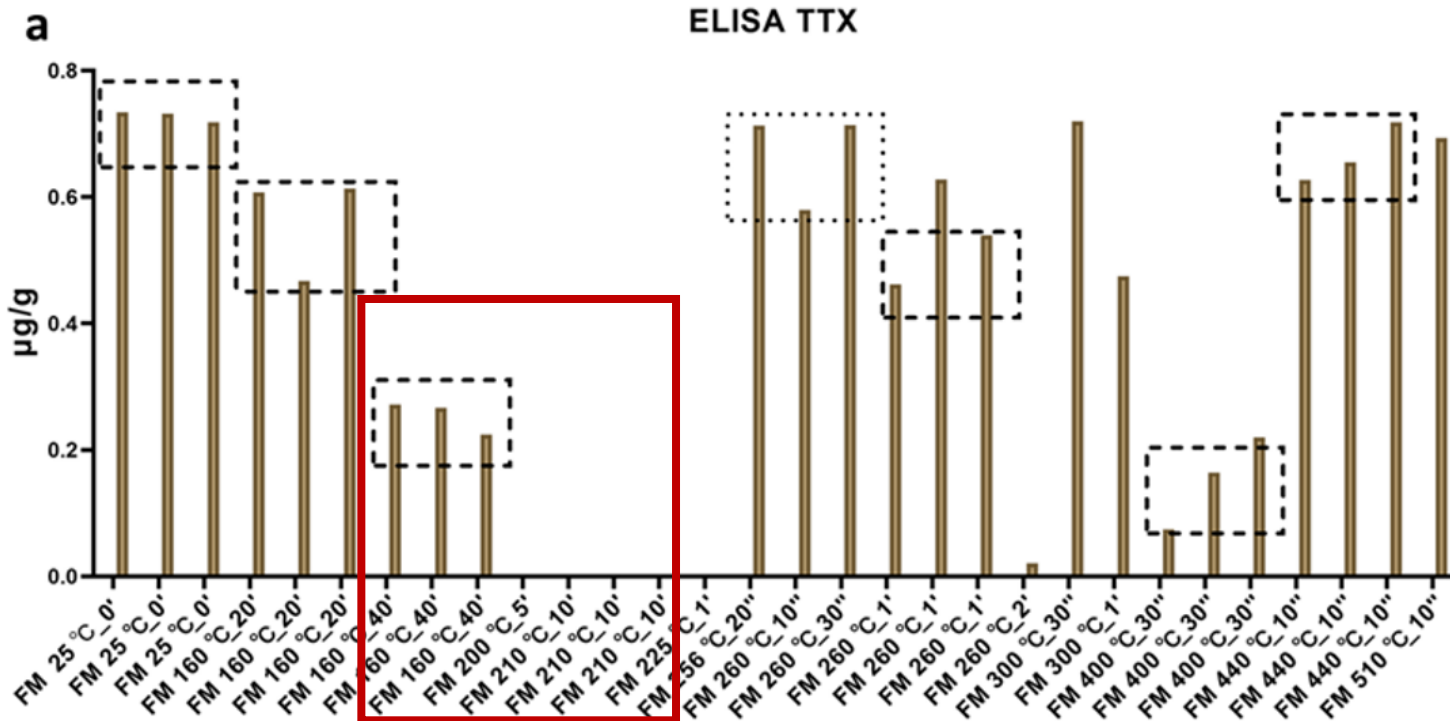
TOXIN DEACTIVATION BY HEATING

Temperature (°C)	Time
160	20 min
160	40 min
180-218	5min
210	10 min
200-248	1 min
256	20 sec
258-260	30 sec
260	10 sec
260	1 min
255-273	2 min
300	30 sec
300	1 min
400	30 sec
440	10 sec
510	10 sec
210	10 min



TOXIN DEACTIVATION BY HEATING

RESULTS



Best results
 160°C – 40mins
 200°C – 5mins



Selection Criteria for Best Results: Based on both TTX levels in tissue and the intensity of thermal processing (°C and duration).



Overheating Concern: Excessive heat can degrade nutritional value.



EFSA Safety Threshold: TTX < 44 µg/kg tissue.



Optimal Processing Conditions Chosen: One condition showed **no detectable toxin** in the tissues. The other had **low TTX levels**, still safely below the EFSA threshold.

