

PROXIMATE, PROTEIN, AND FAT ANALYSIS OF STRIPED CATFISH (PANGASIANODON HYPOPTHALMUS)

AGUNG ARY WIBOWO^{1*}, TRIWANTI², NATHANIA HOSEA³, NATHAN ADITYA WILLYANTO³

¹Department of Surgery, Digestive Division, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

²Department of Biochemistry, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

³Surgery Resident, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

ABSTRACT

Striped catfish is one of the most popular types of freshwater fish consumed by Indonesians. Striped catfish contains Monounsaturated Fatty Acids (MUFA) and Polyunsaturated Fatty Acids (PUFA). MUFA in striped catfish (Omega-3, Omega-6, and Omega-9 Fatty Acids) plays an important role in fat transport and metabolism, immune system regulation, and maintaining cell membrane function and integrity. **MATERIALS AND METHODS:** This study is a descriptive study to compare and determine the analysis result of proximate, protein, and fat between cultivated and wild striped catfish, and compare the analysis of this study with other studies. **RESULT:** In this study, there was a significant difference in the proximal and fat levels of cultivated and wild striped catfish with $\alpha=0.021$ ($\alpha<0.05$), and there was no significant difference in protein content with $\alpha=0.021$ ($\alpha<0.05$). The results of comparison with other studies showed that the proximate, protein, and fat of striped catfish in this study were higher than in other studies. **CONCLUSION:** Striped catfish has a high protein and fat content, high adaptability, and is easy to cultivate. This study showed that cultivated striped catfish has a better result analysis of proximate, fat, and protein content than wild catfish. Therefore, striped catfish have the potential to be an alternative for nutrition improvement, and the cultivation of striped catfish may reduce the damage to wetland ecosystems.

Keywords: *Pangasianodon hypophthalmus*, proximate levels analysis, protein analysis, fat analysis

INTRODUCTION

Reclamation of tidal lowland in South Sumatra is started since 1969 with the main objective to extent agricultural land area in order to fulfil rice requirement because irrigation land area in Java Island is continuously decreasing due to land use change. Tidal lowland is very potential and strategic to be developed as agricultural land and can be a source for new production growth (commodities) because it has several advantages such as: i). Available at relatively extensive area and stand in relatively extensive overlay scale units; ii) having flat or even topography; iii) access into development area can be reached through land route and waterway which ease distribution line. Therefore, government gave main priority to these conditions of tidal lowland.

One of the developed areas are Central Kalimantan 43,503 ha (Ekon, 2021); South Kalimantan 10,000 ha (Pantau Gambut, 2021); and South Kalimantan is an area with a large wetland area. This wetland area is used as an area of interest for agriculture, smallholder plantations, and swamp fisheries.

According to Global Wetlands Version 3, the total wetlands of South Kalimantan cover 32.39% of the total land area (Astuty, 2017; Gumbrecht *et al.*, 2017). In general, wetland areas have less diversity of fish species than clear waters. The specificity of fish in wetlands is caused by the low content of food ingredients, low pH, low brightness, and very high phenol content. Catfish is one of the fish that has a high potential for cultivation, especially in wetland areas because of its adaptation and high protein-fat content (Haryono, 2012; Hashim *et al.*, 2015). South Sumatra of about 235,000 ha (Sariagri, 2020).

^{*}) *Corresponding author:* Agung Ary Wibowo;
Department of Surgery, Digestive Division, Faculty of
Medicine, Lambung Mangkurat University. E-mail
address: agung.wibowo@ulm.ac.id

METHODOLOGY

This study is a descriptive study to compare proximate, fat, and protein levels between cultivated and wild striped catfish. The striped catfish samples were obtained from Sungai Negara, which came from Mount Meratus, Tabalong Regency, South Kalimantan.

Sample analysis was carried out on river- cultivated and wild freshwater striped catfish. Sample examination was analyzed at Saraswanti Indo Genetech (SIG) Laboratory in Surabaya with registration numbers LP-184-IDN and ISO/IEC 17025: 2017. Sample analysis was done twice in each sample (Duplo). Data Analysis of proximate, protein, and fat content of cultivated and wild striped catfish was tested for homogeneity with the Levene and normality tests with Kolmogorov- Smirnov analysis.

