Hydroxy-selenomethionine enhances antioxidant capacity and stress resistance compared with other selenium sources in shrimp

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Introduction

Selenium is an essential micronutrient for shrimp, supporting antioxidant defense through key selenoproteins such as glutathione peroxidase (GPx) and thioredoxin reductase (TrxR).

In commercial shrimp production, environmental stressors can increase reactive oxygen species (ROS), leading to oxidative stress, reduced performance and higher sensitivity to disease. The biological effectiveness of selenium depends strongly on the chemical form supplied in the diet. Selisseo, a pure organic selenium source based on hydroxy-selenomethionine (OH-SeMet) is designed to improve selenium bioavailability, tissue deposition and antioxidant protection under challenging farming conditions.



Objective

This study evaluated the effects of hydroxy-selenomethionine, Selisseo (Adisseo), compared with sodium selenite and selenium yeast, on selenium deposition, antioxidant status, growth performance, meat quality and acute nitrite stress resistance in *Penaeus vannamei*.

Material & Methods

Shrimp with an initial body weight of 0.15 g were reared for 127 days under low salinity conditions at 3 ppt. Shrimp were fed diets supplemented with 0.3 mg/kg selenium from three different sources:

Sodium selenite (SS); selenium yeast (Se-Yeast); and hydroxy-selenomethionine (OH-SeMet).

Antioxidant status and growth performance: Tissue selenium deposition, glutathione and total antioxidant capacity were measured at the end of the trial. Growth performance was recorded to assess whether improved antioxidant status was associated with better performance under low salinity conditions.

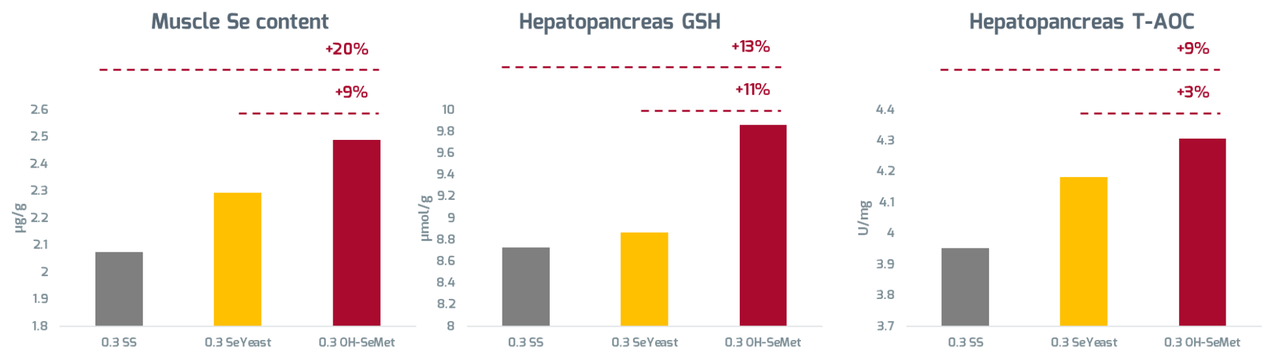
Flesh quality: Fillet yield, texture and cooking loss after frozen storage were evaluated.

Stress resistance: At the end of the trial, an acute nitrite toxicity test was conducted. Shrimp were exposed to a nitrite dose resulting in over 90% mortality within 8 hours.

Results & Discussion

OH-SeMet showed better bioavailability and improved antioxidant status in shrimp

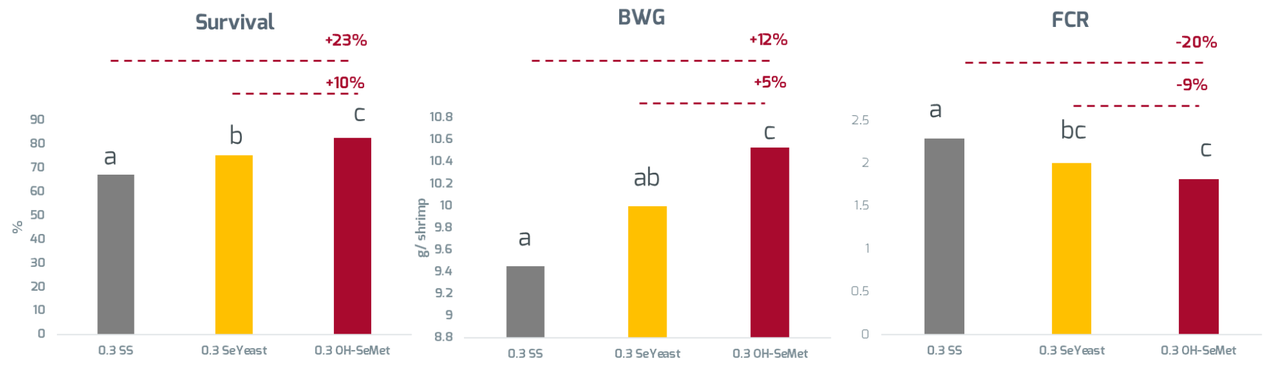
OH-SeMet significantly increased selenium deposition in muscle compared with the other selenium sources. This higher selenium deposition was associated with improved antioxidant defense, as shown by higher glutathione and total antioxidant capacity levels.



