COMMENT FROM AUTHOR

Paper Code: 12-G-O-FP-YH Sipahutar-Chemical Composition Of Whiteleg Shrimp

No	Comment
1.	The purpose and methods in the abstract have been added
2.	The purpose of study and the background of the study in the introduction have been added
3.	Study sites, research duration, tool for research, explaination about traditional and intensive ponds have been added
4.	The discussion have been added more discussion and explanation
5.	Conclusion have been added with discuss that related on this study

ISENREM-2019 Full Paper Review Template

Paper Number	12-G-O-FP
Paper Title	Chemical Composition Of Whiteleg Shrimp (*Litopenaeus Vannamei*) Cultivated From Intensive Farming And Traditional Farming At Bulukumba Regency, South Sulawesi

1. General Comment:

   a. The manuscript is full of grammatical mistakes. It is better to revise the manuscript by people whose native language is English (proofreading) and the authors are also recommended to check your grammar English with **Grammarly application**. Grammarly can be downloaded free at grammerly.com

2. Specific comment:

Section	Comment
Abstract	Abstract does not describe the introduction/background of the study. Please add the background of the study in beginning part (before the objective of the study)!
Introduction	1. Please write clearly the purpose of this study! Did this research aim to find out the differences in chemical composition of whiteleg shrimp in the two different type of ponds? or was it to analyse the effect of differences in storage duration with chemical composition of whiteleg shrimp? 2. The background of the study is still lacking in connection with the study objectives. Please explain what is the relationship between level of customer preference and the objective of this study? and please add more supporting information that related to the objective of the study. 3. Please see all comments in the manuscript (track changes and comment options).
Method	Research method is still lacking of information, such as 1. Study sites 2. Study/research duration 3. Number of samples used in this study 4. Tools that used for parameters measurement 5. Turkey Method. This method was mention in the abstract but not available in Research Methodology Section. 6. Explanation about the intensive ponds and traditional pond? what is the differences between the two ponds? Please see all comments in the manuscript (track changes and comment options).
Result and discussion	1. The manuscript is poor of discussion. Please add more discussion by comparing your study with other studies. 2. Please see all comments in the manuscript directly (track changes and comment options).

Conclusion	1. The conclusion did not answer the objective of the research. Please adjust the conclusion with the objective of the study! 2. Please state how the result of the study can be implemented or useful for people? 3. Recommendation based on the study results can also be state in the conclusion. 4. Please see all comments in the manuscript directly (track changes and comment options).
References	1. Reference format did not follow the IOPs EES format. Please change all the references. Please change all references by following the IOPs EES references format/template! 2. The References are numbered sequentially throughout the text. Please rearrange the sequence of your reference!

Recommendation (√)	
Accept submission	
Revision required (manuscript no need to be send back to reviewer)	
Re-submit for review (manuscript will be reviewed again)	√
Decline submission	
Date: 28 September 2019 Reviewer name :	

Chemical composition of whiteleg shrimp (*Litopenaeus vannamei)* cultivated from intensive farming and traditional farming at Bulukumba Regency, South Sulawesi.

Yuliati H Sipahutar[1], Husnul K Ramli[1], Maria G E Kristiani[1], DH Guntur Prabowo[1], Muhammad R Suryanto[1], Riza B Pratama[1]
[1]Sekolah Tinggi Perikanan, AUP Road, Pasar Minggu, South Jakarta, Jakarta, Indonesia

E-mail: yuliati.sipahutar@gmail.com/husnulkhatimahr@yahoo.com

Abstract. This research aims to study the chemical composition of whiteleg shrimp (*Penaeus vannamei*) from intensive farming and traditional farming. The study on intensive farming was done at Mariorennu Village, Gantarang Subdistrict, while the study on traditional farming wass done at Manjalling Village, Ujung Loe Subdistrict, Bulukumba Regency, South Sulawesi, the Province of South Sulawesi and the Research and Development Center of Fishery Products of Makassar. The research employs randomized complete block design with a storage treatment of 0, 2, 4, 6, and 8 days. Data analysis was done using ANOVA and further tested using the Tukey method. The parameters studied is water content, ash content, lipid content, protein content, total volatile base (TVB), trimethylamine (TMA), pH, free fatty acids (FFA). The results for both intensive and traditional farming of whiteleg shrimp showed that storage time has a significant effect towards the following parameters; TVB, pH, FFA, water content, protein content; while showing no effect towards the following parameters; TMA, ash content, and fat content.

Keywords: chemical composition, whiteleg shrimp, intensive farming, traditional farming

1. Introduction

Bulukumba is a fairly rich area in terms of aquaculture, where the area of ponds reaches 3,576 ha with a potential of 4,000 ha, aquaculture of 6,030 ha with a potential development of 9,000 ha, freshwater cultivation 124,4 ha with a potential of 1,020 ha. The production of whiteleg shrimp in Bulukumba Regency in 2015 was 2241.4 tons and in 2016 there were 2591.8 tons [4].

The process of decreasing the quality of shrimp is caused by factors derived from the shrimp material itself and environmental factors. This decline in quality occurs autolysis, bacteriology, and oxidation [11]. Shrimp handling can be carried out based on the origin of production, among others, from catches in the sea, public waters or harvested fishponds. Regardless of its origin, shrimp handling must be carried out quickly, carefully, carefully, and through a cold chain system while maintaining a temperature of around 0ºC. Handling like this is done because the characteristics of shrimp products are very easily damaged. The destructive nature of shrimp raw materials is related to the high water content (80%) and free amino acid content which is a condition and a very good medium for bacterial growth [3]. In principle, the handling of shrimp in the pond is the same as handling shrimp in the sea, namely carrying out handling so that it is always in the cold chain. Therefore, harvesting shrimp in ponds is usually done at night so that the caught shrimp is not directly exposed to sunlight [11].

[1] To whom any correspondence should be addressed (yuliati.sipahutar@gmail.com)

Deleted: C
Deleted: O
Deleted: W
Deleted: S
Deleted: *V*
Deleted: C
Deleted: F
Deleted: I
Deleted: F
Deleted: A
Deleted: T
Deleted: F
Deleted: A
Deleted:
Deleted:
Commented [R11]: Please use only one corresponding author!
Deleted: yuliati.sipahutar@gmail.com
Deleted: ¶
Deleted: husnulkhatimahr@yahoo.com
Formatted: Font color: Hyperlink
Formatted: Default Paragraph Font, Font: (Default) Times, English (United States)
Commented [R12]: The study objective is not relevant with the conclusion of the study.
Deleted:
Deleted: i
Deleted:
Deleted: i
Deleted:
Deleted: i
Deleted: nova
Commented [R13]: Please explain this method in Researc...
Deleted:
Commented [R14]: The abstract did not contain the ...
Deleted:
Commented [R15]: References are numbered sequentiall...
Formatted: Indent: First line: 0,75 cm
Commented [R16]: References are numbered sequentiall...
Commented [R17]: Please delete one of them!
Formatted: Superscript

The study of the quality / quality & level of consumer preference for whiteleg shrimp needs to be done so that it can be used as a reference for the community both producers and consumers in conducting cultivation, processing, and consumption. This study aims to determine the chemical quality of whiteleg shrimp from intensive ponds and traditional ponds.

2. Research Methodology

Whiteleg shrimp samples were taken from intensive ponds and traditional ponds. The sample was put in a fiberglass bath and ice was added with a ratio of ice and shrimp 2: 1. The base was coated with ice first, then arranged with shrimp that has been put in plastic on top and covered with ice. Samples were tested and stored within 0 days, 2 days, 4 days, 6 days and 8 days to be observed. The research method was Randomized Block Design (RBD) with the treatment of 0 days, 2 days, 4 days, 6 days and 8 days. Analysis of the test data was carried out with ANOVA, and if it was significantly different, it was continued with an Honest Real Difference Test (BNJ). Test parameters were moisture content, ash content, fat protein, TVB, TMA, pH test, FFA test.

3. Result and discussion

3.1. Water Level

Water is an important component in food ingredients because water can affect appearance, texture, and taste. The low water content in food ingredients will inhibit the growth of microorganisms thus extending the shelf life of these foods [5]. This water content test was carried out to determine the water content in intensive pond shrimp and traditional pond shrimp from the storage of 0, 2, 4, 6, and 8 days.