Analysis of proximate and protein content data was carried out using the Independent T-Test parametric test, while the fat content data analysis was carried out using the Mann-Whitney parametric test.

RESULTS AND DISCUSSION

The results of the analysis of proximate levels in this study as shown in table I. The results of the analysis of proximate levels showed that there was a significant difference between cultivated and wild striped catfish in the levels of calories from fat, total fat, and total calories with $\alpha=0.021$ ($\alpha<0.05$).

The statistical comparison results for the levels of ash content, moisture content, carbohydrate (by difference), and protein content of cultivated and wild striped catfish did not have a significant difference.

In table 1, the calorie from fat of pond catfish is 134.82 Kcal/100g and river catfish is 18.77 Kcal/g. The total fat for cultivated striped catfish is 14.98% and for wild striped catfish is 2.09%. This value shows a difference of 7 times where the calorie from fat and total fat in cultivated striped catfish are more than in wild striped catfish.

The total calories in pond catfish are 214.56 Kcal/100gr and the river catfish are 106.03 Kcal/100g. This value shows a difference of 2 times where the total calories in cultivated striped catfish are more than river catfish.

Table 1 Proximate level analysis

Parameter	Unit	Cultivated Striped Catfish	Wild Striped Catfish
Ash Content	%	1.34	0.96
Calorie From Fat	Kcal/100 g	134.82	18.77
Total Fat	%	14.98	2.09
Moisture Content	%	63.75	75.15
Total Calories	Kcal/100 g	214.56	106.03
Carbohydrate (By Difference)	%	1.19	1.96
Protein Content	%	18.75	19.86

The results of the analysis of protein levels in this study can be seen in table 2, where overall it was found that there was no significant difference between cultivated and wild striped catfish with $\alpha=0,873$ ($\alpha<0,05$).

Table 2 Protein analysis

Parameter	Unit	Cultivated Striped Catfish	Wild Striped Catfish
L-Serine	%	4.58	4.74
L-Glutamic Acid	%	12.47	12.23
L-Phenylalanine	%	5.39	6.27
L-Isoleucine	%	5.35	5.16
L-Valine	%	5.45	5.43
L-Alanine	%	4.82	4.7
L-Arginine	%	6.84	7.55
Glycine	%	4.73	5.23
L-Lysine	%	7.93	7.04
L-Aspartic Acid	%	7.61	7.4
L-Leucine	%	8.79	8.54
L-Tyrosine	%	4.28	4.95
L-Proline	%	3.18	3.22
L-Threonine	%	5.46	5.56
L-Histidine	%	2.84	3.19
L-Tryptophan	%	0.59	0.7
L-Cystine	%	5.19	6.15
L-Methionine	%	1.3	1.35

The results of the analysis of fat content in this study as shown in table 3, where overall it was found that there was a significant difference between cultivated and wild striped catfish with $\alpha=0.002$ ($\alpha<0.05$).

Table III shows that Omega 6 Fatty Acids, Omega 9 Fatty Acids, Polyunsaturated Fat, and EPA (Eicosapentaenoic Acid) in cultivated and wild striped catfish have significant differences with $\alpha=0.021$ ($\alpha<0.05$).

The results of statistical comparisons of other amino acids in cultivated and wild striped catfish did not have a significant difference.

