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# Amino Acid and Fatty Acid of Abalone *Haliotis squamata* Cultured in Different Aquaculture Systems

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**Abstract**

The aim was to analyze the amino acid and fatty acid of abalone *Haliotis squamata* cultured in different aquaculture systems. The percentage of total amino acid of abalone cultured in laboratory, floating cage, and longline system valued 11.02%, 9.53% and 8.24%. respectively. Abalone contained 14 saturated fatty acids and 16 unsaturated fatty acids. The saturated fatty acids of abalone were dominated by palmitenoic acid (C16:0) and steraenoic acid (C18:0). The high percentage of unsaturated fatty acids in abalone were oleat acid (C18:1n9), linolenic acid (C18:3n3), arachidonoic acid (C20:4n6) and eicosapentaenoic acid/EPA (C20:5n3).


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*Keywords*: Abalone *Haliotis squamata*, Amino Acid, Fatty Acid.

## INTRODUCTION

Abalone is a kind of gastropod which has high economic value and being a profitable income source to fishers in Indonesia caused by its high price and simple processing. The others benefit of this commodity are its high nutrition value and the safety of consuming it, because abalone do not consume the red tide planktons which produced PSP toxins [10, 23].

Abalone *Haliotis squamata* has some comparative benefits compared with other spesies of abalone such as *H. asinina*, like: (a) higher price; (b) better in performance; (c) higher demands [11]. The flesh of abalone has high nutrition with composition of protein (71.99%), lipid (3.2%), crude fiber (5.6%), ash (11.11%), and water (0.6%). While the shell has estetic and economic value which have been used as jewelry and trinkets, button made, and other kinds of handicraft [24].

This research was aimed to analyze the amino acid and fatty acid of abalone *Haliotis squamata* cultured in different aquaculture systems.

## MATERIALS AND METHODS

### Materials

The tools used in this research *i.e.*: Kjedahl flask, flask, erlenmeyer, lipid beaker, and Soxhlet tube. While the materials are catalyst ($K_2SO_4$ and $CuSO_4$), concentrated $H_2SO_4$, $H_2O_2$,$H_3BO_3$, indicator solution, $Na_2(SO_4)_3$ (alkali), HCl, chloroform, aquadest, and abalone *Haliotis squamata*.

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**Sampling Method**

Abalone *Haliotis squamata* were cultured in three different type of aquaculture systems, *i.e.*: floating cage system, longline system, and laboratory system. The abalones were fed with some natural foods *i.e.Gracillaria lichenoides, Ulva fasciata,* and combination of both *Gracillaria lichenoides* and *Ulva fasciata.* The abalones were cultured for one year and fed 5 times a day. Then the flesh of abalones were taken to analyze the composition of amino acids and fatty acids. Beside that, the analyzes were also conducted to male and female gonads.

**Analysis Method**

**Protein**

Protein is estimated by Micro Kjedahl Method [1]. As much as 0.75 grams of sample put into Kjedahl flask, then added 6.25 grams of $K_2SO_4$ and 0.6625 grams of $CuSO_4$ as catalyst. 15 ml of concentrated $H_2SO_4$ and 3 ml of $H_2O_2$ pour cautiously into the flask and put in acid chamber for 10 minutes.

The next step is destruction process at a temperature of 410 $^oC$ for 2 hours or acquired the pure solution, then pour 50-75 ml of aquadest after the temperature is normal.

Erlenmeyer contained 25 ml solution, 4% of $H_3BO_3$ with indicator (bromocherosol green 0.1 % and mathyl red 0.1 % (2:1)) as distiller. Kjedahl flask is affixed to the distillation tool, then add 50 ml of $Na_2(SO_4)_3$ (alkali). The distillation is conducted and the distillat is collected into the erlenmeyer until gain 150 ml of distillat volume (the distillat is green). The distillat is titrated excess HCl 0.2 N until the color changed to grey. Natural form, HCl titration, are made liked the sample steps. The sample testing is done in duplo. The protein is estimated by ((A-B) x normality of HCL x 14.007 x 6.2) / W (g) where: A = ml sample of HCl titration, B = ml form of HCl titration

**Lipid**

Lipid beaker dried in oven (105 $^oC$) is scaled up to constant weight (A). 2 grams of sample (C) covered with filter paper (lipid free) then put into soxhlet tube. 150 ml of chloroform is poured into the lipid beaker. The sample is refluxed for 8 hours. If the solvent is pure-looking, it sign that all lipid has been extracted. Then the solvent in lipid beaker is evaporated to separate the solvent and the lipid. Then the lipid beaker is dried in oven at a temperature of 105 $^oC$ for 30 minutes, and scaled up to constant weight (B). The lipid is calculated with (B-A)/C [2].

## RESULTS AND DISCUSSION

**The Proximate of Abalone *Haliotis squamata***

Table 1 shows the proximate analyzes of abalone which cultured in different aquaculture systems. The analyzes show that the protein percentage of abalone and the gonads are 21.66 % for floating cage system, 19.46% for longline system, 28.63% for laboratory system, 33.01% for male gonad, and 13.15% for female gonad. While the lipid percentage are 0.17% for floating cage system, 0.20% for longline system, 0.16% for laboratory system, 2.20% for male gonad, and 4.50% for female gonad. Different type of natural foods show insignificant result to proximate composition, while the aquaculture system seems to be more significant affecting the proximate composition [16].

Overall, it can be assumed that abalone cultured in laboratory system has better percentage and value of proximate and nutrition. It is showed by the higher percentage of protein, lipid, and crude fiber, compared to the abalones cultured in floating cage and longline system. Although it is not too significantly different in lipid percentage. The varies can affect the quality of protein and lipid in abalone, in both the flesh and the gonads.