
(*Ctenopharyngodon idella*)

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Archive of SID

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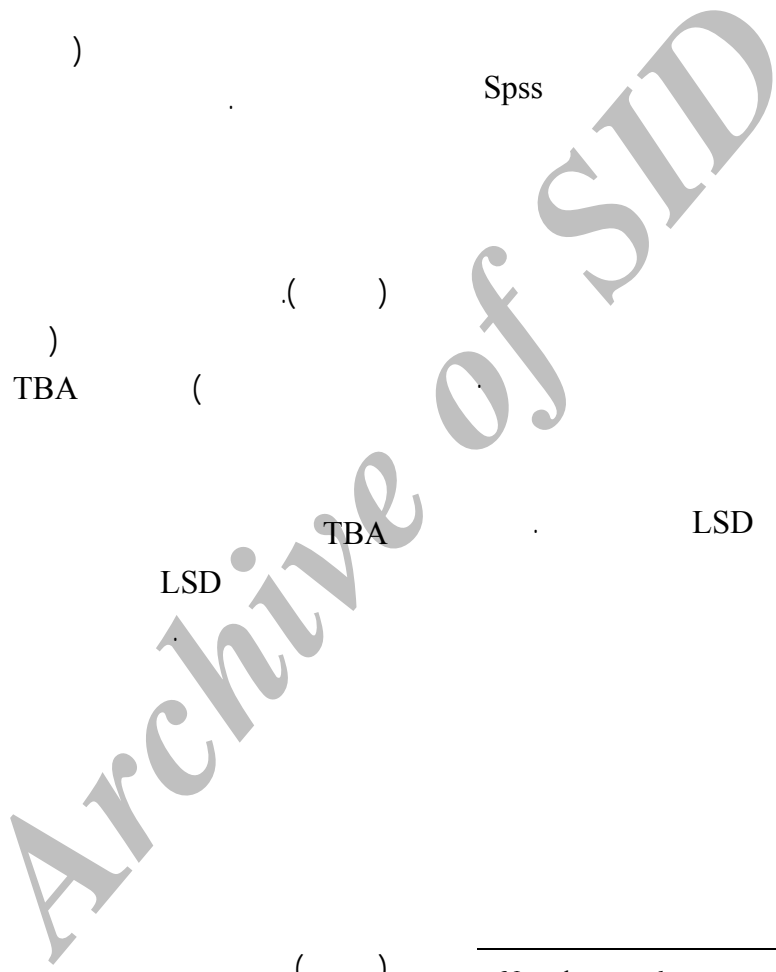
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() AOAC

- Bligh & Dayer

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- Omega -3
 - Omega-6
 - Poly unsaturated fatty acid
 - Rancidity
 - *Ctenopharyngodon idella*
 - *Cyprinidae*

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 ()
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) / /
 (/ () ()
 ()
 ()
 Spss
 ()
)
 () TBA (%
 TBA
 TBA LSD
 TBA PV
 (r= /)
 FFA
 FFA



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- Namulema *et al.*
 - Egan *et al.*
 - Clark *et al.*
 - Lin & Morrissey
 - Kolmogorav-Smirnov
 - Leven
 - Least significant difference
 - Kruskal-Wallis
 - Mann-Whitney

...

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(%) LSD

/ ± / ab	/ ± / a	/ ± / a	/ ± / ab	/ ± / ab	/ ± / a	M
/ ± / c	/ ± / bc	/ ± / bc	/ ± / ab	/ ± / a	/ ± / a	TL
/ ± / c	/ ± / b	/ ± / a	/ ± / d	/ ± / e	/ ± / f	PV
/ ± / a	/ ± / ab	/ ± / b	/ ± / c	/ ± / d	/ ± / d	TBA
/ ± / e	/ ± / de	/ ± / cd	/ ± / c	/ ± / b	/ ± / a	HI
/ ± / a	/ ± / a	/ ± / a	/ ± / b	/ ± / b	/ ± / b	FFA