Table 1. Results of intensive and traditional pond shrimp moisture test results

Day Storage	Intensive	Traditional
Day 0	76.005 ± 1.85^{a}	75.44 ± 0.85^{a}
Day 2	76.8375 ± 1.49^{ab}	75.9475 ± 0.79^{ab}
Day 4	78.6125 ± 0.19^{bc}	77.5725 ± 0.77^{b}
Day 6	80.4275 ± 0.53^{cd}	79.3125 ± 0.5^{c}
Day 8	82.4175 ± 0.9^{dA}	81.6525 ± 0.91^{d}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

ANOVA analysis shows significant effect. The results of further tests on intensive shrimp farms showed that storage time had a very significant effect on water content. Day 0 storage has a significant effect on day 2 storage where the notation is in the table 1% and 5%. Storage of day 0 has a significant effect on the storage of 4th, 6th, 8th days. The second day storage has a significant effect on the 4th day storage where the notation is in table 1% and 5%. 2nd day storage is very significant for the storage of the 6th and 8th day. The 4th day storage has a significant effect on the 6th day storage where the notation is in table 1% and 5% but it has a significant effect on the storage of the 8th day. 6th day storage has a significant effect on 8th day storage.

The results of further tests showed that in traditional pond shrimp that there was a very significant effect on the length of storage time on the moisture content. Day 0 storage has a significant effect on day 2 storage where the notation is in the table 1% and 5%. Storage of day 0 has a significant effect on the storage of 4th, 6th, 8th days. Day 2 storage has a significant effect on the storage of the 4th day and has a significant effect on the storage of the 6th and 8th days. 4th day storage has a significant effect on the storage of the 6th, 8th day. 6th day storage is very significant for the 8th day storage.

Water content in intensive pond shrimp and traditional ponds on the 0th day observations were 76,005 and 75.44% respectively, so it can be said that the shrimp water content still meets the standards of 71.5 - 79.6%. However, after undergoing a storage process of up to eight (8) days, the shrimp water content of two different types of ponds is increasing. This is likely to occur due to the binding process / absorption of free water by the shrimp body to the surrounding environment. Fishery products generally have very high water content. The high water content in food will make it easier for microorganisms to

Commented [R18]: What do you mean by this?

Deleted: …eg shrimp needs to be done so that it can be used as a reference for the community both producers and consumers in conducting cultivation, processing, and consumption. This study aims to determine the chemical quality of white …

Commented [R19]:

Commented [R110]: 1. Please write clearly the purpose of this study! Did this research aim to find out the differences in chemical composition of …

Commented [R111]: 1. Where is the location of the two …

Commented [R112]:

Deleted:

Deleted: i… put in a fiberglass bath and ice wai… added …

Commented [R113]: How long has this research been …

Commented [R114]: Please write the ANOVA stand for!

Commented [R115]: Please explain what tools you have …

Commented [R116]: Moisture content? Or water content?

Deleted: a

Commented [R117]: Please write the TVB, TMA, and FFA …

Deleted: D

Commented [R118]: Do you mean level of water content?

Deleted: ,

Commented [R119]: Please refer this table in the main text!

Deleted: d

Deleted: f

Commented [R120]: Please check again!

Deleted:

Deleted: nova…analysis shows significant effect. The resu…

Formatted: Superscript

Deleted:

Formatted …

Deleted: …ays …

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted: …ay storage where the notation is in the …

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

grow, so that it can cause changes in food ingredients. The low water content in food ingredients will inhibit the growth of microorganisms thus extending the shelf life of these foods [7].

The results of analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on water content in shrimp where the interaction occurred at a value of $p < 0.05$. The value of traditional pond shrimp water content was lower than intensive pond shrimp, so it can be said that the level of freshness of traditional pond shrimp is superior to intensive pond shrimp, and the traditional pond shrimp decay process is slower than intensive pond shrimp.

3.2. Dust Level

Food ingredients contain more than 95% organic matter and water. The rest consists of mineral elements which are also known as inorganic substances. Organic materials burn during the combustion process, but the organic matter is not because that is called ash [5]

Table 2. Results of intensive pond shrimp ash content

Day Storage	Intensif	Traditional
Day 0	2.4375 ± 0.21[a]	2.42 ± 0.23[a]
Day 2	2.4975 ± 0.366[a]	2.435 ± 0.27[a]
Day 4	2.7275 ± 0.05[a]	2.4875 ± 0.38[a]
Day 6	2.54 ± 0.21[a]	2.5725 ± 0.27[a]
Day 8	2.2925 ± 0.18[a]	2.1525 ± 0.16[a]

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

Ash content in intensive and traditional pond shrimp differed with the length of storage time. Intensive shrimp shrimp ash content ranged from 2.29 - 2.72 while the ash content of traditional pond shrimp ranged from 2.15 - 2.48. The ash content in intensive pond shrimp and traditional ponds can still be received both from day 0 storage and 8th day storage. This is because the ash content in shrimp does not meet the specified threshold or standard.

3.3 Protein Level

Protein is an important food substance for the body because this substance besides functioning as a fuel in the body also functions as a builder and regulator substance. Protein is a source of amino acids that contain elements of nitrogen (N), carbon (C), hydrogen (H), and oxygen (O) which is not owned by fat or carbohydrates [1]. This protein level test was carried out to determine protein levels and decrease protein levels in intensive pond shrimp and traditional pond shrimp on storage of 0, 2, 4, 6, and 8 days.

Table 3. Results of intensive shrimp pond protein test results

Day Storage	Intensif	Traditional
Day 0	18.6675 ± 1.35[a]	19.3025 ± 0.78[a]
Day 2	17.7925 ± 1.2[ab]	18.81 ± 0.98[ab]
Day 4	15.935 ± 0.18[bc]	17.27 ± 1.06[bc]
Day 6	14.4175 ± 0.57[cd]	15.5075 ± 0.33[c]
Day 8	12.6625 ± 0.85[d]	13.5575 ± 0.82[d]

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

The ANOVA results showed a real difference. The results of further tests on intensive pond shrimp showed that the storage time significantly affected the protein content. Day 0 storage has a significant effect on day 2 storage where the notation is in the table 1% and 5%. Storage of day 0 has a significant effect on the storage of 4th, 6th, 8th days. The second day storage has a significant effect on the 4th day storage where the notation is in the table 1% and 5%, and has a very significant effect on the storage of

Formatted: Indent: First line: 0,75 cm

Deleted: i

Commented [R121]: Please discuss in this manuscript the reason why traditional pond has the higher level of freshness?

Commented [R122]: Please refer this table in the main text!

Deleted:

Formatted: Indent: First line: 0,75 cm

Commented [R123]: Please check again!

Formatted: Superscript

Deleted:

Deleted: ,

Commented [R124]: Please refer this table in the main text!

Deleted:

Deleted: nova

the 6th and 8th days. The 4th day storage has a significant effect on the storage of the 6th day and has a significant effect on the storage of the 8th day. 6th day storage has a significant effect on 8th day storage.

The results of further testing of traditional pond shrimp showed a very significant effect on storage time on protein content. Day 0 storage has a significant effect on the second haari storage and has a significant effect on the storage of the 4th, 6th, 8th day. The second day storage has a significant effect on the 4th day storage where the notation is in the table of 1% and 5% but it has a significant effect on the 6th and 8th haari storage. The 4th day storage has a significant effect on the storage of the 6th day and has a significant effect on the storage of the 8th day. 6th day storage was very significant for the 8th day storage.

The test results showed that the protein content of traditional pond shrimp was higher than that of the intensive shrimp shrimp protein. Things that make different protein levels / levels are the feed and life cycle and habitat of the shrimp. According to [6] The diversity of chemical composition can be caused by food factors, species, sex, and the age of the commodity. Intensive shrimp protein and traditional pond shrimp protein content is less at 8th day storage. This is due to the protein denaturation process in the shrimp body. According to [9] various cooking conditions above 60ºC can cause a decrease in fish and shrimp protein along with a reduced content of dissolved water.

The results of analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on protein levels in shrimp where the interaction occurred at $p < 0.05$. The value of traditional shrimp shrimp protein levels is higher than intensive pond shrimp, so it can be said that traditional pond shrimp are superior to intensive pond shrimp.

3.4 Fat Level

Fat can be defined as materials that can dissolve in ether, chloroform or benzene, but cannot dissolve in water. Fat is a trihidik glycerol bond with fatty acids that are monobasic [9].