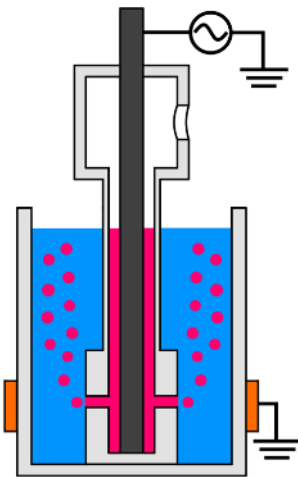


Selected Treatments: LT-LM: Low Temperature and HT-LM: High Temperature

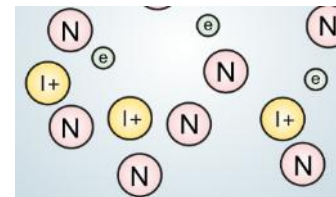
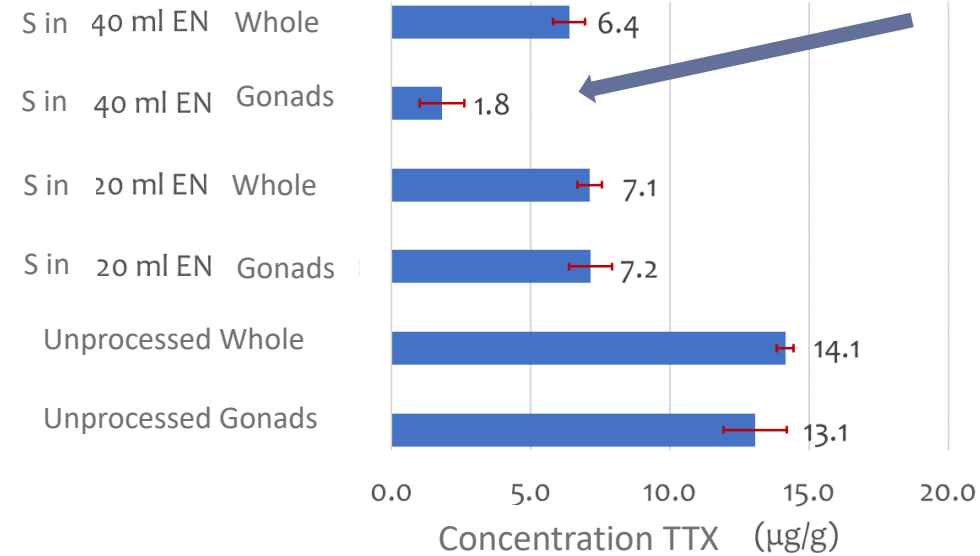
DEACTIVATION OF TOXIN WITH COLD PLASMA TECHNOLOGY

Ionized gas containing ions, electrons and neutral components, being on average electrically neutral

S: Sample
EN: Plasma Activated water



Reduction of TTX by more than 7 times



ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

Feeding trial production using Fishmeal from *Lagodon rhomboides* (Lagodon)

- Weight gain
- Feed Utilisation
- Body Composition



ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS NUTRITION

Formulation of experimental diets (%)

	Control	UnP-LM	HT-LM	LT-LM	Combo
Fishmeal conventional	30	-	-	-	15
UnP-LM	-	30	-	-	-
HT-LM	-	-	30	-	-
LT-LM	-	-	-	30	15
Wheat meal	10.9	10.9	10.9	10.9	10.9
Corn gluten	19	19	19	19	19
Soybean Concentrate	17	17	17	17	17
Soybean meal	9	9	9	9	9
Fish Oil	13	13	13	13	13
Monocalcium phosphate	0.5	0.5	0.5	0.5	0.5
Mineral & Vitamin	0.4	0.4	0.4	0.4	0.4
Lysine	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1