TBA

FFA

PV

HI

TL

M :

/	/	/	/	/	/	
a	b	c	d	d	e	
/	/	/	/	/	/	
a	a	b	c	c	d	
/	/	/	/	/	/	
a	a	b	c	d	e	
/	/	/	/	/	/	
a	a	a	b	c	d	
/	/	/	/	/	/	
a	b	c	c	d	e	

Mann-whitney kruskal-wallis

< (Reject)

= (Acceptable)

=(Good)

=(Excellent)

FFA	HI	TBA	PV	TL	M	
/ *	/ **	/ *	/ **	/	/	M
/ **	/ **	/ **	/ **	/		TL
/ **	/ **	/ **	/			PV
/ **	/ **	/				TBA
/ **	/					HI
/						FFA

.(p≤ /)

.(p≤ /)

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TBA

PV

TL

M :

FFA

HI

/ **	/ **	/ **	/ **	/	
/ **	/ **	/ **	/		
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.(p≤ /)

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TBA PV
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FFA ()

FFA ()

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FFA

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(ATP

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-*R. frisii kutum*

-*L. aurata*

-*Ariomma indica*

- Monomolecular

- Bimolecular

- 9- Ackman, R.G. 1980. Fish Lipids. Part1. In *Advances in Fish Science and Technology*; J. J. Conell (Ed), Fishing News Book, Ltd, Farnham, Surrey, England; 1980; pp. 86-103.
- 10- AOAC. 1990. Association of Official Analytical Chemists, 15th (end), procedure 984. 25.
- 11- Aubourg P.S., Lehmann I. & M.J Gallardo, 2002. Effect of previous chilled storage on rancidity development in frozen horse mackerel (*Trachurus trachurus*); *J. Sci. Food Agric*, 82, pp. 176-1771.
- 12- Ben-Gigirey B., De Sousa J.M., Villa T.G. & J. Barros-velazquez, 1999. Chemical changes and visual appearance of albacore tuna as related to frozen storage. *J. Food Sci.* 64, pp. 20-24.
- 13- Bligh E. G., & W.J. Dyer, 1959. A rapid method of total lipid extraction and purification. *Can. J. Biochem. Physiol.* 37, pp. 911-917.
- 14- Clark E. M.; Mahoney A. W. & C. E. Carpenter, 1997. Heme and total iron in ready -to- eat chicken. *J. Agric. Food Chem.* 45, pp. 124-126.
- 15- Dragoev S.G., Kiosev D.D., Danchev S.A., Ionchev N.I. & N.S. Genv, 1998. Study on oxidative processes in frozen fish Bulgarian. *J. Agric Sci.* 4, pp. 55-65.
- 16- Egan H., Krik R.S. & R. Sawyer, 1997. Pearson`s Chemical Analysis of Foods. 9(edn), 1997, pp. 609-634.
- 17- Fisher J. & J.C. Deng, 1977. Catalysis of lipid oxidation: A study of mullet (*Mugil cephalus*) dark flesh and emulsion model system. *J. Food Sci.* 42, pp. 610-614.
- 18- Haard N.F., 1992. Biochemistry and chemistry of color and color change in seafoods. In: *Advances in Seafood Biochemistry. Composition and Quality*. G. J. Flick and R. E. Martin (Eds.), Technomic Publishing, Lancaster, Pennsylvania. pp. 305-360.53.
- 19- Hoke M. E., Jahnce M. L., Silva J. L., Hearnberger J.O., Chamul R. S. & O. Suriyaphan, 2000. Stability of washed frozen mince from channel catfish farms, *J. Food Sci.* 65: 1083-1086.
- 20- Hui, Y. H., 1996. Baileys industrial oil and fat products. Vol. 4, John Willey & Sons, U.S.A, 679 p.