Table 4. Results of intensive shrimp pond fat test results

Day Storage	Intensif	Traditional
Day 0	1.6325 ± 0.33^a	1.575 ± 0.18^a
Day 2	1.58 ± 0.29^a	1.56 ± 0.16^a
Day 4	1.475 ± 0.13^a	1.4075 ± 0.16^a
Day 6	1.38 ± 0.21^a	1.395 ± 0.14^a
Day 8	1.375 ± 0.2^a	1.4025 ± 0.19^a

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

ANOVA test results showed that the storage time did not significantly affect the intensive fat content of shrimp, and the fat content of traditional shrimp. Fat content test results get various values. Intensive shrimp fat content ranged from 1.38 - 1.63 while the fat content of traditional pond shrimp ranged from 1.39 - 1.57. According to [16] based on the fat content of shrimp included in shrimp with medium fat content of 2-5% as well as carp, lemuru fish, salmon and also types of shellfish. The results of the analysis of intensive pond fat and traditional pond shrimp showed that the shrimp was still acceptable because the fat content in the shrimp body was still within normal limits. Factors that influence the diversity of fat composition include species, fishing season, geographical location, level of gonadal maturity and size of the shrimp [6].

The results of analysis of fat content in intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on fat content in shrimp where the interaction occurred at a value of $p < 0.05$. The value of fat content of traditional pond shrimp does not differ greatly from intensive pond shrimp fat, so it can be said that the level of fat content of traditional pond shrimp is almost the same as intensive pond shrimp.

3.5 TVB Test

Commented [R125]: Please check again this word!

Deleted:

Formatted: Superscript

Deleted: s

Deleted:

Formatted: Superscript

Deleted:

Commented [R126]: Do you mean “day”?

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Deleted:

Deleted: i

Formatted: Superscript

Formatted: Superscript

Deleted:

Commented [R127]: What do mean by shrimp shrimp?

Commented [R128]: Please check again this word? what do you mean by level/levels?

Commented [R129]: If feed, life cycle and habitat are the reason for the difference in protein levels, then please explain (1) the difference in feed provided at intensive ponds with traditional ponds, (2) the difference in life cycle at intensive ponds with traditional ponds, and (3) the difference of intensive ponds and traditional pond where the sample were obtained.

Formatted: Indent: First line: 0,75 cm

Commented [R130]: What do you mean by shrimp shrimp protein ?

Commented [R131]: Do you mean triadic?

Commented [R132]: Please refer this table in the main text!

Deleted:

The condition and number of TVB levels depend on the quality and freshness of the fish. The lower the freshness of the fish, the higher the TVB content of the fish. The purpose of this test is to determine the level of freshness of intensive pond vannamei shrimp and traditional ponds from a total base that evaporates. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of TVB in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05).

Table 5. Test results of TVB on intensive and traditional shrimp farms

Day Storage	Intensif	Tradisioal
Day 0	12.0325 ± 0.44^{a}	9.9875 ± 0.44^{a}
Day 2	19.7 ± 1.71^{b}	12.8425 ± 1.71^{b}
Day 4	24.9225 ± 1.08^{c}	15.1750 ± 1.08^{c}
Day 6	25.6725 ± 0.84^{c}	20.4175 ± 0.84^{d}
Day 8	32.87 ± 1.19^{d}	24.7525 ± 1.19^{e}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

Commented [R133]: Please refer this table in the main text!

Deleted:

ANOVA results show significant differences. The results of the TVB test on intensive pond shrimp showed a very significant effect on the length of storage time. Observation of day-0 storage is very significant for the storage of 2nd, 4th, 6th, and 8th days. Day 2 storage has a significant effect on the storage of 4th, 6th and 8th days. 4th day storage has no significant effect on the 6th day of storage where the notation on the 4th and 6th day storage shows the same notation. Storage observations on the 6th day have a significant effect on 8th day storage.

The results of further testing of the TVB content in traditional pond shrimp showed a very significant effect where on day 0 storage it was very significant for the storage of 2nd, 4th, 6th, and 8th days. 2nd day storage observation is very significant for the 4th, 6th, and 8th day observations. 4th day storage has a very significant effect on the storage of the 6th and 8th days. 6th day storage is very significant for the 8th day storage.

The table above, it can be seen that white leg shrimp from traditional ponds on day 0 observations contain 9.9 mgN TVB where the number does not exceed the standard of very fresh shrimp group which is <10 mgN / 100 g. For intensive pond white leg shrimp, at the observation of day 0 the shrimp were still grouped in fresh shrimp that were in accordance with the standard, namely $10 \leq$ TVB ≤ 20 mgN / 100 g. At the second day storage, intensive pond shrimp can still be said to be fresh with a TVB value of 19.7 mgN / 100gr and traditional pond shrimp on the 2nd and 4th day storage also classified as fresh shrimp. On observations on days 4 and 6, intensive pond shrimp were said to be suitable for consumption shrimp with a TVB value of 24.9 - 25.6 mgN / 100gr where the standard of consumption of shrimp TVB is $20 \leq$ TVB ≤ 30 mgN / 100 g, as well as traditional shrimp shrimp at storage of 6th and 8th days with each TVB value of 20.4 and 24.7 mgN / 100gr. So, it can be concluded that traditional pond shrimp can be consumed until the 8th day of storage and intensive pond shrimp are not suitable for consumption on the 8th day.

The results of the analysis can be concluded that the longer the shrimp storage process, the higher the level / content of the shrimp TVB. According to [15], this TVB value will increase with increasing storage time due to degradation of enzymes in the shrimp body to produce simple compounds which are constituent components of volatile bases. According to [8], an increase in TVB values during storage due to degradation of proteins and derivatives produces a number of volatile bases such as ammonia, histamine, H2S, and foul-smelling trimethyl amine. The TVB value obtained from the results of the study showed that the shrimp at the beginning of storage were still in a very fresh state.

The results of analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on TVB levels in shrimp where the interaction occurred at a value of p <0.05. Traditional TVB shrimp pond value is lower than intensive pond shrimp, so it can be said that the traditional shrimp pond freshness level is superior to intensive pond shrimp.

3.6. TMA Test

Trimethyl amin nitrogen is one method of bacteriological freshness testing or a method of measuring the results of bacterial action derived from trimethyl aminoxide. TMAO content is different in different species, different waters, and in season differences in one year, body size and age of shrimp [16]. This TMA test was conducted to determine the level of freshness and rate of increase in TMA content in intensive pond shrimp and traditional pond shrimp. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of TMA in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05).

Table 6. BNJ TMA for intensive and Traditional shrimp farms

Day Storage	Intensif	Traditional
Day 0	1.375 ± 0.17^{a}	1.4 ± 0.18^{a}
Day 2	1.55 ± 0.12^{ab}	1.75 ± 0.28^{a}
Day 4	$2.15b \pm 0.28^{c}$	2.025 ± 0.37^{a}
Day 6	2.725 ± 0.28^{cd}	2.425 ± 0.41^{a}
Day 8	3.125 ± 0.26^{d}	2.825 ± 0.25^{a}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

The results of further tests showed that the storage time was very significant for the intensive content of shrimp shrimp TMA. Day 0 storage has a significant effect on the 2nd day storage where the number notation shows in the table 1% and 5%. Day 2 storage has a significant effect on 4th day storage. The 4th day storage has a significant effect on the 6th day storage where the number notation shows in tables 1% and 5%. 6th day storage is very significant for the 8th day storage.

The results of further tests showed that the length of storage did not significantly affect the TMA content in traditional pond shrimp. The longer storage time, the higher the content of TMA in shrimp. From the average results of TMA test of intensive pond white leg shrimp as well as traditional ponds starting from the storage of day 0 to day 8 it is still feasible to consume. The TMA value in intensive pond shrimp ranged from 1,375 - 3,125 mg while the TMA value for traditional pond shrimp ranged between 1.4 - 2,825 mg. According to the TMA levels in suitable products for consumption do not exceed 10 mg / 100 g. [13] stated that the value of TMA-N in black shrimp packaged either vacuum or non-vacuum and stored in cold storage showed that at the beginning of storage the N-TMA value was 0.34 mg / 100g and increased to 3.26 mg / 100g for non-vacuum packaging and 2.44 mg / 100g in vacuum packaging after 8 days of cold storage. Furthermore, the increase was recorded to be 5.59 mg / 100g for non-vacuum packaging and 3.66 mg% in vacuum packaging after 17 days of storage in cold storage.

The results of TMA analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed an effect that was not significantly different from TMA levels in shrimp where the interaction occurred at p <0.05. Traditional pond shrimp TMA values are lower than intensive pond shrimp, so it can be said that the traditional shrimp pond freshness level is superior to intensive pond shrimp, and the traditional shrimp pond decay process is slower than intensive pond shrimp.

3.7. pH Test

Determination of pH value is one indicator of the measurement of freshness of fish or shrimp. The pH value of fish meat while still alive generally has a neutral pH and after death pH becomes decreased [16]. The ANOVA test results showed that the length of time of observation day had a significant effect on the pH growth rate in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05).