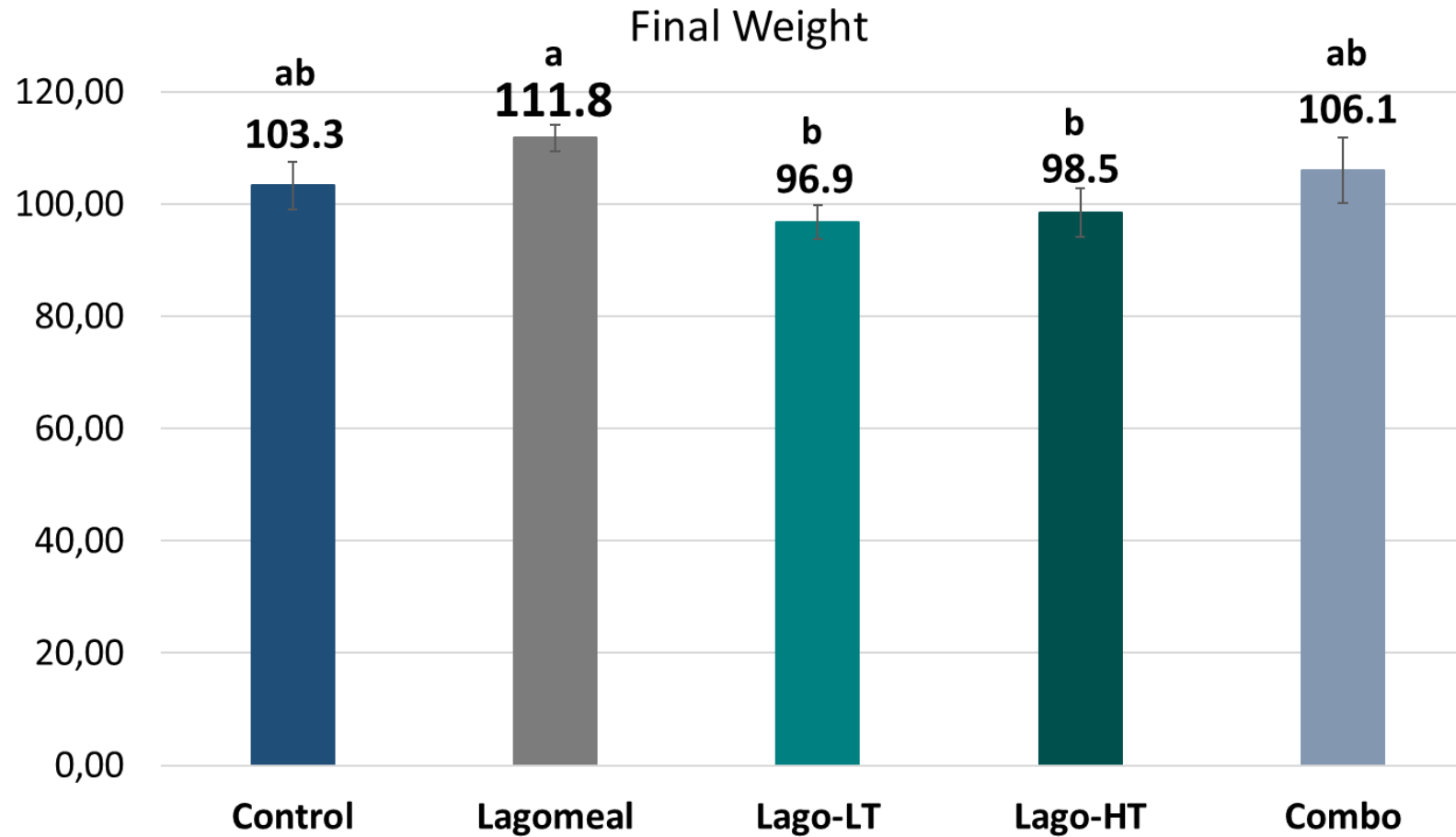


UnP-LM: Unprocessed

HT-LM: High temperature 210°C/5'

