Effect of traditional handling and preservation on the quality of Bardwiel lagoon fish during storage in ice

Hatab, Shimaa R., A. A. El-Shibiny, M. G. Abdel-Fadeel and S. I. Ghoneim
Food and Dairy Sciences and Technology Dept., Faculty of Environ. Agric. Sci., Suez Canal Univ., El-Arish, Egypt.

Received: *11/5/2009*

Abstract: Fresh fish is a highly perishable raw material that will deteriorate rapidly if it is poorly handled. The effects of traditional handling and preservation techniques on the quality of Mulet fish (*Mugil cephelus*) have been nvestigated. The fish were divided into tow groups. The first group was directly transferred in ice box to the laboratory and reserved under laboratory conditions whereas; the second group was transferred to the market by traditional methods and preserved under market condition. All samples were evaluated regularly for chemical, bacteriological and sensory tests. The results showed that there were significant differences ($P < 0.05$) between laboratory samples and market samples during storage period. These results indicated that bad handling and preservation techniques affect the quality of mullet fish of Bardwiel lagoon.

Keywords: Fish, Handling, Ice preservation, Bardwiel Lagoon, Fish quality.

INTRODUCTION

Fish are considered an ideal low caloric food source. It is low fat and high in protein. It is also considered a rich source for minerals and vitamins (Silva and White, 1994). Fish, especially saltwater fish, is high in Omega-3 fatty acids which are heart-friendly, and a regular diet of fish is highly recommended by nutritionists (Chan, 2009). This is supposed to be one of the major causes of reduced risk for cardiovascular diseases in Eskimos.

Despite the fact that fish is one of the most important sources of animal protein, statistics show that there is a shortage in fish consumption in Egypt estimated by 27% compared to the estimated global where per capita in Egypt is 12.45 kg while the global average per capita is about 15.8 kg during the period from 2002 to 2004 (GAFRD, 2004).

Freshness is one of the main quality attributes for fish commercialization and consumption (Barat *et al.*, 2008). Fresh fish have a short shelf-life, which causes substantial practical problem for their distribution. Improvement in the shelf-life of the products can has an important economic impact by reducing losses attributed to spoilage and by allowing the products to reach distant and new markets (Rhodehamel, 1992). The high perishability of fish is attributed to several intrinsic factors. Fish is subjected to contamination with different microorganisms from different sources during fishing, handling, vessel sanitation, processing and storage condition (Ward and Bay, 1988). Bacterial populations associated with wild and farmed fish depend on the rearing conditions and the autochthonous bacterial strains in the environment (Hansen *et al.*, 1992). The microbiological control and management of water may be decisive to the health of fish species (Blanch *et al.*, 2009).

Bardwiel lagoon in North Sinia is one of the biggest sources of fish, its production is about 3534 tons per year (GAFRD, 2005). The Bardwiel lagoon is internationally famous for various fish species such as sea bass, sea bream and mullet so, necessary measures should be taken to keep the lagoon as it is in order to guarantee the good quality of the fish. Therefore, the present study was aimed to recognize the chemical and biological changes on fish quality of Bardawil lagoon after handling and preservation.

MATERIALS AND METHODS

The present study was carried out in Food and Dairy Science & Technology Department, Faculty of Environmental Agricultural Sciences, Suez Canal University, EL-Arish North, Sinai, Egypt.

Collection of samples

About twenty kilograms of fresh caught Mulet fish (*Mugil cephelus*) were collected from Bardwiel lagoon and used in this study. The fish were divided into 2 groups (10 kg each). The first group was directly transferred in ice box to the laboratory and preserved under laboratory conditions whereas; the second was transferred to the market by traditional methods and preserved under market condition. All samples were examined as follow:

Chemical examination

Determination of pH value

The pH values were determined according to the method reported by A.O.A.C. (1995)

Reflective index of the eye fluids

Reflective index of the eye fluids as an index of proteolysis was measured according to Ghoneim (1974).

Total Volatile Bases Nitrogen (T.V.B.N.) and Trimethylamine (T.M.A)

Total Volatile Bases Nitrogen (T.V.B.N.) and Trimethylamine (T.M.A) were determined according to the methods of AMC (1979).

Thiobarbituric acid (T.B.A)

The Thiobarbituric acid value was estimated according to the method recorded by Siu and Draper (1978).

Bacteriological examinations

Preparation of the sample

Each sample was placed on its side over sterile plate hold by a sterile forceps. The skin was sterilized by burning with ethyl alcohol and then removed. Ten grams of fish muscle were transferred to a sterile

blender Jar containing 90 ml of sterile 1% peptone water, the contents were homogenized for 2 minutes at 4000 rpm., the mixture was allowed to stand for 5 minutes at room temperature, one ml of the homogenate was transferred into a sterile separate tubes. Each tube contains 9 ml of peptone water, from which 10-fold serial dilutions up to 10^{-6} were prepared (APHA, 1992).