Table 7. BNJ of intensive and traditional pond shrimp pH

Day Storage	Intensive	Traditional
Day 0	6.625 ± 0.47^{a}	6.375 ± 0.25^{a}

Commented [R134]: Please refer this table in the main text!

Deleted:

Commented [R135]: What do you mean?

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Indent: First line: 0,75 cm

Commented [R136]: Please discuss more about this!

Commented [R137]: Please refer this table in the main text!

Deleted: f

Day 2	7.75 ± 0.64[a]	6.875 ± 0.25[a]
Day 4	9.5 ± 0.7[b]	8 ± 0.4[b]
Day 6	9.75 ± 0.28[b]	8.5 ± 0.57[bc]
Day 8	10.5 ± 0.4[b]	8.875 ± 0.25[c]

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

The results of further tests indicate that the length of storage time has a very significant effect on the pH content in intensive pond shrimp. Observation of day-0 storage did not significantly affect the storage of the 2nd day but it had a significant effect on the storage of 4th, 6th, 8th day. Day 2 storage has a significant effect on the storage of 4th, 6th, 8th days. The 4th day storage did not significantly affect the 6th day storage, as well as the 6th day storage did not significantly affect the 8th day storage.

The results of further tests showed that the storage time showed a significant effect on the pH content of traditional pond shrimp. The 0-day storage did not significantly affect the storage of the 2nd day but it had a significant effect on the storage of the 4th, 6th, 8th day. Storage of Harike-2 has a very significant effect on 4th, 6th, 8th day storage. The 4th day storage has a significant effect on the 6th day storage where the number notation shows in tables 1% and 5%. 6th day storage is very significant for the 8th day storage.

Whiteleg shrimp should be given a cooling treatment as soon as possible because of the storage of room temperature because the activity of bacteria and enzymes begins to take place where the pH value and TVB value are related to the activity of bacteria and enzymes that naturally exist so that an increase in pH will result in the formation of ammonia, TMA and derivatives [12]

The longer the storage process, the higher the pH of the shrimp. The pH standard of fresh shrimp is 7-8. The results of research conducted on whiteleg shrimp in accordance with the explanation of [10] the longer the storage time of the resulting pH value increases along with the phase of decline in quality of shrimp. This is allegedly due to the work of fast metabolic enzymes in shrimp and glycogen content in shrimp meat due to the process of death in shrimp. Increasing the pH value during cold temperature storage is thought to be due to the formation of amines by decarboxylation amino acids [10].

The pH of intensive pond white leg shrimp and traditional ponds is still said to meet the standard on day 0 storage until 4th day storage. Shrimp with a high pH are closely related to the process of decreasing the quality of shrimp where the process of enzyme formation due to bacterial activity becomes faster. According to [2] changes in pH values occur due to the process of autolysis and bacterial activity. Changes in pH values in the phase of deterioration in quality can be caused due to the production of lactic acid from glycogen breakdown in shrimp meat.

The results of pH analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a very significant different effect on pH levels in shrimp where interactions occurred at $p < 0.05$. Traditional pond shrimp pH value is lower than intensive pond shrimp, so it can be said that the freshness of traditional shrimp shrimp is superior to intensive pond shrimp, and traditional pond shrimp decay process is slower than intensive pond shrimp.

3.8 FFA (Free Fatty Acid) Test

Free fatty acids are fatty acids that are not bound as triglycerides. Fatty acid levels are the best indicator to determine the amount of fatty acid levels in intensive pond shrimp and traditional ponds. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of FFA in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05).

Table 8. BNJ pH of intensive pond shrimp

Day Storage	Intensive	traditional
Day 0	11.65 ± 0.79[a]	6.626 ± 0.79[a]
Day 2	13.05 ± 0.46[a]	7.325 ± 0.58[ab]
Day 4	15.675 ± 0.82[b]	7.9 ± 0.62[ab]

Deleted:
Deleted:
Deleted: s
Formatted: Superscript
Formatted: Superscript
Deleted:
Deleted:
Deleted: s
Formatted: Superscript
Formatted: Superscript
Deleted:
Formatted: Superscript
Deleted:
Formatted: Superscript
Deleted:
Formatted: Superscript
Deleted:
Deleted:
Commented [R138]: Please re-write this sentence!
Deleted:
Commented [R139]: Please check again!
Commented [R140]: Please refer this table in the main text!
Deleted: f
Deleted: s

Day 6	17.9 ± 1.0[c]	8.7 ± 0.78[bc]
Day 8	20.525 ± 1.27[d]	9.975 ± 0.61[c]

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

The results of further tests showed that the FFA content in intensive pond shrimp had a significant effect on the presence of storage treatments. The 0-day storage did not significantly affect the storage of the 2nd day, but it was highly significant for the storage of the 4th, 6th, 8th days. Day 2 storage has a significant effect on the storage of 4th, 6th, 8th days. 4th day storage has a very significant effect on the storage of the 6th and 8th day. 6th day storage is very significant for the 8th day storage. The further test results show that the 0-day storage has a significant effect on the 2nd day storage where the notation is in the 1% and 5% tables. The second day storage did not significantly affect the 4th day storage but it had a significant effect on the 6th day storage where the notation was in the 1% and 5% tables. The 6th day storage is very significant for the 8th day storage.

The results above show the process of increasing the free fatty acid content of shrimp in each storage period. The longer the storage period, the higher the free fatty acid content in the shrimp. From the graph above it can be seen that the content of free fatty acids intensive shrimp shrimp is higher than the free fatty acids of traditional pond shrimp. Increasing the content of free fatty acids usually consists of several factors including the temperature of the environment, the way of handling, and shrimp feed.

Free fatty acids in intensive pond shrimp have increased rapidly from 11.6 to 20.5 mgN / 100gr while for traditional shrimp shrimp the value of the content starts from 7.3 and increases to 9.9 mgN / 100gr. Increasing the content of free fatty acids in intensive ponds is faster than free fatty acids in traditional ponds. The results of analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on FFA levels in shrimp where interactions occurred at $p < 0.05$. FFA value of traditional pond shrimp is lower than intensive pond shrimp, so it can be said that the level of free fatty acid content of traditional pond shrimp is less than intensive pond shrimp.

4. Conclusion

The results showed that storage time significantly affected TVB parameters, pH, FFA, moisture content, protein content, and did not affect the parameters of TMA, ash content, and fat content in shrimp cultivated in intensive ponds and traditional pond shrimp.

5. References

[1] Agoes M Jacoeb, Muchamad Hamdani, and Nurjanah 2008 Perubahan Komposisi Kimia Dan Vitamin Daging Udang Ronggeng (Harpiosquilla raphidea) Akibat Perebusan, *Buletin Pengolahan Hasil Perikanan.* **XI**(2) *Tahun 2008*

[2] Azizah Hidayatul Laelah. 2015. *Analisis Kemunduran Mutu Udang Vaname (Litopenaeus vannamei) Secara Kimiawi Dan Mikrobiologis. Institut Pertanian Bogor. Bogor.*

[3] Buckle, KA, Edwards, RA, Fleet, GH, dan Wotton, M. 2009. *Ilmu Pangan. Terjemahan Hari Purnomo dan Adiono. Jakarta: UI-press.*

[4] Dinas Kelautan dan Perikanan Kabupaten Bulukumba, 2016

[5] F. G. Winarno 2008, *KIMIA PANGAN DAN GIZI: EDISI TERBARU, Penerbit MBrio Pres*

[6] Gokce M A, Tazbozan O, Celik M, Tabakoglu S. 2004. *Seasonal variation in proximate and fatty acyd of female common sole (Solea solea). Food Chem.*

[7] John deMan 2010 Kimia Makan , penerbit ITB . Bandung

[8] Karungi, C., Byaruhanga Y.B., & Moyunga J.H. (2003). *Effect of pre-icing duration on quality deterioration of iced perch (Lates niloticus*). *J Food Chemistry.*

[9] Khotami Ihsanul Afid 2009 *Komposisi Mineral Makro Dan Mikro Daging Udang Ronggeng (Harpiosquilla Raphidea) Akibat Proses Perebusan. Institut Pertanian Bogor. Bogor.*

Deleted:

Formatted: Superscript

Deleted: …ayss

Formatted: Superscript

Deleted: …ays

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Superscript

Deleted:

Formatted: Indent: First line: 0,75 cm

Commented [R141]: Which graph? There is no graph in this manuscript

Commented [R142]: Please check again!

Commented [R143]: Please check again!

Commented [R144]: Please discuss why fatty acids in intensive pond is faster than traditional pond! How the difference between habibtat type (pond) can affect the fatty acid?

