Alliance
(https://www.aquaculturealliance.org)

Global Aquaculture Advocate M

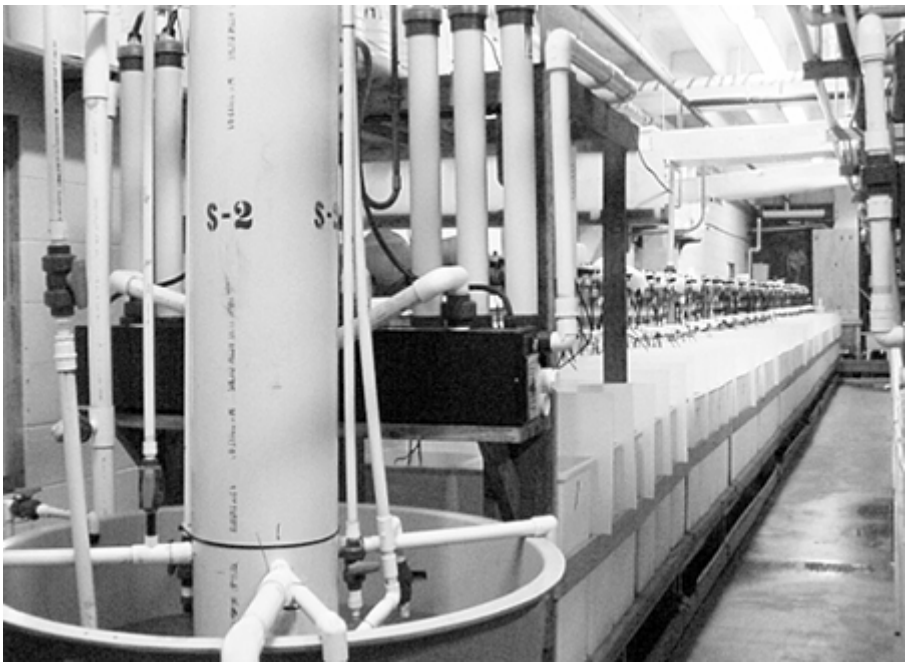
Aquafeeds

Fatty acid nutrition of juvenile Litopenaeus vannamei

Tuesday, 1 October 2002

By Mayra Lizett González-Félix, Ph.D. , Martin Perez-Velazquez, Ph.D. , Addison L. Lawrence, Ph.D. and Delbert M. Gatlin III, Ph.D.

Recirculating-system research conducted at Texas A&M



Among lipids, some omega-3 and omega-6 polyunsaturated fatty acids (PUFA) such as linolenic (18:3 omega-3) and linoleic (18:2 omega-6) acid, as well as highly unsaturated fatty acids (HUFA) such as arachidonic (20:4 omega-6), eicosapentaenoic (20:5omega -3), and docosahexaenoic (22:6 omega-3) acid are considered essential nutrients for penaeid shrimp. In spite of this, knowledge of the dietary requirements for these nutrients in Pacific white shrimp (*Litopenaeus vannamei)*, an economically important penaeid for shrimp farming in the Americas, is limited.

The authors conducted a six-week experiment at the Shrimp Mariculture Project of Texas A&M University in Port Aransas, Texas, USA to test the dietary inclusion of 18:3 omega-3, 18:2 omega-6, 20:4 omega-6,

Nutrition lab at Texas A&M Shrimp Mariculture Project.

20:5 omega-3, and 22:6 omega-3 fatty acids at 0.5 percent of diet. An additional diet contained 0.5 percent of an omega-3 HUFA mix, which included 416 milligrams per gram of 20:522:6 omega-3-3 and 237 milligrams per gram of 22:6 omega-3. A basal diet contained only palmitic (16:0) and stearic (18:0) acid, also used as fillers for a 5 percent total dietary lipid.

L. vannamei juveniles with a mean initial weight of 0.4 grams were stocked at 44.4 animals per square meter into 10, 32-liter replicate tanks per dietary treatment. The indoor aerated recirculating system was kept at a temperature of 30 degrees-C and a salinity of 25 ppt.

