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Tilapia (*Oreochromis niloticus*) Quality from Pasar Besar Malang

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Abstract

Transportation of live tilapia impact evaluated from Pasar Besar, Malang city. Pasar Besar tilapias were supplied from Sidoarjo and Malang Regency. Transportation impact can be identified from tilapia meat quality. pH levels, TVC (Total Viable Count) and TVB (Total Base Nitrogen) determined as tilapia meat quality. pH levels, TVC and TVB showed stress comes from transportation impacted tilapias meat quality.

Keyword: *tilapia, quality, pasar besar, supplier*

Introduction

Tilapia is the second freshwater fish most cultured worldwide. Tilapia cultured with mono or poly-culture system (Wang and Lu, 2015). Tilapia was freshwater fish belong to Cichlidae family and an adaptive species from tropical region. Tilapia was known as "aquatic chicken" because it can be cultured in almost all freshwater aquatic conditions (Canonico, *et al.*, 2005). Almost all of Tilapia harvested for local market. Tilapia supplies played an important role in the Asian country market (Ahmed, *et al.*, 2012). Aquaculture product carried some problems and need to be solved before marketed. Aquaculture product major problem was perishable foods (Jennings, *et al.*, 2016).

Food quality is always plays an important role on the market. Perishable foods quality decayed during storage has a big impact on prices (Liu, *et al.*, 2015). Perishable foods is major problem in food supply chain. Perishable foods losses can reach 35% from market unnecessarily based EU reports (Mallidis, *et al.*, 2018). Transportation and distributiaon could be the reason on the losses of perishable foods (Farahani, *et.al.*, 2011).
Research is aimed to investigate effect of transportation and distribution of tilapia at Pasar Besar, Malang City on the meat quality.

Material and Method

Sample Preparation

Tilapia seller investigated the source of the fish (tilapia cultured region). Live tilapia was bought (4 kg) for each cultured region and transported to the laboratory in an hour using aerated round plastic container (diameter 1 meter and height 1 meter). Tilapia size is 500-700 gram. Tilapias were killed immediately by stunning technique. Tilapias were packaged, stored at room temperature and analyze (pH, TVC and TVB) at 0, 4, 8 and 12 hours. 5 tilapias were taken as replication for each cultured region.

pH analysis

pH analysis was using modification of Zakhariya, *et al.* (2015). Tilapia sample sliced, weighed (5 grams), pounded and transferred into beaker glass containing 45 mL distillated water. pH level is analyze using TPS WP-80 pH meter.

TVC analysis

TVC analysis was using modification of AOAC (1995). Tilapia sample sliced and weighed (5 grams) aseptically and transferred into aseptic plastic bags containing 50 ml sterilized saline water (0.9% b/v). Homogenize using vortex for 10 minutes and take 0.1 mL into the surface of sterilized plate count agar (Oxoid). Incubate the medium for 48 hours at 25^{o}C and counted the colony as cfu.

TVB analysis

TVB analysis was using method mentioned in Kusuma and Teerawut (2014). Tilapia sample sliced, weighed (5 grams), pounded and transferred into 100 mL bottle glass with lid containing 10 mL TCA 4%. Solution homogenized using vortex for 5 minutes and incubated the solution for 30 minutes (room temperature 28±2 ^{o}C). Solution filtered using Whatman filter paper number 1. Filtrate was dilute 3 times used TCA 4%. The solution transferred into outer chamber of Conway disc with saturated K_2CO_4. Inner chamber of Conway disc filled with innering solution. Lastly, Conway disc closed and incubated for 2 hours at 28^{o}C. Incubated Conway disc titrated with 0.02M HCl at the inner chamber.

Statistical analysis

Data of pH, TVC and TVB analyses using one-way ANOVA and followed by Duncan. One-way ANOVA and Duncan performed by SPSS 16.0 for Windows.