Commented [R145]: 1. This conclusion did not answer the objective of the research. Please adjust the conclusion with the objective of the study!
2. Please state how the result of the study can be implemented or useful for people?
3. Recommendation based on the study results can also be state in the conclusion.

Commented [R146]: All the references format did not follow IOPs EES's format. Please modify all your references format by following IOPs EES template! Herewith the example of the correct reference for published paper: Wessel R, Koch C and Gabbiani F 1996 Coding of time-varying electric field amplitude modulations in a wave-type electric fish *J. Neurophysiol.* **75** 2280–93

Deleted: … Muchamad Hamdani, …nd

Formatted: Font: Not Italic, Complex Script Font: Italic

Commented [R147]: This part should be the page numbers.

Deleted: *p…ngolahan Hh…sil Pp…rikanan.* **Vol**

Formatted: Font: Not Italic, Complex Script Font: Italic

Deleted: …Nomor

Commented [R148]: Full name of the author may not be

Deleted: ,…K…… Edwards,…R…… Fleet, G.…

Commented [R149]: The title of the books should not be

Deleted: ….(…009).

[10] Leitao MFDF, Rios DDPA. 2000. *Microbiological and chemical changes in freshwater prawn (Macrobrachium rosembergii) storaged under refrigeration. Brazil Journal Microbiology* 31(3): 1-4.
[11] Purwaningsih, S. 1995. *Teknologi Pembekuan Udang. Penebar Swadaya. Jakarta.*
[12] Riyanto, R,. A. Kusmarwati, Dwiyitno. 2006. *Pengaruh Penyimpanan Ikan pasa Suhu Kamar Terhadap Mutu Kimia, Mikrobiologi, dan Organoleptik.* Jurnal Pasca Panen dan Bioteknologi Kelautan dan Perikanan Vol. I No. 2. Desember 2006.
[13] Reddy, Vijar K.,*et al*. 2012. *Effect of Antimelanotic Treatment and Vacuum Packaging on Melanosis and Quality Condition of Ice Stored Farmed Tiger Shrimp (Paneus monodon).*Maharashtra-India.
[14] Sediaoetama AD. 1993. *Ilmu Gizi untuk Mahasiswa dan Profesi di Indonesia.* Jakarta : Dian Rakyat.
[15] Shafira Nurul S.A. 2015. Karakteristik Laju Kemunduran Mutu Dan Melanosis Udang Vaname *(L. Vannamei)* Pada Tambak Intensif Dan Non Intensif. Sekolah Tinggi Perikanan. Jakarta.
[16] *Suwetja I.K. 2011. Biokimia Hasil Perikanan. Media Prima Aksara. Jakarta.*

Chemical composition of whiteleg shrimp (*Litopenaeus vannamei*) cultivated from intensive farming and traditional farming at Bulukumba regency, South Sulawesi

Chemical composition of whiteleg shrimp (*Litopenaeus vannamei)* cultivated from intensive farming and traditional farming at Bulukumba regency, South Sulawesi.

Y H Sipahutar[1], H K Ramli[1], M G E Kristiani[1], D H Guntur Prabowo[1], M R Suryanto[1] and R B Pratama[1]
[1] Sekolah Tinggi Perikanan, AUP Road, Pasar Minggu, South Jakarta, Jakarta, Indonesia

E-mail: yuliati.sipahutar@gmail.com

Abstract. The aim of this research was to study the effect of intensive and traditional farming on the chemical composition of whiteleg shrimp (*Penaeusvannamei*) during storage till up to 8 days. The study on intensive and traditional farming were done at MariorennuVillage, Gantarang Subdistrict and at Manjalling Village, Ujung Loe Subdistrict, respectively, Bulukumba Regency, as well as at the Research and Development Center of Fishery Products of Makassar, South Sulawesi, the Province of South Sulawesi. The research design was conducted by a randomized complete block design with a storage treatment of 0, 2, 4, 6, and 8 days. The parameters studied are water content, ash, lipid, and protein content, as well as total volatile base (TVB), trimethylamine (TMA), pH, and free fatty acids (FFA). Whiteleg shrimps from intensive farming and traditional farming were stored in a coolbox containing with 2: 1 ratio of ice and shrimp, respectively. The addition of ice was carried out every day for 8 days storage, and chemical analysis was condcuted at intervals of 2 days. Chemical testings was carried out based on the SNI method. Samples were measured as much as 10-15g and then chemically tested reffer to the method in SNI. The results for both intensive and traditional farming of whiteleg shrimp showed that storage time had a significant influence on the following parameters i.e. TVB, pH, FFA, water content, and protein content. No significant effect was found for following parameters, namely TMA, ash and fat content.

Keywords: chemical composition, whiteleg shrimp, intensive farming, traditional farming

1. Introduction

Bulukumba is a fairly rich area in terms of aquaculture, where the area of ponds reaches 3,576 ha with a potential of 4,000 ha, aquaculture of 6,030 ha with the potential development of 9,000 ha, freshwater cultivation 124,4 ha with a potential of 1,020 ha. The production of whiteleg shrimp in Bulukumba Regency in 2015 was 2241.4 tons and in 2016 there was 2591.8 tons [1].

The process of decreasing the quality of shrimp is caused by factors derived from the shrimp material itself and environmental factors. This decline in quality occurs autolysis, bacteriology, and oxidation [2]. Shrimp handling can be carried out based on the origin of production, among others, from catches in the sea, public waters or harvested fishponds. Regardless of its origin, shrimp handling must be carried out quickly, carefully, and through a cold chain system while maintaining a temperature of around 0°C. Handling like this is done because the characteristics of shrimp products are very easily damaged. The destructive nature of shrimp raw materials was related to the high water

content (80%) and free amino acid content which is a condition and a very good medium for bacterial growth [3]. In principle, the handling of shrimp in the pond was the same as handling shrimp in the sea, namely carrying out handling so that it is always in the cold chain. Therefore, harvesting shrimp in ponds is usually done at night so that the caught shrimp is not directly exposed to sunlight [2].

The study of the quality and level of consumer preference for whiteleg shrimp needs to be done so that it can be used as a reference for the community both producers and consumers in conducting cultivation, processing, and consumption. This study was aimed to determine the quality of the chemical composition of whiteleg shrimp from intensive ponds and traditional ponds during the storage for up to 8 days.

2. Research methodology

White leg shrimp samples were taken from intensive. PT. 2512 at Mariorennu Village, Gantarang Sub-district and traditional ponds (government pilot ponds) at Manjalling Village, Ujung Loe Sub-district, Bulukumba Regency, South Sulawesi, the Province of South Sulawesi. The sample was put in a fiberglass bath and ice was added with a ratio of ice and shrimp 2:1. The base was coated with ice first, then arranged with shrimp that has been put in plastic on top and covered with ice. Samples were tested and stored within 0 days, 2 days, 4 days, 6 days and 8 days to be observed.

The research method was Randomized Block Design (RBD) with the treatment of 0 days, 2 days, 4 days, 6 days and 8 days. This research was conducted for three (3) months from February until April 2017. Statistical analysis of the test data was carried out with ANOVA, and if it was significantly different, it was continued with an Honest Real Difference Test (BNJ). Test parameters were water content (SNI-01-2354.2-2006), ash content (SNI-01-2354.1-2006), fat(SNI 01-2354.3-2006), protein (SNI 01-2354.4-2006), TVB (SNI 2354.8:2009), TMA (SNI 2354.8:2009), pH test, FFA.Equipment used includes thermometer, oven, desiccator, gluttering, graying furnace, digital weighing scale, soxhlet, fat sleeve, aluminum cup, desiccator, gluttering, porcelain cup, kjehdal flask, titration instrument, measuring cup, beaker, dropper, titration device, protein destruction tool (kjeltec), a protein distillation device (foss), erlenmeyer, fume hood, filter paper, funnel, goblet, and water bath.

3. Result and discussion

3.1. Water Content

Water is an important component in food ingredients because water can affect appearance, texture, and taste. The low water content in food ingredients will inhibit the growth of microorganisms thus extending the shelf life of these foods [1]. This water content test was carried out to determine the water content in intensive pond shrimp and traditional pond shrimp from the storage of 0, 2, 4, 6, and 8 days. Table 1 presented the result of water content at intensive and traditional farming.