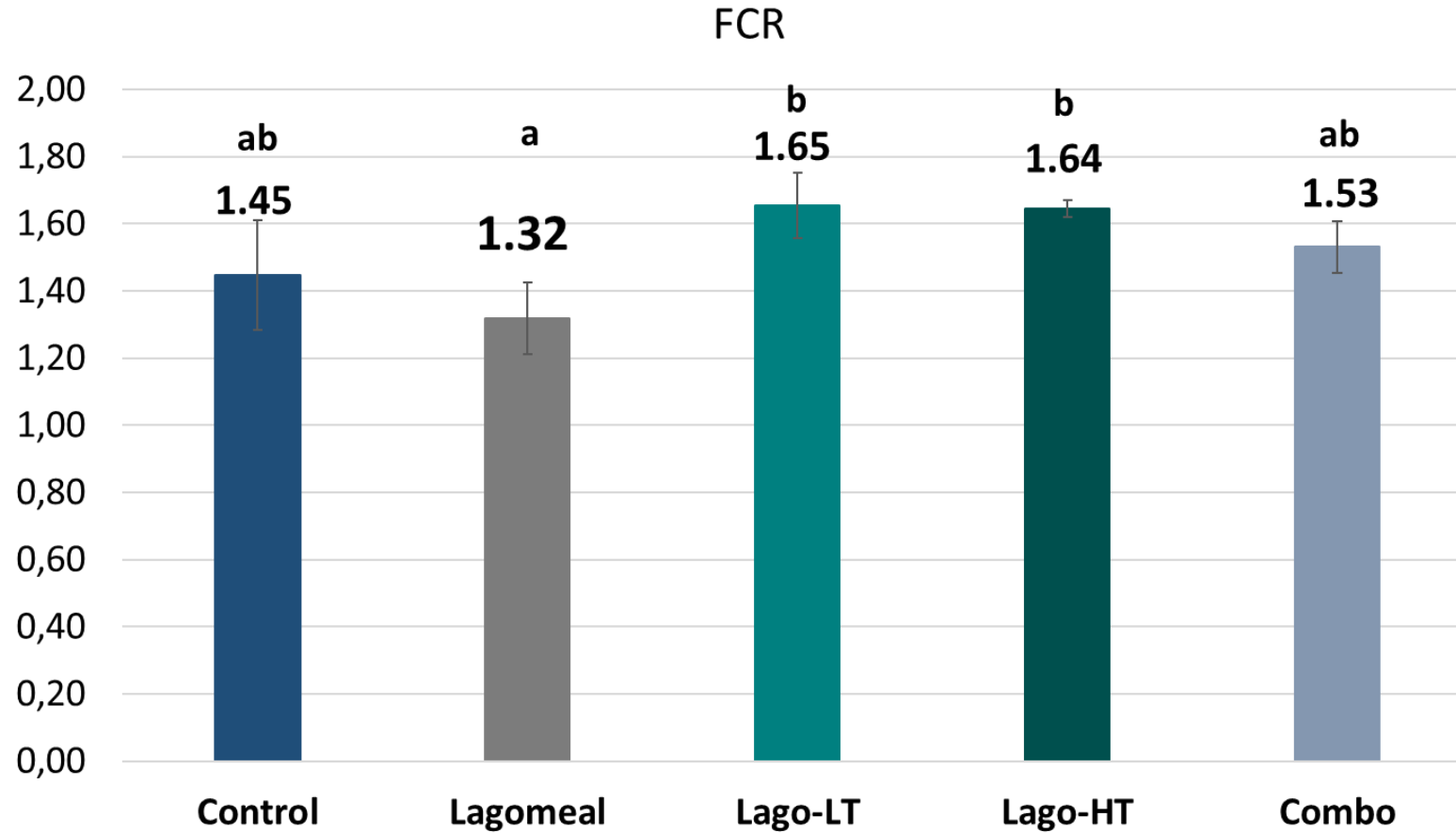
LT-LM: Low temperature: 160°C/40'

ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

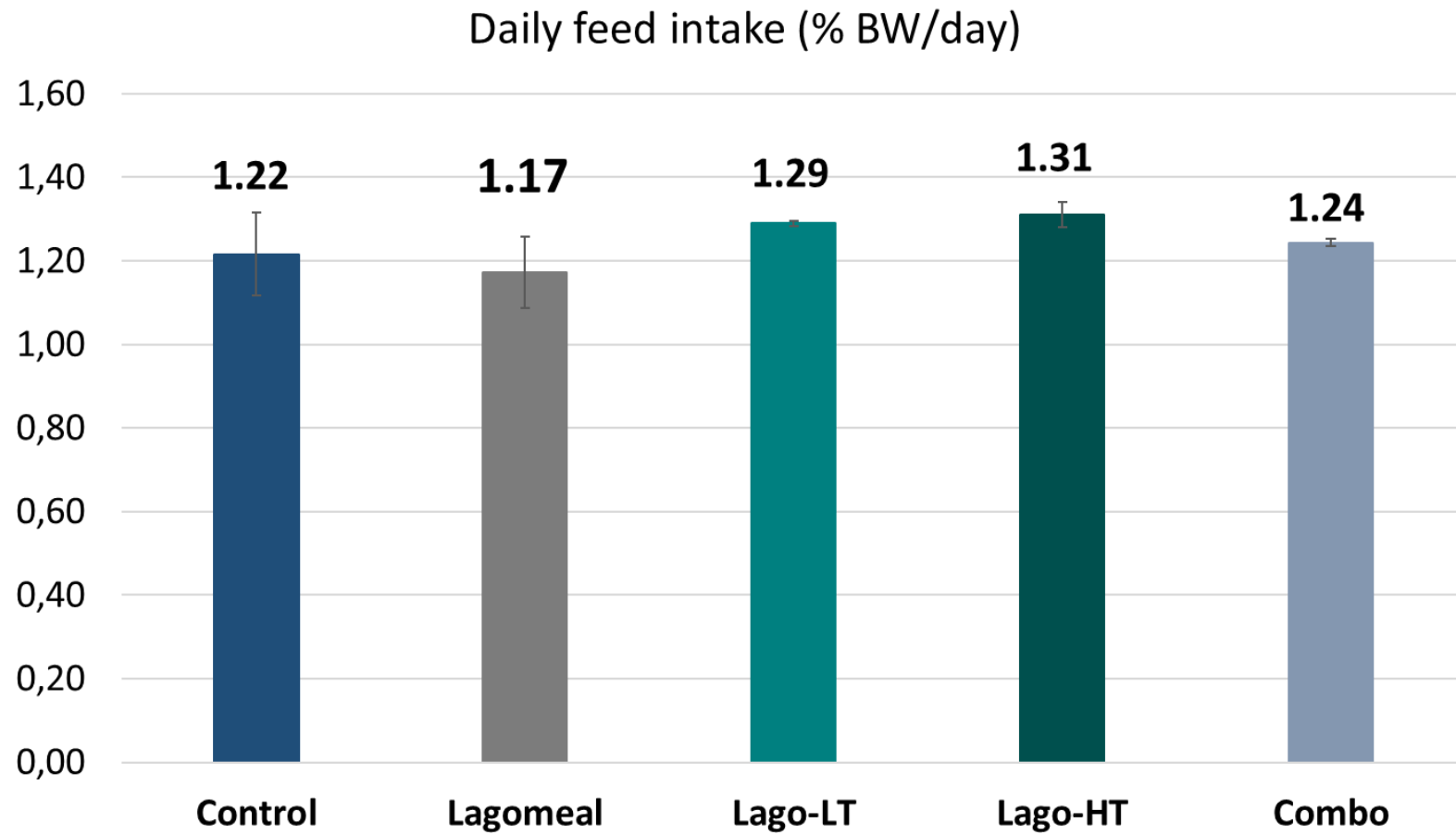


ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