Enumeration of Aerobic Plate Count (APC)

Total Aerobic Plate Count (APC) was determined according to the method described by APHA (1992).

Enumeration of total psychrophiles count

Total psychrophiles count was determined according to the method mentioned by APHA (1992).

Enumeration of total coliform count

Total coliform count was determined according to ICMSF (1996).

Enumeration of total Vibrio count

Total *Vibiro* count were determined according to the method mentioned by APHA (1992).

Sensory examination

The sensory examinations were achieved according to the procedures recommended by Larsen *et al.*, (1992).

Statistical analysis:

Results of these parameters were statistically analyzed by student T-test, (ANOVA- test) by using SAS (1990).

RESULTS AND DISCUSSION

Chemical evaluations

Refractive index measurement

Eye refractive index is one of the factors that influence the freshness of fish. Changes in eye refractive index of Mullet fish stored under laboratory and market conditions are shown in Table (1). The highest eye refractive index value for laboratory samples was observed at day 6 whereas, the same value was observed at day 3 for these market samples. That result was in agreement with those obtained by **Ghoneim, (1974)**. The statistical analysis showed that there were significant differences ($P < 0.05$) between laboratory and market samples at the binging and after three days of storage. These results may indicate the effect of improper handling on the quality of fish and consequently on the eye refractive index as a freshness of fish.

The pH

The effect of market condition and storage time on the pH value of Mullet fish during ice storage is presented in Table (1). The initial pH value of the Mullet fish under market preservation condition at zero time was 6.61 whereas for the samples stored in ice under control preservation condition was 6.60. Changes in pH values showed no significant differences ($P > 0.05$) between market and laboratory samples. The pH values have increased by the time and these results are in agreement with those obtained by others for sea bass species stored in ice (Masyinom *et al.*, 2002; Tejada and Huidobro, 2002; Grigorakis *et al.*, 2003; Papadopoulos *et al.*, 2003). The pH values of live fish muscle is close to 7.0. However, post-mortem pH can vary from 6.0 to 7.1 depending on season, species and other factors (Simeonidou *et al.*, 1998).

Total volatile base nitrogen (TVB-N) and trimethylamine (TMA)

-Total volatile base nitrogen (TVB-N)

Both TVB-N and TMA are the most useful indices for spoilage in fresh and lightly preserved seafood (Dalgaard, 2000). The concentration of TVB-N in freshly caught fish is typically between 5 and 20 mg N/100 g, whereas levels of 30–35 mg N/100 g flesh are generally regarded as the limit of acceptability for ice-stored cold water fish (Connell, 1995). In our study, the initial TVB-N values (mg N/100 g muscle) in analyzed Mullet fish ranged from 5.10 ± 0.1 in laboratory samples to 11.98 in market samples (Table 1). The increase of the TVB-N value was then observed throughout the first days of storage, reaching a value of 35.58 mg N/100 g by day 6 in laboratory samples. However, a sharp rise of TVB-N value was noticed in the market samples, which reached a value of 39.04 mg N/100 g muscle on day 6. As for many fish species, the formation of TVB-N increased with the time of storage, and by the end of the storage period (day 6), a significant higher value ($P < 0.05$) was detected for TVB-N in market samples when compared with laboratory samples. Similar results have been reported by (Grigorakis *et al.*, 2003). Based on the results obtained from this study; TVB-N value could be useful in assessing the degree of Mullet fish deterioration during storage in the market condition.

-Trimethylamine (TMA)

The changes in TMA content in Mullet fish stored in ice under laboratory and market conditions are shown in Table (1). The initial TMA value ranged from 0.91 to 2.39 mg/100 g in muscles of examined fish in laboratory and market samples respectively. During storage period, the TMA value of laboratory and market samples increased steadily attaining final values of 10.79 mg/100 g and 16.08 mg/100 g in laboratory and market samples respectively at the end of the storage period (day 6). Significant differences ($P < 0.05$) have been observed between laboratory and market samples. The level of TMA found in fresh fish rejected by sensory panels varies between species, but is typically around 10–15 mg TMA-N/100 g in aerobically-stored fish (Dalgaard *et al.*, 1993). In the present study, the TMA values detected at the time of fish rejection, as estimated by the sensory attributes, was < 4 mg TMA-N/100 g for both laboratory and market samples. Similar results have been reported by other authors in sparidae species (Kyrana *et al.*, 1997 and Huidobro *et al.*, 2001).

TVB-N and TMA are directly related to the microbial spoilage in various species of fish during their storage under refrigerated conditions (Dalgaard, 2000). The values of TVB-N and TMA were low during the edible storage period and increased rapidly when the fish was near to rejection. Therefore, TVB-N and TMA are considered unreliable to estimate the degree of freshness in the early stages of storage of Mullet fish

and they only reflect the degree of spoilage in the later stages.