Table 1. Test results of water content on intensive and traditional pond shrimp

Storage day	Intensive	Traditional
Day 0	76.005 ± 1.85^{a}	75.44 ± 0.85^{a}
Day 2	76.8375 ± 1.49^{ab}	75.9475 ± 0.79^{ab}
Day 4	78.6125 ± 0.19^{bc}	77.5725 ± 0.77^{b}
Day 6	80.4275 ± 0.53^{cd}	79.3125 ± 0.5^{c}
Day 8	82.4175 ± 0.9^{da}	81.6525 ± 0.91^{d}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different at 5% at confidence level

ANOVA analysis showed that storage day had significant effects on water content for both intensive and traditional farming. The further test found that for intensive storage time the Day 0 had no significant effect on Day 2 storage but possessed significant influence at the 0.05 confidence level on storage day 4, 6, and 8. The Day 2 had significant influence on Day 6 and Day 8, as well as Day 4

on Day 8 at the 0.05 confidence level for storage days. In traditional pond shrimp, the length of storage time had significant effect on the moisture content. Day 0 possessed significant influence on Day 4, 6, and 8 of storage time at 5% confidence level. Meanwhile Day 2 of storage time had no significant effect with Day 4 but giving significant influence with Day 6 and 8, respectively in water content.

Water content in intensive pond shrimp and traditional ponds on the 0th-day observations were 76,005 and 75.44% respectively, so it can be said that the shrimp water content still meets the standards of 71.5 - 79.6%. However, after undergoing a storage process of up to eight (8) days, the shrimp water content of two different types of ponds is increasing. This is likely to occur due to the binding process/absorption of free water by the shrimp body to the surrounding environment. Fishery products generally have very high water content. The high water content in food will make it easier for microorganisms to grow so that it can cause changes in food ingredients. The low water content in food ingredients will inhibit the growth of microorganisms thus extending the shelf life of these foods [4].

The results of the analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on the water content in shrimp where the interaction occurred at a value of $p < 0.05$. The value of traditional pond shrimp water content was lower than intensive pond shrimp, so it can be said that the level of freshness of traditional pond shrimp is superior to intensive pond shrimp, and the traditional pond shrimp decay process is slower than intensive pond shrimp. This result is allegedly due to the absence of the addition of chemicals such as chlorine, antibiotics, or prebiotics into the traditional pond, so it is certain that there are no chemicals that contaminate and react with the body of the whiteleg shrimp that can affect the process of shrimp decomposition

3.2. Dust Level

Food ingredients contain more than 95% organic matter and water. The rest consists of mineral elements which are also known as inorganic substances. Organic materials burn during the combustion process, but the organic matter is not because that is called ash [5].

Ash content in intensive and traditional pond shrimp differed with the length of storage time (table 2). Intensive shrimp ash content ranged from 2.29 - 2.72 while the ash content of traditional pond shrimp ranged from 2.15 - 2.48. The ash content in intensive pond shrimp and traditional ponds can still be received both from day 0 storage and 8th-day storage. This is because the ash content in shrimp does not meet the specified threshold or standard. Statistical analysis found that there was no significant influence from storage time on as content values for both intensive and traditional farming.

Table 2. Test results of ash content on intensive and traditional pond shrimp.

Day Storage	Intensive	Traditional
Day 0	2.4375 ± 0.21^{a}	2.42 ± 0.23^{a}
Day 2	2.4975 ± 0.366^{a}	2.435 ± 0.27^{a}
Day 4	2.7275 ± 0.05^{a}	2.4875 ± 0.38^{a}
Day 6	2.54 ± 0.21^{a}	2.5725 ± 0.27^{a}
Day 8	2.2925 ± 0.18^{a}	2.1525 ± 0.16^{a}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

3.3 Protein Level

Protein is an important food substance for the body because this substance besides functioning as a fuel in the body also functions as a builder and regulator substance. Protein is a source of amino acids that contain elements of nitrogen (N), carbon (C), hydrogen (H), and oxygen (O) which is not owned by fat or carbohydrates [6]. This protein level test was carried out to determine protein levels and

decrease protein levels in intensive pond shrimp and traditional pond shrimp on storage of 0, 2, 4, 6, and 8 days as shown in table 3.

The value of traditional shrimp protein levels was higher than intensive pond shrimp, so it can be said that traditional pond shrimp are superior to intensive pond shrimp. Statistical analysis found that intensive pond shrimp and traditional pond shrimp had a significantly different effect on protein levels in shrimp at $p < 0.05$ during the storage process from day 0 to day 8. The Day 0 had significant difference with Day 4, 6, and 8. Day 2 also had significant influence with Day 6 and 8, as well as Day 6 possessed significant difference result for protein level with day 8 at 0.05 confidence level.

Table 3. Test results of protein on intensive and traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	18.6675 ± 1.35^{a}	19.3025 ± 0.78^{a}
Day 2	17.7925 ± 1.2^{ab}	18.81 ± 0.98^{ab}
Day 4	15.935 ± 0.18^{bc}	17.27 ± 1.06^{bc}
Day 6	14.4175 ± 0.57^{cd}	15.5075 ± 0.33^{c}
Day 8	12.6625 ± 0.85^{d}	13.5575 ± 0.82^{d}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

The test results showed that the protein content of traditional pond shrimp was higher than that of the intensive shrimp protein. Potential things that make different protein levels are the type of feed and life cycle and habitat of the shrimp. The type of feed used for traditional ponds is natural to feed such as plankton, fito, and zooplankton, while the feed used for intensive ponds is artificial feed such as pellets. In the harvest process, there are differences in handling there. Post-harvest handling on traditional ponds is done by cool, clean, careful, and Quick, with a comparison of ice according to the standard. In intensive ponds, the ratio of ice does not meet the standards so that the shrimp temperature after harvest rises above 5^{o}C. According to [6] The diversity of chemical composition can be caused by food factors, species, sex, and the age of the commodity. Intensive shrimp protein and traditional pond shrimp protein content are less at 8th-day storage. This was due to the protein denaturation process in the shrimp body. Various cooking conditions above 60^{o}C can cause a decrease in fish and shrimp protein along with a reduced content of dissolved water [7].

3.4. Fat Level

Fat can be defined as materials that can dissolve in ether, chloroform or benzene, but cannot dissolve in water. Fat is a trihydric glycerol bond with fatty acids that are monobasic [8]. The value of the fat content in traditional pond shrimp does not differ greatly from intensive pond shrimp fat, so it can be said that the level of the fat content of traditional pond shrimp is almost the same as the intensive pond shrimp (table 4).

Table 4. Test results of *Fat* on intensive and traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	1.6325 ± 0.33^{a}	1.575 ± 0.18^{a}
Day 2	1.58 ± 0.29^{a}	1.56 ± 0.16^{a}
Day 4	1.475 ± 0.13^{a}	1.4075 ± 0.16^{a}
Day 6	1.38 ± 0.21^{a}	1.395 ± 0.14^{a}
Day 8	1.375 ± 0.2^{a}	1.4025 ± 0.19^{a}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

Statistical analysis of ANOVA found that day storage at intensive and traditional farming had no significantly affect on the fat content of shrimp. Fat content test results obtained various values.

Intensive shrimp fat content was ranged from 1.38-1.63 while the fat content of traditional pond shrimp ranged from 1.39-1.57. According to [9] based on the fat content of shrimp included in shrimp with a medium fat content of 2-5% as well as carp, lemuru fish, salmon and also types of shellfish. The results of the analysis of intensive pond fat and traditional pond shrimp showed that the shrimp was still acceptable because the fat content in the shrimp body was still within normal limits. Factors that influence the diversity of fat composition include species, fishing season, geographical location, level of gonadal maturity and size of the shrimp [6].

3.5 TVB Test

The condition and number of TVB levels depend on the quality and freshness of the fish. The lower the freshness of the fish was the higher the TVB content of the fish. The purpose of this test was to determine the level of freshness of intensive pond vannamei shrimp and traditional ponds from a total base that evaporates. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of TVB in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05) (table 5).

Table 5. Test results of TVB on intensive and traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	12.0325 ± 0.44^{a}	9.9875 ± 0.44^{a}
Day 2	19.7 ± 1.71^{b}	12.8425 ± 1.71^{b}
Day 4	24.9225 ± 1.08^{c}	15.1750 ± 1.08^{c}
Day 6	25.6725 ± 0.84^{c}	20.4175 ± 0.84^{d}
Day 8	32.87 ± 1.19^{d}	24.7525 ± 1.19^{e}

Note: the numbers in the same column are followed by different superscript letters (a, b, etc.) which are significantly different

ANOVA results show significant differences. The results of the TVB test on intensive pond shrimp showed a very significant effect on the length of storage time. Observation of day-0 storage is very significant for the storage of 2nd, 4th, 6th, and 8th days. Day 2 storage has a significant effect on the storage of 4th, 6th and 8th days. 4th-day storage has no significant effect on the 6th day of storage where the notation on the 4th and 6th-day storage shows the same notation. Storage observations on the 6th day have a significant effect on 8th-day storage.