FCR: FEED CONSUMPTION/WEIGHT GAIN

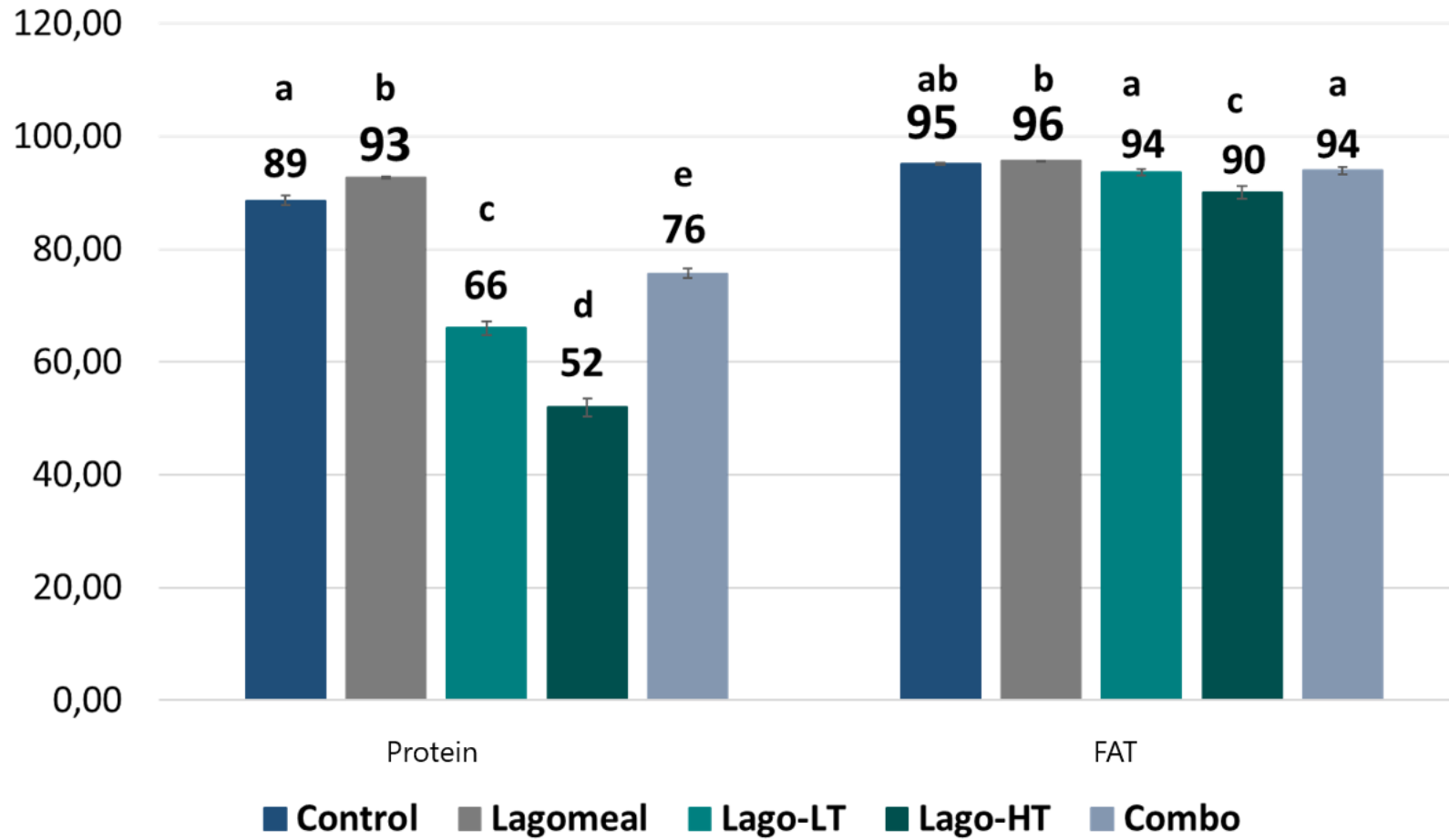


ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

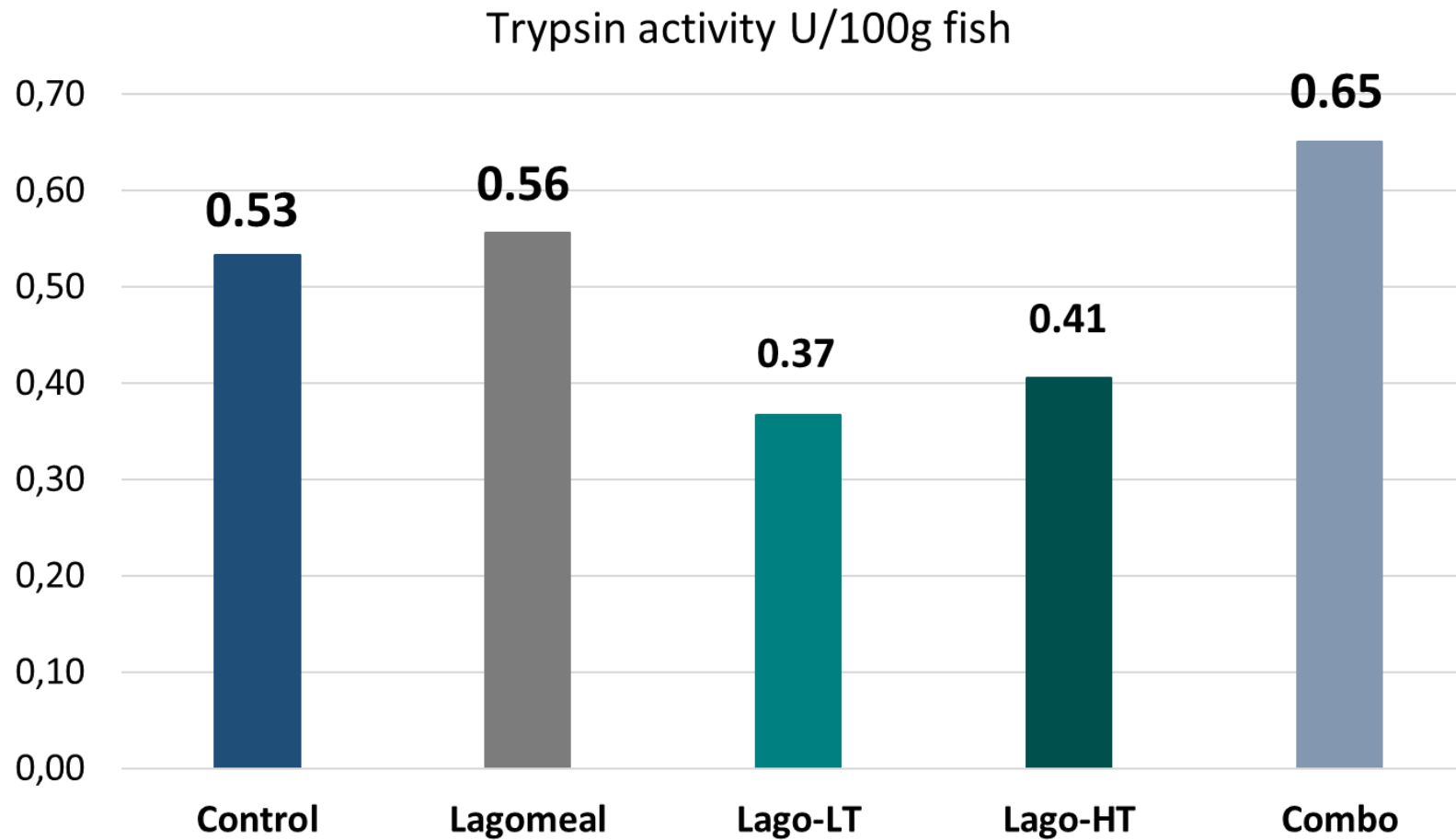


ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

Nutrient Digestibility

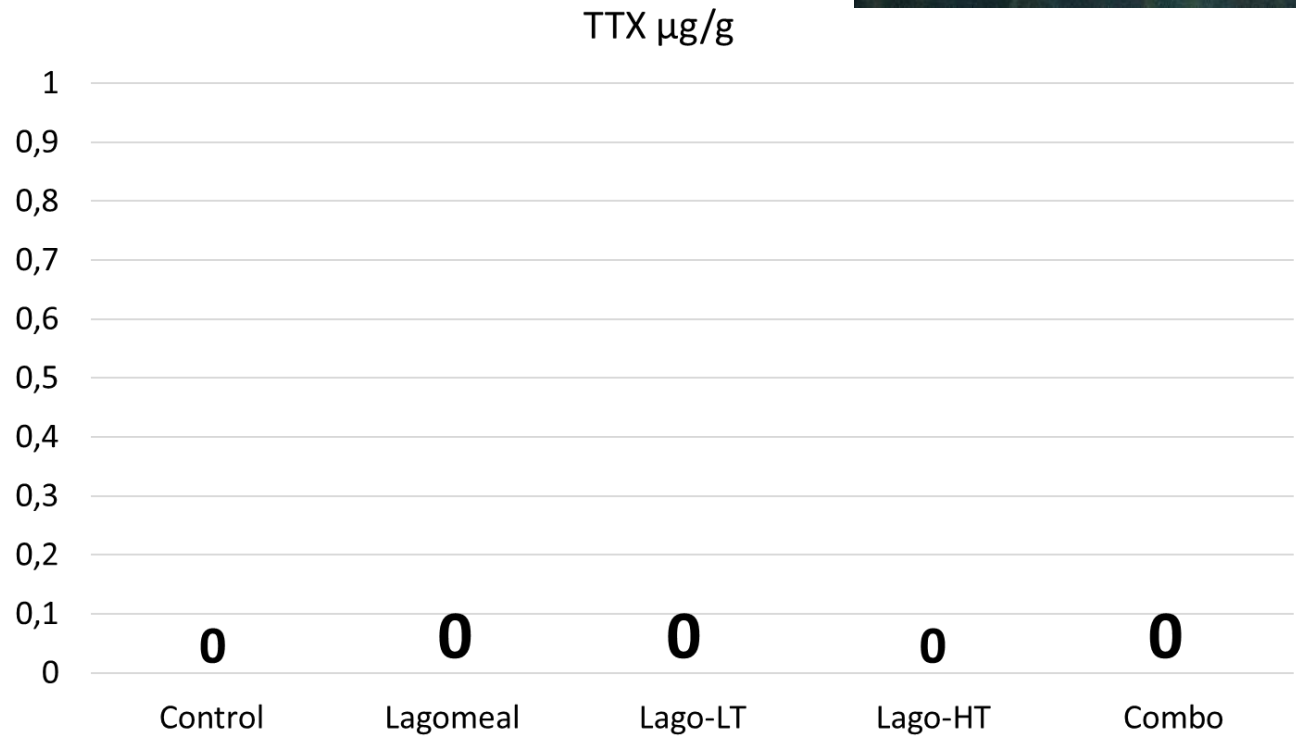
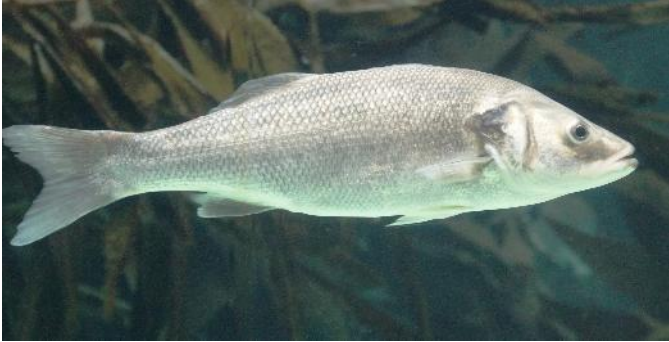