Parameter	Unit	Cultivated Striped Catfish	Wild Stripe Cat
C 22:6 W3 (Docosahexanoic Acid)	%	0.12	0.05
C 18:0 (Stearic Acid)	%	1.05	0.21
C 20:3 W3 (Eicosatrienoic Acid / W3)	%	0	0.01
C 22:2 (Docosadinoic Acid)	%	0.03	0.02
C 17:0 (Heptadecanoic Acid)	%	0.04	0.02
C 16:0 (Palmitic Acid)	%	3.84	0.79
Unsaturated Fat	%	9.13	0.99
Omega 9 Fatty Acids	%	5.93	0.59
C 15:0 (Pentadecanoic Acid)	%	0.04	0.02
AA	%	0.1	0.03
C 14:0 (Myristic Acid)	%	0.56	0.05
EPA	%	0	0.01
C 12:0 (Lauric Acid)	%	0.28	0.01
C 20:1 (Eicocyanic Acid)	%	0.15	0.02
Monounsaturated Fat	%	6.21	0.7
C 20:0 (Arachidic Acid)	%	0.04	0
Saturated Fat	%	5.85	1.09
Linolenic Acid	%	1.11	0.04
Linoleic Acid	%	2.3	0.1
Oleic Acid	%	5.93	0.59
C 18:2 W6 (Linoleic Acid / W6)	%	2.3	0.1
C 18:2 W6C (C-Linoleic Acid)	%	2.3	0.1
C 18:1 W9C (C-Oleic Acid)	%	5.93	0.59
C 20:5 W3 (Eicosapentaenoic Acid)	%	0	0.01
C 17:1 (Heptadecanoic Acid)	%	0.12	0.01
C 16:1 (Palmitoleic Acid)	%	0.1	0.08
C 20:4 W6 (Arachidonic Acid)	%	0.1	0.03
C 20:3 W6 (Eicosatrienoic Acid / W6)	%	0.13	0.01
Omega 6 Fatty Acids	%	2.58	0.15
C 14:1 (Miristoleic Acid)	%	0.01	0
C 20:2 (Eicosadienoic Acid)	%	0.14	0.01
DHA	%	0.12	0.05
C 18:3 W6 (Linolenic Acid / W6)	%	0.04	0

The results of the analysis of proximate levels showed that there was a significant difference between cultivated and wild striped catfish in the levels of calories from fat, total fat, and total calories with $\alpha=0.021$ ($\alpha<0.05$). The statistical comparison results for the levels of ash content, moisture content, carbohydrate (by difference), and protein content of cultivated and wild striped catfish did not have a significant difference.

In table I, the calorie from fat of pond catfish is 134.82 Kcal/100g and river catfish is 18.77 Kcal/g. The total fat for cultivated striped catfish is 14.98% and for wild striped catfish is 2.09%. This value shows a difference of 7 times where the calorie from fat and total fat in cultivated striped catfish are more than in wild striped catfish.

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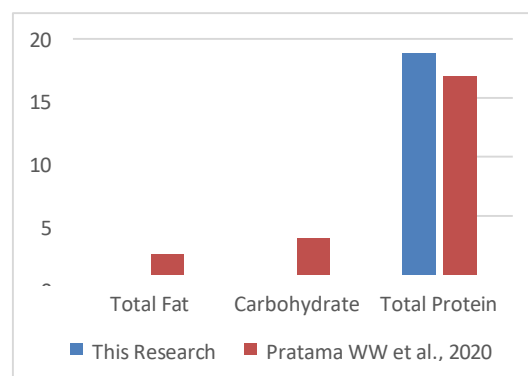


Figure 1 Comparison of proximate levels analysis with the study from Begum et al

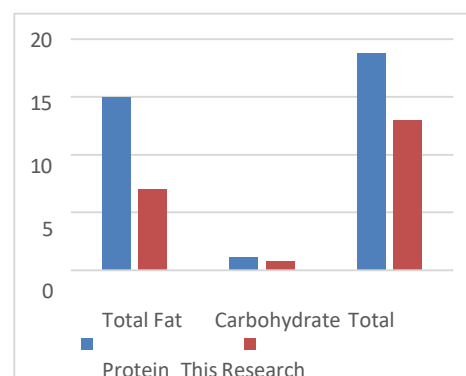


Figure 2 Comparison of proximate levels analysis between striped catfish and snakehead fish

The results of research by Pratama *et al.* (2020) showed that the analysis of proximate levels, protein content, and total fat in snakehead fish was lower than that of cultivated catfish in this study, where the protein content of pond catfish was 1.95% higher than snakehead fish and the total fat of cultivated catfish was 13.28% higher than snakehead fish.

The results of the analysis of protein levels in this study can be seen in table II, where overall it was found that there was no significant difference between cultivated and wild striped catfish with $\alpha=0.873$ ($\alpha<0.05$).

A study from Pratama *et al* (2020) showed the comparison of the protein levels between snakehead fish and cultivated striped catfish, where the protein content level of cultivated striped catfish is higher than snakehead fish as shown in Figure 1.

