

# BENEFITS OF DIETARY KRILL MEAL TOWARDS BETTER UTILIZATION OF NUTRIENTS AND RESPONSE TO OXIDATIVE STRESS IN GILTHEAD SEABREAM (*Sparus aurata*) JUVENILES

Kiranpreet Kaur, Marta Carvalho, Daniel Montero, Antonio Serradell, Mónica Betancor, Marisol Izquierdo, Virginie Claeysens, Silvia Torrecillas

## GLOBAL ISSUE

- Aquaculture is essential to meeting the increasing demand for sustainable food. However, the growth of aquaculture is constrained by the high feed cost and limited availability of feed ingredients. This challenge can be addressed by incorporating more sustainable and high-quality ingredients, which improve feed utilization (FCR), ultimately enhancing the growth and welfare of various fish species in a cost-effective way.

## THE PURPOSE

- Krill meal (KM) is a sustainable marine ingredient certified with an MSC- A rating for many years. It provides essential nutrients, including high-quality marine protein, phospholipids, and n-3 PUFAs like EPA and DHA. KM also contains bioactive antioxidants such as choline, selenium, astaxanthin, and vitamin E, which can enhance fish health and antioxidant defenses. Given the physical, chemical, and biological stressors in farming conditions that induce oxidative stress in fish, this study investigated the effect of KM on growth, feed conversion ratio (FCR), and oxidative stress response in gilthead seabream juveniles.

## EXPERIMENTAL SET UP



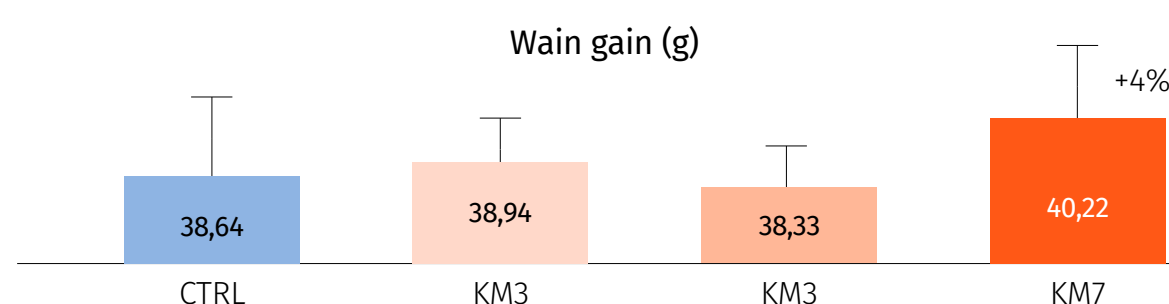
### EXPERIMENTAL FEEDS

	Control	KM3	KM5	KM7
Fishmeal Super Prime	7.0	4.0	2.0	0.0
Fishmeal 60	8.0	8.0	8.0	8.0
Krill meal	0.0	3.0	5.0	7.0
Poultry meal	12.0	12.0	12.0	12.0
Soy protein concentrate	10.0	10.0	10.0	10.0
Wheat gluten	8.1	8.6	8.9	9.2
Com gluten meal	10.0	10.0	10.0	10.0
Soybean meal 44	14.0	14.0	14.0	14.0
Wheat meal	11.0	10.6	10.4	10.2
Faba beans (low tannins)	3.1	3.1	3.1	3.1
Vitamin and mineral premix	1.3	1.3	1.3	1.3
Choline chloride 50%	0.2	0.2	0.2	0.2
Antioxidant	0.2	0.2	0.2	0.2
Sodium propionate	0.1	0.1	0.1	0.1
MCP (Monocalcium phosphate)	1.0	1.0	1.0	1.0
DL-Methionine	0.2	0.2	0.2	0.2
Fish oil	5.5	5.5	5.5	5.5
Soybean oil	3.6	3.6	3.6	3.6
Rapeseed Oil	3.4	3.4	3.4	3.4
Palm Oil	1.3	1.3	1.3	1.3

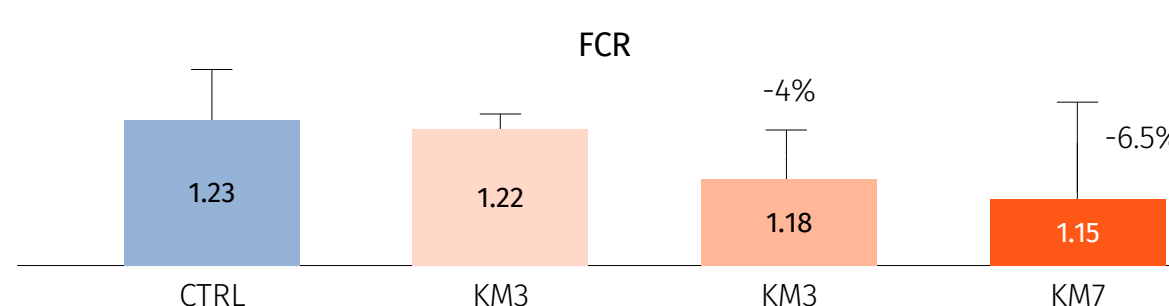
Proximate composition (% dry weight)	Control	KM3	KM5	KM7
Protein (dw)	48,8	49,2	48,8	48,9
Lipids (dw)	24,3	22,2	22,5	22,5
Ash (dw)	7,8	7,7	7,6	7,8
EPA (%fat)	5,0	5,3	5,7	5,6
DHA (%fat)	4,0	4,01	4,2	4,1
N3 / N6	0,65	0,68	0,71	0,71