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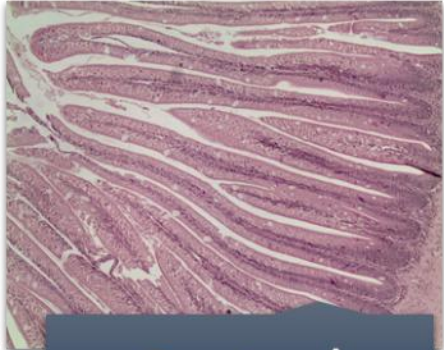


ASSESSMENT OF THE NUTRITIONAL VALUE IN SEA BASS DIETS

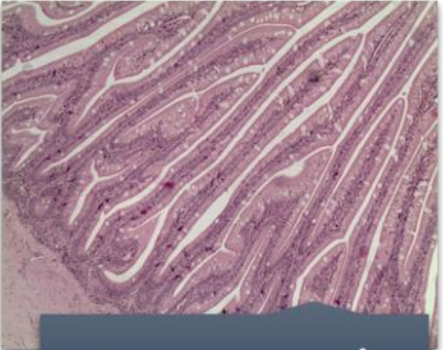
No TTX Detected in sea bass fed LagoMeal



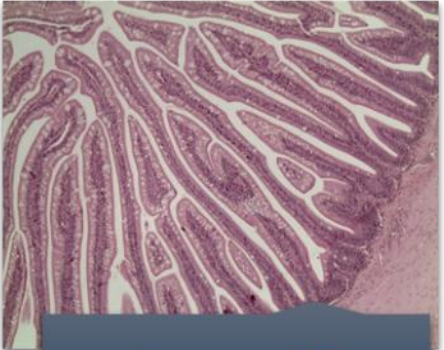
Histology of intestine



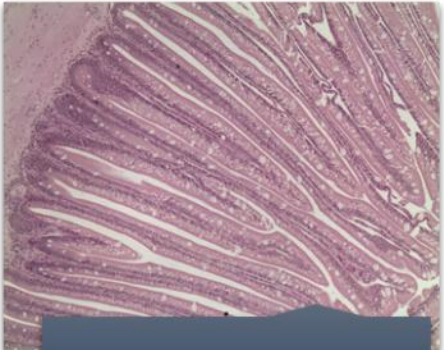
Control



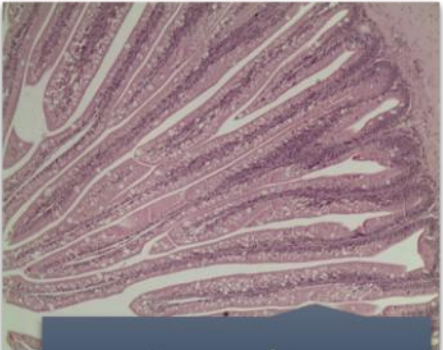
Lagomeal



Lago-LT



Lago-HT



Combo

No Histological differences

Conclusions

VALIAS feed

Improved Key Production Indices (KPIs) (weight gain, FCR) for Combo

Control & Combo

Potential to incorporate Lago-LT at 15% in diet

Longer Term feeding trials required

Lago-LT & Lago-HT

Lower KPIs. Negative effect of high temperature during TTX disactivation

No TTX in the body of Sea bass fed the experimental diets



THANK YOU

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