The results of further testing of the TVB content in traditional pond shrimp showed a very significant effect where on day 0 storage it was very significant for the storage of 2nd, 4th, 6th, and 8th days. 2ndday storage observation is very significant for the 4th, 6th, and 8thday observations. 4thday storage has a very significant effect on the storage of the 6thand 8thdays. 6thday storage is very significant for 8thday storage.

The table 5, it can be seen that white leg shrimp from traditional ponds on day 0 observations contain 9.9 mgN TVB where the number does not exceed the standard of very fresh shrimp group which is <10 mgN / 100 g. For intensive pond whiteleg shrimp, at the observation of day 0 the shrimp were still grouped in fresh shrimp that were in accordance with the standard, namely $10 \leq TVB \leq 20$ mgN / 100 g. At the second day storage, intensive pond shrimp can still be said to be fresh with a TVB value of 19.7 mgN / 100gr and traditional pond shrimp on the 2nd and 4th-day storage also classified as fresh shrimp. On observations on days 4 and 6, intensive pond shrimp were said to be suitable for consumption shrimp with a TVB value of 24.9 - 25.6 mgN / 100gr where the standard of consumption of shrimp TVB is $20 \leq TVB \leq 30$ mgN / 100 g, as well as traditional shrimp at storage of 6th and 8th days with each TVB value of 20.4 and 24.7 mgN / 100gr. So, it can be concluded that traditional pond shrimp can be consumed until the 8thday of storage and intensive pond shrimp are not suitable for consumption on the 8thday.

The results of the analysis can be concluded that the longer the shrimp storage process, the higher the level/content of the shrimp TVB. According to [10], this TVB value will increase with increasing

storage time due to the degradation of enzymes in the shrimp body to produce simple compounds that are constituent components of volatile bases. According to [8], an increase in TVB values during storage due to the degradation of proteins and derivatives produces a number of volatile bases such as ammonia, histamine, H_2S, and foul-smelling trimethyl amine. The TVB value obtained from the results of the study showed that the shrimp at the beginning of storage was still in a very fresh state.

The results of the analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on TVB levels in shrimp where the interaction occurred at a value of $p < 0.05$. Traditional TVB shrimp pond value is lower than intensive pond shrimp, so it can be said that the traditional shrimp pond freshness level is superior to intensive pond shrimp.

3.6. TMA Test

Trimethylamine nitrogen is one method of bacteriological freshness testing or a method of measuring the results of bacterial action derived from trimethyl aminoxide. TMAO content is different in different species, different waters, and in-season differences in one year, body size and age of shrimp [9]. This TMA test was conducted to determine the level of freshness and the rate of increase in TMA content in intensive pond shrimp and traditional pond shrimp. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of TMA in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05).

The results of further tests showed that the storage time was very significant for the intensive content of shrimp TMA. Day 0 storage has a significant effect on the 2ndday storage where the number notation shows in table 1% and 5%. Day 2 storage has a significant effect on 4th-day storage. The 4thday storage has a significant effect on the 6thday storage where the number notation shows in tables 1% and 5%. 6thday storage is very significant for 8thday storage (table 6).

Table 6. Test results of *TMA* for intensive and Traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	1.375 ± 0.17^{a}	1.4 ± 0.18^{a}
Day 2	1.55 ± 0.12^{ab}	1.75 ± 0.28^{a}
Day 4	$2.15b \pm 0.28^{c}$	2.025 ± 0.37^{a}
Day 6	2.725 ± 0.28^{cd}	2.425 ± 0.41^{a}
Day 8	3.125 ± 0.26^{d}	2.825 ± 0.25^{a}

Note: the numbers in the same column are followed by different super scrip letters (a, b, etc.) which are significantly different

The results of further tests showed that the length of storage did not significantly affect the TMA content in traditional pond shrimp. The longer the storage time, the higher the content of TMA in shrimp. From the average results of the TMA test of intensive pond whiteleg shrimp as well as traditional ponds starting from the storage of day 0 to day 8, it is still feasible to consume. The TMA value in intensive pond shrimp ranged from 1,375-3,125 mg while the TMA value for traditional pond shrimp ranged between 1.4-2,825 mg. According to the TMA levels in suitable products for consumption do not exceed 10 mg / 100 g. It is stated that the value of TMA-N in black shrimp packaged either vacuum or non-vacuum and stored in cold storage showed that at the beginning of storage the N-TMA value was 0.34 mg / 100g and increased to 3.26 mg / 100g for non-vacuum packaging and 2.44 mg / 100g in vacuum packaging after 8 days of cold storage [11]. Furthermore, the increase was recorded to be 5.59 mg / 100g for non-vacuum packaging and 3.66 mg% in vacuum packaging after 17 days of storage in cold storage.

The results of TMA analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed an effect that was not significantly different from TMA levels in shrimp where the interaction occurred at $p < 0.05$.

Traditional pond shrimp TMA values are lower than intensive pond shrimp, so it can be said that the traditional shrimp pond freshness level is superior to intensive pond shrimp, and the traditional shrimp pond decay process is slower than intensive pond shrimp. The increase in the value of TMA in whiteleg shrimp from intensive ponds is thought to be due to the treatment after the harvest process does not pay attention to the temperature in the shrimp. this results in that, the longer the storage of shrimp at room temperature, the higher the TMA content in shrimp.

3.7. pH Test

The determination of pH value is one indicator of the measurement of the freshness of fish or shrimp. The pH value of fish meat while still alive generally has a neutral pH and after death pH becomes decreased [9]. The ANOVA test results showed that the length of time of observation day had a significant effect on the pH growth rate in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05) (table 7).

Table 7. Test results of *pH* intensive and traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	6.625 ± 0.47^{a}	6.375 ± 0.25^{a}
Day 2	7.75 ± 0.64^{a}	6.875 ± 0.25^{a}
Day 4	9.5 ± 0.7^{b}	8 ± 0.4^{b}
Day 6	9.75 ± 0.28^{b}	8.5 ± 0.57^{bc}
Day 8	10.5 ± 0.4^{b}	8.875 ± 0.25^{c}

Note: the numbers in the same column are followed by different super scrip letters (a, b, etc.) which are significantly different

The results of further tests indicate that the length of storage time has a very significant effect on the pH content in intensive pond shrimp. Observation of day-0 storage did not significantly affect the storage of the 2nd day but it had a significant effect on the storage of 4th, 6th, 8th days. Day 2 storage has a significant effect on the storage of 4th, 6th, 8th days. The 4th-day storage did not significantly affect the 6thday storage, as well as the 6thday storage, did not significantly affect the 8thday storage.

The results of further tests showed that the storage time showed a significant effect on the pH content of traditional pond shrimp. The 0-day storage did not significantly affect the storage of the 2nd day but it had a significant effect on the storage of the 4th, 6th, 8thdays. Storage of Harike-2 has a very significant effect on 4th, 6th, 8th-day storage. The 4th-day storage has a significant effect on the 6th-day storage where the number notation shows in tables 1% and 5%. The 6thday storage is very significant for the 8th day storage.

Whiteleg shrimp should be given a cooling treatment as soon as possible because of the storage of room temperature can increase activity of bacteria and enzymes begins to take place where the pH value and TVB value are related to the activity of bacteria and enzymes that naturally exist so that an increase in pH will result in the formation of ammonia, TMA and derivatives [11]

The longer the storage process, the higher the pH of the shrimp. The pH standard of fresh shrimp is 7-8. The results of research conducted on whiteleg shrimp in accordance with the explanation of [12] the longer the storage time of the resulting pH value increases along with the phase of decline in the quality of shrimp. This is allegedly due to the work of fast metabolic enzymes in shrimp and glycogen content in shrimp meat due to the process of death in shrimp. Increasing the pH value during cold temperature storage is thought to be due to the formation of amines by decarboxylation amino acids [12].

The pH of intensive pond whiteleg shrimp and traditional ponds is still said to meet the standard on day 0 storage until 4thday storage. Shrimp with a high pH is closely related to the process of decreasing the quality of shrimp where the process of enzyme formation due to bacterial activity becomes faster. According to [13] changes in pH values occur due to the process of autolysis and

bacterial activity. Changes in pH values in the phase of deterioration in quality can be caused due to the production of lactic acid from glycogen breakdown in shrimp meat.

The results of pH analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a very significant different effect on pH levels in shrimp where interactions occurred at $p < 0.05$. Traditional pond shrimp pH value is lower than intensive pond shrimp, so it can be said that the freshness of traditional shrimp is superior to intensive pond shrimp, and traditional pond shrimp decay process is slower than intensive pond shrimp.