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- 21- Hulin H. O. 1994. Oxidation of lipids in seafood, in *Seafood Chemistry Processing Technology and Quality*. F. Shahidi and J.R. Botta (Ed), pp. 49-74.
- 22- Lin D. & M.T. Morrissey, 1994. Iced storage characteristics of Northern Squawfish (*Ptychocheilus oregonensis*). *J. Aquat. Food Prod. Tech.* 3: 25-43.
- 23- Mazorra-Manzano M. A., Pacheco-Aguilar R., Diaz-Rojas E. I. & M. E. Lugo-Sanchez, 2000. Postmortem changes in Black Skipjack muscle during storage in ice. *Journal of Food Science*. 65 (5): 774-779.
- 24- Medina, I. S. Auborg & R. Perez-Martin, 1995. Composition of phospholipids of white muscle of six Tuna species. *Lipids*, 30, no. 12, pp. 1127-1135.
- 25- Namulema A., Muyonga J. H. & A. N. Kaaya, 1999. Quality deterioration in frozen Nile perch (*Lates niloticus*) stored at -13 and -27°C . *Food Research International*. 32, pp. 151-156.
- 26- Pacheco-Aguilar R., Lugo-Sachez M.E. & R. Robles-Burgueno, 2000. Postmortem biochemical and functional characteristic of Monterey sardine muscle stored at 0°C . *J. Food Sci.* 65, 40-47.
- 27- Perez-Alonso, F., C. Arias, & S. P. Auborg, 2003. Lipid deterioration during cold storage of Atlantic pomfret (*Brama brama*). *Journal of Lipid Science and technology*, 105, pp. 661-667.
- 28- Saeed S. & N.K. Howell, 2001. 12-lipoxygenase activity in the muscle tissue of Atlantic mackerel (*Scomber scombrus*) and its prevention by antioxidants. *J. Sci food Agric*, 81: 745-750.
- 29- Sankar T. V. & M. R. Raghunath, 1995. Effect of Pre-Freezing Iced Storage on the Lipid Fraction of *Ariomma indica* during Frozen Storage. *Fishery Technol*, 32, no. 2, pp. 88-92.
- 30- Shewfelt R.L., 1981. Fish muscle lipolysis-A review, *J. Food Biochem.* 5, 79-100.
- 31- Siddaih D., G. Vdya, C. V Raju & T. C. Chandracekhar, 2000. Changes in Lipids, protein and kamaboko forming ability of Silver carp (*Hypophthalmichthys molitrix*) mince during frozen storage. *Journal of Food research International*. 34, pp. 47-53.
- 32- Toyomizu M., K. Hanaoka, & K. Yamaguchi, 1981. Effect of release of free acids by enzymatic hydrolysis of phospholipids on lipid oxidation during storage of fish muscle at -5°C ; *Bull. Jap. Soc. Sci. Fish.* 47. pp. 615-610.
- 33- Vidya, S. R. G. & L. N. Srikar 1996. Effect of preprocess ice storage on the lipid changes of Japanese threadfin bream (*Nemipterus japonicus*) mince during frozen; *Asian Fisheries Science*. 9, pp. 109-114.

Sensory Evaluation and Lipid Quality of Grass Carp (*Ctenopharyngodon idella*) Stored in Ice

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(Received 29 May 2005, Accepted 27 June 2007)

Abstract

In this research, variation in the lipid content of grass carp (*Ctenopharyngodon idella*) during 20 days of storing it in ice was investigated qualitatively. The quality of the fat of the grass carp, in terms of oxidative and hydrolytic deterioration, significantly reduced over the storage period ($P < 0.05$). Also statistical analysis showed significant increase in peroxide value (PV), thiobarbitoric acid (TBA) and free fatty acid (FFA), and significant decrease in heme iron (HI). The quality and freshness of the meat of the grass carp was reported good to excellent until the fourth day and as well good to acceptable until the tenth day according to sensory evaluation of texture, general appearance, eye, color and smell of gills.

Keywords: Sensory evaluation, Lipid quality, Ice, Shelf life, Grass carp (*Ctenopharyngodon idella*)

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