The statistical analysis used the Tukey test for sources and the T-test for levels,), and results will be considered significant with P < 0.05 for significant differences and P < 0.10 for trends

Better antioxidant defenses under salinity stress supported better growth

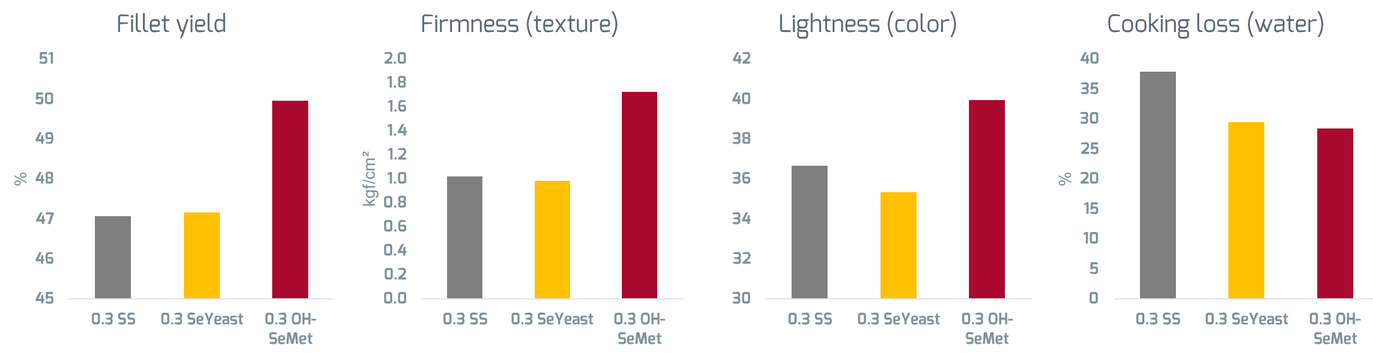
Shrimp fed OH-SeMet showed better growth performance over the 127-day feeding period, including higher survival, greater body weight gain and improved feed efficiency.



The statistical analysis used the Tukey test for sources and the T-test for levels,), and results will be considered significant with P < 0.05 for significant differences and P < 0.10 for trends

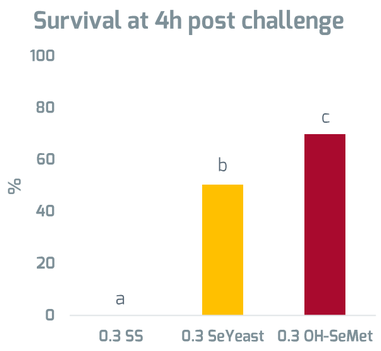
OH-SeMet improved fillet yield and meat quality

Supplementation with OH-SeMet not only improved shrimp fillet yield but also helped preserve meat quality after long-term frozen storage, as shown by firmer texture, lower cooking loss and more stable quality.



OH-SeMet enhanced resistance to acute nitrite stress

Shrimp fed OH-SeMet showed delayed mortality, with 70% survival at 4 h post challenge, compared with 51% for selenium yeast and 0% for sodium selenite.



100 shrimp/ treatment, n=5, The statistical analysis used the Tukey test for sources and the T-test for levels

Conclusion

Selisseo demonstrated higher biological effectiveness than sodium selenite and selenium yeast in juvenile *Penaeus vannamei*. By improving selenium bioavailability and antioxidant capacity, Selisseo supported better survival, growth performance, feed efficiency and flesh quality under low salinity conditions.

The improved antioxidant status also enhanced shrimp resilience under acute nitrite stress, supporting Selisseo as an effective organic selenium source for shrimp performance in challenging farming environments.

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