3.8 FFA (Free Fatty Acid) Test

Free fatty acids are fatty acids that are not bound as triglycerides. Fatty acid levels are the best indicator to determine the number of fatty acid levels in intensive pond shrimp and traditional ponds. The results of the ANOVA test showed that the length of time of observation day had a significant effect on the growth rate of FFA in intensive pond shrimp and traditional pond shrimp (p 0.000 <0.05) (table 8).

Table 8. Test results of *FFA* of intensive and traditional pond shrimp

Day Storage	Intensive	Traditional
Day 0	11.65 ± 0.79^{a}	6.626 ± 0.79^{a}
Day 2	13.05 ± 0.46^{a}	7.325 ± 0.58^{ab}
Day 4	15.675 ± 0.82^{b}	7.9 ± 0.62^{ab}
Day 6	17.9 ± 1.0^{c}	8.7 ± 0.78^{bc}
Day 8	20.525 ± 1.27^{d}	9.975 ± 0.61^{c}

Note: the numbers in the same column are followed by different super scrip letters (a, b, etc.) which are significantly different

The results of further tests showed that the FFA content in intensive pond shrimp had a significant effect on the presence of storage treatments. The 0-day storage did not significantly affect the storage of the 2nd day, but it was highly significant for the storage of the 4th, 6th, 8th days. Day 2 storage has a significant effect on the storage of 4th, 6th, 8th days. 4th-day storage has a very significant effect on the storage of the 6thand 8thdays. 6thday storage is very significant for 8thday storage. The further test results show that the 0-day storage has a significant effect on the 2ndday storage where the notation is in the 1% and 5% tables. The second-day storage did not significantly affect the 4th-day storage but it had a significant effect on the 6th-day storage where the notation was in the 1% and 5% tables. The 6thday storage is very significant for 8thday storage.

The results above show the process of increasing the free fatty acid content of shrimp in each storage period. The longer the storage period, the higher the free fatty acid content in the shrimp. From the result above it can be seen that the content of free fatty acids intensive shrimp is higher than the free fatty acids of traditional pond shrimp. Increasing the content of free fatty acids usually consists of several factors including the temperature of the environment, the way of handling, and shrimp feed.

Free fatty acids in intensive pond shrimp have increased rapidly from 11.6 to 20.5 mgN/100gr while for traditional shrimp the value of the content starts from 7.3 and increases to 9.9 mgN/100gr. the content of free fatty acids in intensive ponds is faster than free fatty acids in traditional ponds. The difference in the high FFA content in whiteleg shrimp from intensive ponds and traditional ponds, allegedly due to differences in pond maintenance methods, namely pond habitat, pond size, species, shrimp seedlings, feed type factors, feeding methods, environmental conditions, temperature and water cycle and the process of handling harvesting. The results of the analysis on intensive pond shrimp and traditional pond shrimp can be concluded that during the storage process from day 0 to day 8, shrimp showed a significantly different effect on FFA levels in shrimp where interactions occurred at $p < 0.05$. FFA value of traditional pond shrimp is lower than intensive pond shrimp, so it can be said that the level of the free fatty acid content of traditional pond shrimp is less than intensive pond shrimp.

4. Conclusion

The results showed that for both intensive and traditional ponds had a significant effect on the chemical composition of whiteleg shrimp. The storage time was significant for the chemical composition of TVB, pH, FFA, water content, protein content, but non-significant for the chemical composition of TMA, ash content, and fat content. Traditional shrimp ponds are better than intensive shrimp ponds in terms of both chemical content and shelf life.

5. References

[1] Dinas Kelautan dan Perikanan Kabupaten Bulukumba 2016 *Dokumen Dinas Kelautan dan Perikanan Kabupaten Bulukumba* (Bulukumba, ID: Dinas Kelautan dan Perikanan Kabupaten Bulukumba)
[2] Purwaningsih S 1995 *Teknologi pembekuan udang* (Jakarta, ID: Penebar Swadaya)
[3] Buckle KA, Edwards RA, Fleet GH, and Wotton M 2009 *Ilmu pangan, terjemahan Purnomo H dan Adiono* (Jakarta, ID: UI-press)
[4] John deMan 2010 *Kimia makan* (Bandung, ID: Penerbit ITB)
[5] Winarno F G 2008 *Kimia pangan dan gizi edisi terb*aru (Jakarta, ID: MBrio Pres)
[6] Gokce M A, Tazbozan O, Celik M and Tabakoglu S 2004 Seasonal variation in proximate and fattyacyd of female common sole (Soleasolea) *Food Chem.*
[7] Afid K I 2009 Komposisi mineral makro dan mikro daging udang Ronggeng (Harpiosquilla Raphidea) akibat proses perebusan (Bogor, ID: IPB University)
[8] Karungi C, Byaruhanga Y B, and Moyunga J H 2003 Effect of pre-icing duration on qualitydeterioration of iced perch (Latesniloticus) *J Food Chemistry*
[9] Suwetja I K 2011 *Biokimia hasil perikanan* (Jakarta, ID: Media Prima Aksara)
[10] Nurul S A 2015 Karakteristik Laju kemunduran mutu dan melanosis udang Vaname *(L. Vannamei)* pada tambak intensive dan non intensive (Jakarta, ID: Sekolah Tinggi Perikanan)
[11] Riyanto R, Kusmarwati A and Dwiyitno 2006 Pengaruh penyimpanan ikan pasa suhu kamar terhadap mutu kimia, mikrobiologi, dan organoleptik *Jurnal Pasca Panen dan Bioteknologi Kelautan dan Perikanan* **I(2)**
[12] Leitao M F D F and Rios D D P A 2000 Microbiological and chemical changes in freshwater prawn (Macrobrachiumrosembergii) storaged under refrigeration *Brazil Journal Microbiology* **31(3)** 1-4.
[13] Laelah A H 2015 Analisis kemunduran mutu udang Vaname (Litopenaeuvannamei) secara kimiawi dan mikrobiologis (Bogor, ID: IPB University)

RECEIPT

Billed to: Yuliati H. Sipahutar

Invoice No. 159/SM-01/08/19
Date 15 AGUSTUS 2019

The 1st International Seminar on Natural Resources and Environmental Management 2019
IPB University

No	Description	Qty	Unit Price (IDR)	Amount (IDR)
1.	Registration fee 1st International Seminar on Natural Resources and Environmental Management 20	1	750.000,-	750.000,-
			Total (IDR)	**750.000,-**

Sincerely yours,

Herlin Anggreayani, SP
Account Officer

INVITATION LETTER

Dear **Yuliati Sipahutar,**

Thank you for your interest in the "1st International Seminar on Natural Resources and Environmental Management, which will be held in Bogor, Indonesia on **August 15, 2019**. We received the abstract of your paper, titled "Chemical Composition Of White Leg Shrimp (*Litopenaeus vannamei*) Cultivated From Intensive Farming And Traditional Farming At Bulukumba Regency, South Sulawesi"

On behalf of the Organizing Committee, we are pleased to inform you that your paper has been accepted for inclusion in the Symposium as an **oral presentation**.

For further preparation of the symposium please note the following:

1. Please revise and reformat your abstract using the attached template, "Abstract- Guideline ISenREM 2019.docx". All abstracts will be edited and compiled in a guide booklet (program book). Please send your final abstract to isenrem_ipb@apps.ipb.ac.id by July 25, 2019.

2. Please use the attached document, "FP- Guideline ISENREM 2019-JPCSExample.doc", to prepare your full-length paper (oral and poster presentations). The paper should be 4 to 8 pages in length. Paper submission is due by July 30, 2019. Please send your full paper to isenrem_ipb@apps.ipb.ac.id.

Note that we are publishing the proceedings from the symposium electronically in IOP Conference Series Earth and Environmental Science (Scopus indexed proceeding).

3. You will receive additional information regarding your presentation/poster and paper after the program has been finalized on the conference website http://isenrem.ipb.ac.id/.

Once again, please send your revised abstract by July 25, 2019 and your completed full-length paper (electronic copy) by July 30, 2019 to Dr. Pipin Noviati Sadikin at the following address: isenrem_ipb@apps.ipb.ac.id.

This will allow us time to compile all abstracts and papers and to prepare the a guide booklet (program book) and proceeding.

If you have any questions, please contact the organizing committee.

We look forward to your coming visit.

Best regards,

Symposium Chairs,

Dr. Zaenal Abidin, Prof. Dr. Lina Karlinasari, Prof. Widiatmaka

1st International Seminar on Natural Resources and Environmental Management2019

The Study Program of Natural Resources & Environmental Management,
Graduate School of IPB University Campus IPB Baranangsiang, Bogor 16144, Indonesia