## RESULTS

### 1. Better weight gain with 7% KM



### 2. Better FCR with 5% KM and 7% KM

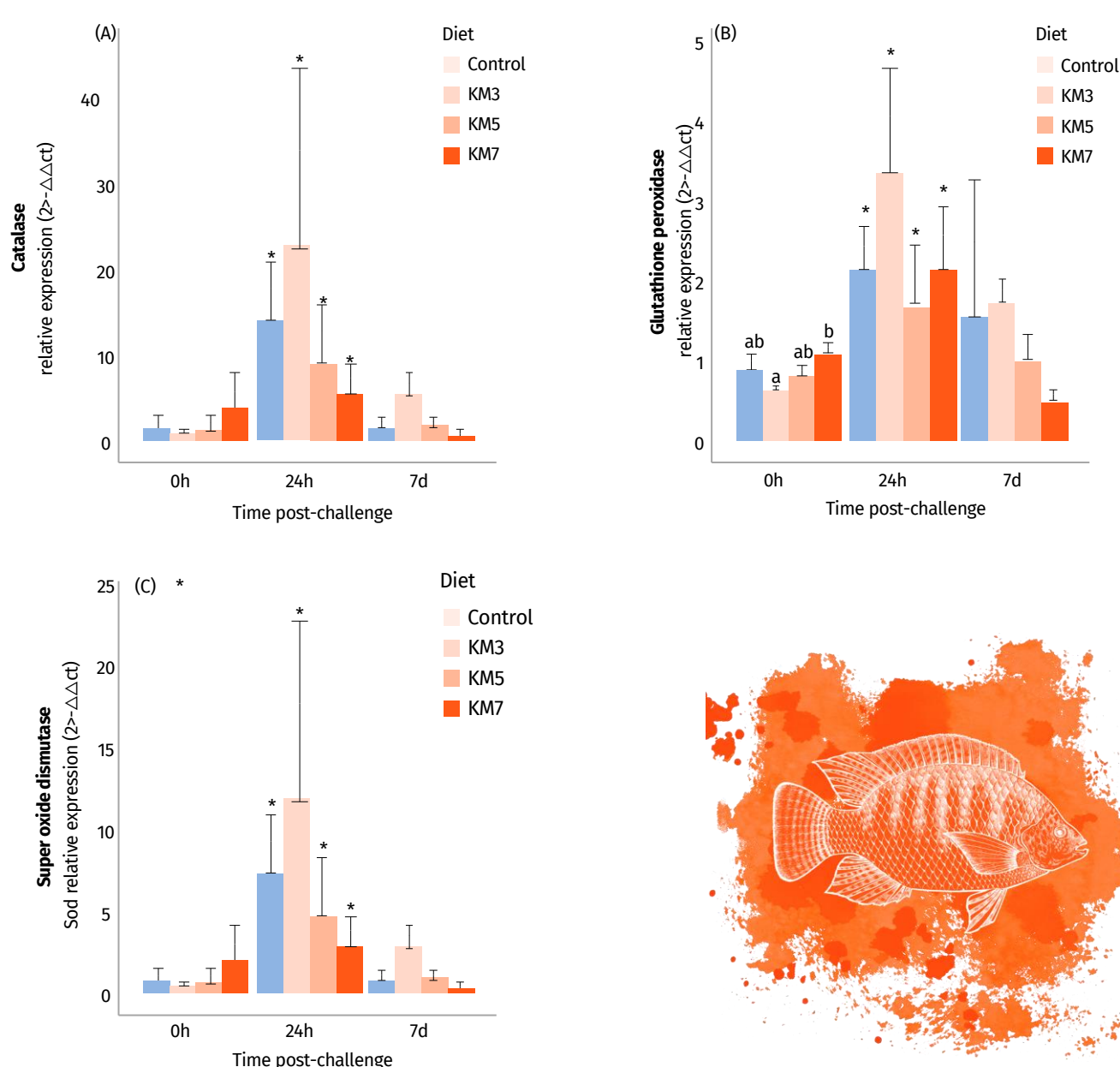


### 3. Better omega 3 index with KM diets

Diet	0h	Time 24h	7 days	Diet	Two-way ANOVA time
Control	18.76 ± 3.40 <sup>1</sup>	22.56 ± 3.76 <sup>2</sup>	19.92 ± 4.591 <sup>a</sup>	p < 0.05	p < 0.05 0h<24h, 7d
KM3	17.88 ± 2.52 <sup>1</sup>	20.46 ± 4.181 <sup>2</sup>	22.14 ± 3.932 <sup>ab</sup>		
KM5	19.15 ± 2.97 <sup>1</sup>	22.31 ± 3.85 <sup>2</sup>	23.85 ± 2.672 <sup>b</sup>		
KM7	19.52 ± 3.48 <sup>1</sup>	23.72 ± 3.26 <sup>2</sup>	23.12 ± 2.562 <sup>ab</sup>		

### 4. Lower expression of antioxidant genes with KM (5% KM and 7%KM) during the stress challenge

Relative expression of antioxidant genes in head kidney, including catalase (A), glutathione peroxidase (B) and super oxide dismutase (C).



## CONCLUSION

KM is an effective functional marine ingredient that **improves growth and feed conversion ratios** (FCR) in Gilthead seabream juveniles. Additionally, it **boosts the omega-3 index** in fish during oxidative stress and serves as a **potent antioxidant modulator** in fish feeds, helping to mitigate stressful events.