In a comparative study of protein content analysis between studies conducted Begum *et al* (2019), Pratama *et al* (2018) and Monalisa *et al* (2013) shown that there were significant differences in protein levels in all amino acids found in cultivated striped catfish in this

study.

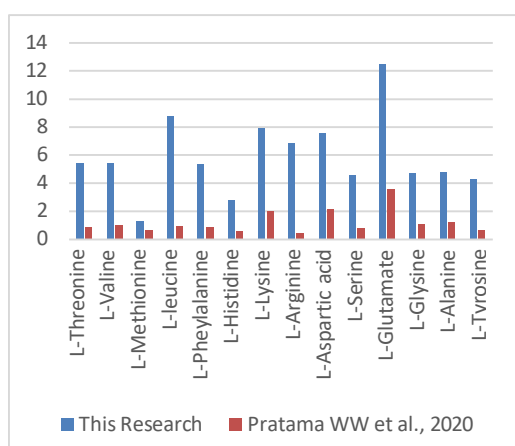


Figure 4 Comparison of protein levels analysis between striped catfish and snakehead fish

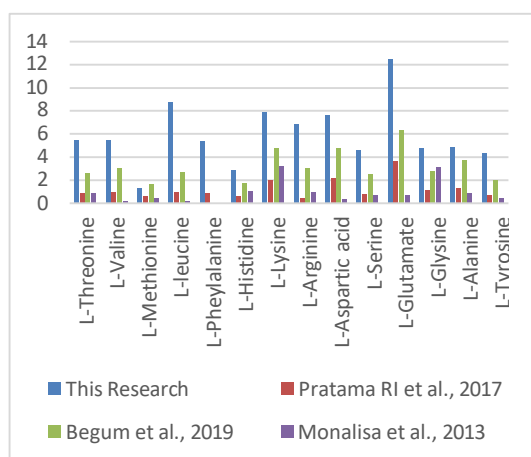


Figure 4 Comparison of protein levels analysis with the study from Begum et al., Monalisa et al., Pratama RI

The results of the analysis of fat content in this study as shown in table 3, where overall it was found that there was a significant difference between cultivated and wild striped catfish with $\alpha=0.002$ ($\alpha<0.05$).

Table III shows that Omega 6 Fatty Acids, Omega 9 Fatty Acids, Polyunsaturated Fat, and EPA (Eicosapentaenoic Acid) in cultivated and wild striped catfish have significant differences with $\alpha=0.021$ ($\alpha<0.05$). The results of statistical comparisons of other amino acids in cultivated and wild striped catfish did not have a significant difference.

Striped catfish have many advantages in terms of adaptation to the extreme environment. This causes striped catfish to survive and reproduce rapidly in various environments.(Dewita *et al*, 2011) In addition,

striped catfish contain Monounsaturated Fatty Acids (MUFA) and Polyunsaturated Fatty Acids (PUFA). MUFAs in catfish (Omega-9, omega-3, and omega-6) play an important role in fat transport, metabolism, immune function, and maintaining cell membrane function and integrity. Omega-3 Fatty Acids can prevent coronary heart disease and arthritis.(Dewita *et al*, 2011; Lestari *et al*, 2020)1,2 Catfish also has some drawbacks, namely the pH of the fish's body which is close to neutral pH, causing fish meat to rot quickly.(Dewita *et al*, 2011; Hashim *et al.*, 2015).

CONCLUSION

The results of the comparison of proximate levels of statistical analysis showed that there was a significant difference between pond catfish and river catfish in the levels of calories from fat, total fat, and total calories with $=0.021$ ($\alpha<0.05$). In statistical analysis of protein content, there was no significant difference between pond catfish and river catfish with $=0.873$ ($\alpha<0.05$). The results of the fat content analysis showed that Omega 6 Fatty Acids, Omega 9 Fatty Acids, Polyunsaturated Fat, and EPA (Eicosapentaenoic Acid) in pond catfish and river catfish had significant differences with $=0.021$ ($\alpha<0.05$).

The results of the analysis in this study indicate that striped catfish in South Kalimantan have a high composition of amino acids and proximate analysis when compared to snakehead fish and striped catfish in other areas.

This study showed that cultivated striped catfish has a better result analysis of proximate, fat, and protein content than wild catfish. Therefore,

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