Nutritional value of sea lettuce (*Ulva rigida*) and application as feed ingredients in Pacific white shrimp (*Litopenaeus vannamei* Boone, 1931) diets

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Abstract

The nutritional value and application as feed ingredients of sea lettuce (*Ulva rigida*) was investigated in Pacific white shrimp (*Litopenaeus vannamei*). Biochemical compositions of *U. rigida* at different harvesting periods was analyzed. There were 2 feeding trials; the first trial investigated growth and survival rate of *L. vannamei*. Shrimp were fed with 6 experimental diets containing *U. rigida* at 0, 6, 9 and 12%, and soybean meal at 17 and 20%, respectively. Thirty shrimps were sampling into each of 24-1x1x1 metres cages and subjected to experimental diets 4 times a day for 12 weeks. The second trial was study the protein digestion efficiency in diet using the same diets as the first trail. Shrimps were reared in 24 of 50x90x40 centimeters aquariums contained 180 liters seawater at 20 shrimps per aquarium for 3 weeks. *U. rigida* at 1-4 weeks contained 10.37-11.60% protein, 2.36-2.78% lipid. Total amino acids and essential amino acids (EAA) were 78-85.25% and 28.97-34.14% of protein, respectively. The highest EAA was Leucine, the second order was Arginine, Threonine, Valine and Phenylalanine. Methionine and Histidine was in limited amount. Major fatty acids were C16:0, C18:0, C18:1n-9, C18:2n-6 and C18:3n-3. The C20:5n-3 (EPA) was 0.57-0.76%, while the C22:6n-3 (DHA) was found only in 3 and 4 weeks *U. rigida* which were 0.61 and 1.21%, respectively. The 8 weeks *U. rigida* contained 11.35-13.59% dry weight, 19.83-22.41% protein, 0.25-0.30% lipid, 42.16-47.28% carbohydrate, 26-34.96% ash, 2.75-3.72% fiber and gross energy of 287.52-322.59 Kcal/100g Results of the first trial showed that growth and survival rate of *L. vannamei* fed with 6 formulated diets were not significance difference (*p*>0.05). The result of the second trial found that protein digestibility efficiency of *L. vannamei* fed with 6 formulated diets were not significance difference (*p*>0.05) which were 84.01-84.32%. The proportion of 6-12% *U. rigida* can be used in *L. vannamei* diet and it value was comparable to 17-20% of soybean meal diets.

Key words Feed ingredients *Ulva rigida* Fishmeal replacement *Litopenaeus vannamei*

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