

HEAVY METAL Pb REDUCTION IN CONSUMPTION FISH MEAT FROM FLOATING NET CAGES IN CIRATA RESERVOIR USING CITRIC ACID



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ABSTRACT

This study aims to reduce the heavy metal Pb content in meat of carp, tilapia and catfish are cultured in floating net cages (FNCA) Cirata Reservoir using citric acid. The method used is experimental with two treatments. The first treatment was citric acid concentration consisting of 4 levels ie 15%, 20%, 25% and 30%. The second treatment is the duration of the soaking which consists of 5 levels ie 30 minutes, 60 minutes, 90 minutes, 120 minutes and 150 minutes. Each combination of treatments was repeated 2 times. The observation was done on Pb of fish meat using AAS (Atomic Absorption Spectrometry) method and its testing procedure based on SNI 2354.5: 2011. Pb data was analyzed descriptively and compared with the quality standard. The results showed that Pb content in carp meat was below the standard allowed in the treatment of 15% concentration of citric acid with 150 minutes of soaking time. The initial Pb content in carp meat was 3.152 ppm. The content of Pb in tilapia meat has been below the standard allowed on the treatment of 25% concentration of citric acid with 150 minutes of soaking time. The initial Pb content in tilapia meat was 3.878 ppm. The content of Pb in catfish meat has been below the permissible quality standard at the treatment of 25% concentration of citric acid with the duration of soaking 120 minutes. The initial Pb content in catfish meat was 3.911 ppm.

Keywords: heavy metal, FNCA, Cirata Reservoir, Citric Acid

INTRODUCTION

The heavy metals in the water of Cirata reservoir could be bioaccumulated in the aquatic organisms, including the cultured fish species. According to Benzer et al¹. (2013), bioaccumulation of heavy metals could be occurred in the meat part. The accumulation of heavy metals in the fish meat could have a fatal impact to the human who consumed it. The heavy metals contained in fish meat could not be metabolized thus accumulated in the body. Moreover, they can significantly affect the health condition. Several health disorders could be observed such as dizziness, allergies and impaired growth of abnormal cells. Therefore, efforts should be made to overcome this health problem. One possible solution could be conducted such as the heavy metals binding from the heavy metals contaminated fish meat to decrease their concentration. This alternative solution could be implemented before the contaminated fish meat are processed and consumed by human.

A study from Junianto et al¹. (2015) estimated that areintensively cultured Tilapia, Carp and Pangasius in Cirata reservoir are heavily contaminated by the lead metal (Pb). The concentration of this contaminant has extremely surpassed the allowed national standard quality (2 ppm).

MATERIAL AND METHODS

The present study consists of 2 stages, first, was by evaluating the heavy metals contamination on the three most consumed freshwater fish, namely the Carp, Tilapia and Pangasius, in the West Java Province. Secondly, was by evaluation on citric acid as Pb binder by acidification technique.

Pb binding in the fish meat using acidification technique.

This stage was aimed to determine the concentration levels and submersion time as well as preparation technique of three fish species in order to reduce Pb concentration until the allowed standard (2 ppm) using citric acid as binder.

RESULT AND DISCUSSION

Pb concentration(ppm) in the Carp fish meat in different concentrations of citric acid and submersion times

| Submersion time (minutes) | Citric acid conc | | | |
|---------------------------|------------------|-------|-------|-------|
| | 15% | 20% | 25% | 30% |
| 30 | 2.842 | 2.704 | 2.545 | 2.311 |
| 60 | 2.615 | 2.485 | 2.225 | 2.098 |
| 90 | 2.379 | 2.239 | 2.075 | 1.888 |
| 120 | 2.165 | 2.035 | 1.866 | 1.754 |
| 150 | 1.943 | 1.843 | 1.685 | 1.576 |

The Pb concentration with light blue color indicates the concentration below the allowed national standard quality according to the Inspectorate of Foods and Drugs (Ditjen POM Republic of Indonesia)

Pb concentration(ppm) in the Tilapia meat in different concentrations of citric acid and submersion times

| Submersion time (minutes) | Citric acid conc | | | |
|---------------------------|------------------|-------|-------|-------|
| | 15% | 20% | 25% | 30% |
| 30 | 3.511 | 3.366 | 3.300 | 3.183 |
| 60 | 3.255 | 3.109 | 2.913 | 2.688 |
| 90 | 3.032 | 2.889 | 2.638 | 2.205 |
| 120 | 2.877 | 2.633 | 2.297 | 1.905 |
| 150 | 2.708 | 2.460 | 1.989 | 1.822 |

The Pb concentration with yellow color indicates the concentration below the allowed national standard quality according to the Inspectorate of Foods and Drugs (Ditjen POM Republic of Indonesia)

Pb concentration(ppm) in the Pangasius meat in different concentrations of citric acid and submersion times

| Submersion time (minutes) | Citric acid conc | | | |
|---------------------------|------------------|-------|-------|-------|
| | 15% | 20% | 25% | 30% |
| 30 | 3.483 | 3.318 | 3.099 | 2.875 |
| 60 | 3.111 | 2.951 | 2.575 | 2.275 |
| 90 | 3.111 | 2.725 | 2.025 | 1.903 |
| 120 | 2.500 | 2.433 | 1.933 | 1.799 |
| 150 | 2.311 | 2.145 | 1.772 | 1.655 |

The Pb concentration with red color indicates the concentration below the allowed national standard quality according to the Inspectorate of Foods and Drugs (Ditjen POM Republic of Indonesia)

CONCLUSION

The present study showed that Pb concentration in Carp meat could be decreased from 3.152 ppm to the allowed level (< 2 ppm) at 15% of citric acid with 150 minutes of submersion time. As for Tilapia, Pb concentration in this fish reduced from 3.878 ppm to the allowed level at 25% of citric acid with 150 minutes of submersion time. On the other hand, Pb concentration in Pangasius meat successfully reduced from 3.911 ppm to the allowed level at 25% of citric acid with 120 minutes of submersion time.

REFERENCES

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