Result and Discussion

pH analysis

Pasar Besar Tilapias were cultured in Sidoarjo and Malang regency. Tilapias pH analysis from both regions was normal after death. Tilapias pH data tend to drop and rise during storage time. Statistical analysis showed that pH of tilapia samples significantly different ($p<0.05$) during storage time. pH analysis showed low on correlation between pH level and tilapias cultured region (Table 1).

Table 1. pH measurement of tilapia from Pasar Besar during room temperature storage

Time (hours)	Supplier	
	Malang	Sidoarjo
0	7.0±0.14^{b}	7.08±0.16^{b}
4	6.58±0.13^{a}	6.84±0.05^{a}
8	6.70±0.07^{a}	7.20±0.07^{b}
12	7.16±0.05^{c}	7.48±0.08^{c}
p-value	0.000	0.000
R^2	0.0813	0.5637

Superscript indicated significant different ($p<0.05$) during storage time

pH data showed tilapias from Malang Regency have lower pH levels compared to Sidoarjo at 12 hours storage, respectively.
pH was fluctuated during storage time. Biochemical changed during storage time could lead pH fluctuated (Ruiz-Capillas and Moral, 2001). Nucleotide degradation leaded on pH drop. Nucleotide degradation occurred in anaerobic condition by producing lactid acid (Ozogul, *et al.*, 2008). In another hand, microbial activity produced volatile base, ammonia and other derivate leaded on pH to rise (Ruiz-Capillas and Moral, 2001; Ozogul, *et al.*, 2008). Stress during live fish transportation and rough handling could decrease fish meat quality (Foss, *et al.*, 2021)

TVC analysis

Tilapias TVC data rise with increasing storage time. Statistical analysis showed that TVC of tilapia samples significantly different ($p<0.05$) during storage time. TVC analysis showed high on correlation between TVC and tilapias cultured region (Table 2).

Table 2. TVC (cfu) measurement of tilapia from Pasar Besar during room temperature storage

Time (hours)	Supplier	
	Malang	Sidoarjo
0	3.08±0.07^{a}	3.17±0.03^{a}
4	4.02±0.03^{b}	4.41±0.02^{b}
8	4.50±0.03^{c}	4.97±0.02^{c}
12	5.00±0.01^{d}	5.25±0.02^{d}
p-value	0.000	0.000
R^2	0.9425	0.8674

Superscript indicated significant different ($p<0.05$) during storage time

TVC data showed tilapias from Malang Regency have lower TVC compared to Sidoarjo at 12 hours storage, respectively.
TVC was rising during storage time. Ozogul, et al. (2008) reported increasing on TVC of white grouper during storage in ice and

chilling condition. Higher storage temperature was leading on faster bacterial growth.

TVB analysis

Tilapias TVB rise with increasing storage time. Statistical analysis showed that TVB of tilapia samples significantly different ($p<0.05$) during storage time. TVB analysis showed high on correlation between TVB and tilapias cultured region (Table 3).

Table 3. TVB (mg/100 gr sample) measurement of tilapia from Pasar Besar during room temperature storage

Time (hours)	Supplier	
	Malang	Sidoarjo
0	2.36 ± 0.05^{a}	2.74 ± 0.38^{a}
4	7.70 ± 0.33^{b}	12.12 ± 0.94^{b}
8	24.02 ± 0.81^{c}	28.72 ± 0.52^{c}
12	28.56 ± 1.45^{d}	38.02 ± 1.21^{d}
p-value	0.000	0.000
R^2	0.9259	0.9786

Superscript indicated significant different ($p<0.05$) during storage time

TVB data showed tilapias from Malang Regency have lower TVB compared to Sidoarjo at 12 hours storage, respectively.

TVB is suitable as meat quality indicator. Ruiz-Capillas and Moral (2001) reported, pH, TMA and TVB are suitable as meat quality indicator since it have a good correlation. TVB produced by microbial activity and proteolysis.

Conclusion

Live fish transportation has a big impact on the tilapia meat quality. Practicing standard live fish transportation from FAO (ISBN 92-5-102380-8) is suggested as a solving problem.

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