Shrimp growth and survival

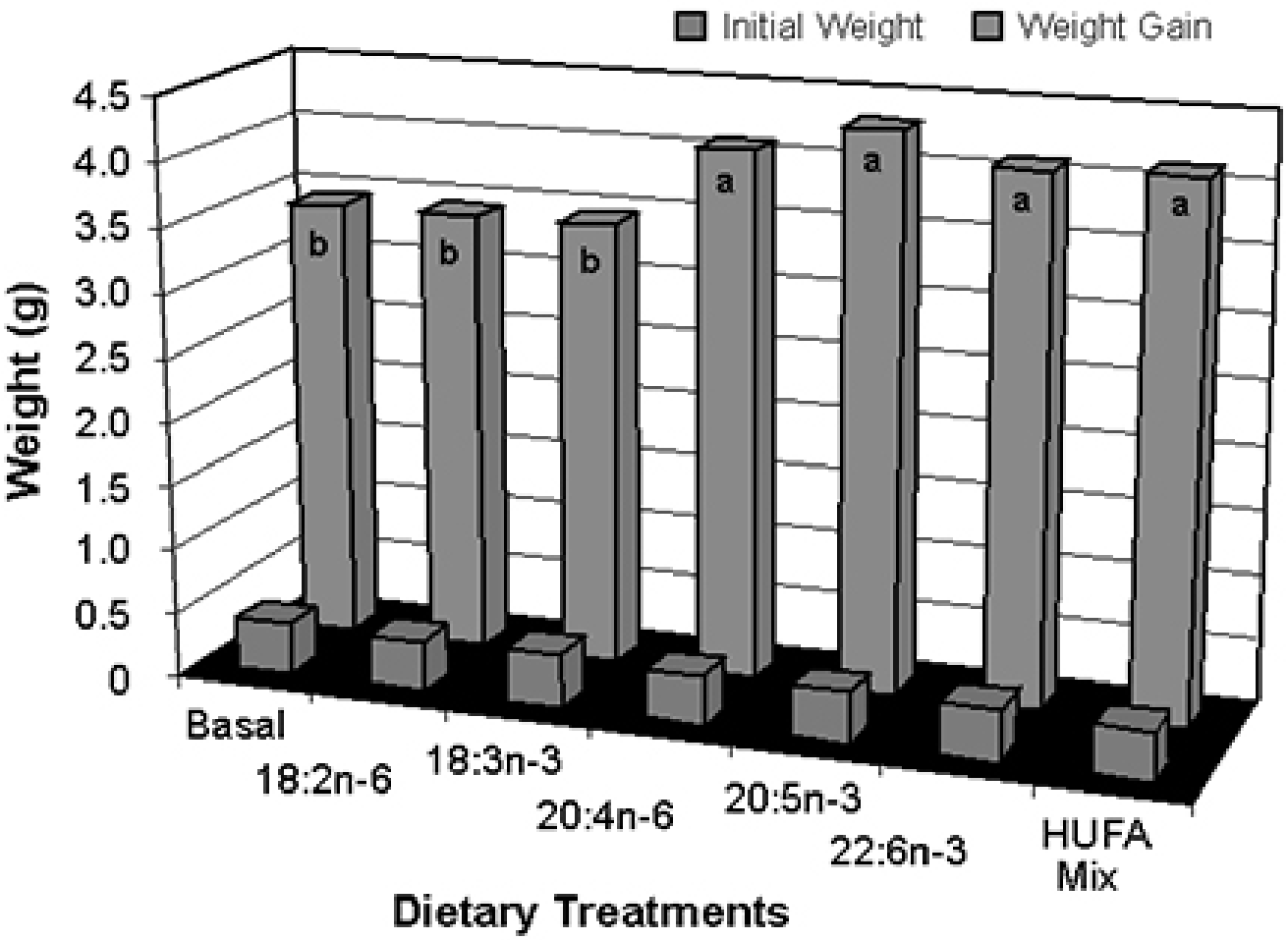


Fig. 1: Initial weight and weight gain of juvenile Litopenaeus vannamei fed different PUFA and HUFA (mean values). Bars with the same superscript are not significantly different.

Differences in weight gain of shrimp were observed at the end of the feeding trial (Fig. 1). HUFA like 20:4 omega-6, 20:5 omega-3, and 22:6 omega-3, as well as the omega-3 HUFA mix, showed higher nutritional value than PUFA like 18:3 omega-3 and 18:2 omega-6 for juvenile *L. vannamei*.

Neither 18:3 omega-3 or 18:2 omega-6 improved shrimp growth significantly when compared to animals fed the basal diet with 16:0 and 18:0 only. Survival of shrimp averaged almost 94 percent and was not significantly affected by the dietary treatments.

Conclusion

As demonstrated for juvenile *L. vannamei* in the study, HUFA generally show higher nutritive value than PUFA. However, no preferential activity as essential fatty acids was observed for the omega-3 over the n-6 family of fatty acids under our experimental conditions, as different reports have indicated.

Results suggested that for *L. vannamei*, the essential fatty acid value may be determined by chain length and degree of unsaturation, with long-chain unsaturated fatty acids having greater nutritional value than shorter-chain fatty acids, regardless of the family to which they belong.

(Editor's Note: This article was originally published in the October 2002 print edition of the Global Aquaculture Advocate*.)*

Authors

MAYRA LIZETT GONZÁLEZ-FÉLIX, PH.D.

Departmento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Rosales y Niños Héroes
A.P. 1819 C.P. 83000
Hermosillo, Sonora, México

mgonzale@correom.uson.mx (mailto:mgonzale@correom.uson.mx)

MARTIN PEREZ-VELAZQUEZ, PH.D.

Departmento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Rosales y Niños Héroes
A.P. 1819 C.P. 83000
Hermosillo, Sonora, México

ADDISON L. LAWRENCE, PH.D.

Texas A&M University
Shrimp Mariculture Project
Port Aransas, Texas, USA

DELBERT M. GATLIN III, PH.D.

Department of Wildlife and Fisheries Sciences
Texas A&M University
College Station, Texas, USA