Thiobarbituric acid (T.B.A)

TBA index is a widely used as indicator for the assessment of the degree of lipid oxidation (Nishimoto *et al.*, 1985). In the present study, no significant differences ($P > 0.05$) were observed in TBA values between laboratory and market samples. TBA values were increased from 0.87 to 3.24 mg and from 0.89 to 4.10 mg malonaldehyde /kg during storage period in laboratory and market samples, respectively (Table 1). These results are in agreement with those reported by (Khuntia *et al.*, 1993).

Microbiological evaluation

Total bacterial count

The present study focused on determining total bacterial, total psychrophilic counts, *Vibrio* spp and coliform group. The total bacterial count results for laboratory and market samples are present in Table (2). It was clear that, the total bacterial counts in fish stored under control condition were lower than those of fish stored under market condition with significant differences ($P < 0.05$). Initial total bacterial counts of market samples were ranged from 5.95 to 10.96 $\log_{10}$ CFU/g whereas in laboratory samples ranged from 4.9 to 9.97 $\log_{10}$ CFU/g during storage period (6 days). Similar results have been reported by Kyrana and Lougovois, (2002) and Papadopoulos *et al.* (2003). On the other hand, Ababouch *et al.* (1991) showed that, sardines stored at ambient temperature (21–27°C) experienced more rapid microbial growth than those stored in ice, while at ambient temperature, mesophiles multiplied more rapidly. The common number of spoilage bacteria at the point of rejection of fish products are about 10^7–10^9 CFU/g (Huss *et al.*, 1997; Ólafsdòttir *et al.*, 1997).

Total psychrophilic count

The total psychrophilic counts are presented in Table (2). The increases in total psychrophilic count of Mullet fish during storage under market and laboratory condition were significant. The initial total psychrophilic count of market samples was 4.24 $\log_{10}$ CFU/g at zero time, this value increased to 7.61 $\log_{10}$ CFU/g. Whereas, in Mullet fish stored under laboratory condition it was less than the detectable value at zero time and increased to 6.95 $\log_{10}$ CFU/g at the end of storage period. Mol *et al.* (2007) stated that, psychrophilic aerobic bacteria counts were around 6 $\log_{10}$ CFU/g, when the horse mackerel and cod fish samples spoiled. It was reported that, estimation of the psychrophilic microorganisms gives better results to the shelf-life estimation of chilled fish than mesophilic bacteria and 6 $\log_{10}$ CFU/g could be accepted as the acceptability limit. Similar results were reported with different kinds of fish by Cutting and Spencer, (1968); Youssef *et al.* (1985); Awad, (1998) and Russell, (1997).

Total Vibrio species

Despite the fact that, naturally occurring *Vibrio* spp. can be difficult to culture (Huq and Colwell, 1995), the changes in *Vibrio* counts of Mullet fish during storage in ice under market and laboratory conditions are enumerated and shown in Table (2). *Vibrio* counts of market samples increased steadily to 4.55 $\log_{10}$ CFU/g at day 6, whereas for laboratory samples they were 4.37 $\log_{10}$ CFU/g at the same day. There were significant differences ($P<0.05$) between market samples and laboratory samples and this pointed out the effect of poor handling on the quality of fish. Interestingly, these bacteria are able to survive, proliferate and persist in all stages of fish rearing nursery even after seawater treatment with UV light (Snoussi *et al.*, 2009).

Total coliform group

All samples which stored under laboratory and market conditions have been examined for the presence of coliform group. The results were negative which means that, there was no contamination with human and worm-blooded feces in Bardwiel lagoon.

Sensory evaluation

Changes in organoleptic attributes of Mullet fish (under laboratory and market preservation conditions) during storage in ice were recorded using the descriptions given by the individual panel members. Descriptions in Table (3) cover the range from freshly harvested to inedible fish, Rigor mortis, metallic sheen and iridescence of the skin as well as glossy, bright red gills possessing seaweedy and shellfish odours should be considered as attributes of extreme freshness, whereas loss of brilliance and iridescence, fading of skin colours and bleaching of the gills in patches would indicate stale fish. It can be noticed from Table (3) that excellent and very good grades were scored at 0 time of storage for Mullet fish under laboratory preservation condition and under market preservation condition and also during the first 3 days of storage for laboratory preservation condition. Moderate grades were obtained between day 3 and day 6 of storage for laboratory preservation condition, and after day 0 for market preservation condition. Unfit for sale raw fish samples were obtained after day 6 of storage for laboratory preservation condition and between day 3 and day 6 of storage for market preservation condition. These results are in agreement with those obtained by Bonkase *et al.*, (2000), Dutta *et al.* (2004) and Wetterskog and Undeland (2004).

In conclusion, the adoption of improved fish handling practices, including icing and grading the fish at Bardawil lagoon will improve the quality of fish.

Table (1): Some quality attributes of Mullet fish during storage under control and market conditions.

Storage period (days)	Eye refractive index			pH values			T.V.B.N (mg/100g)			T.M.A (mg/100g)			T.B.A (mg/ Kg)		
	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value
	Mean ±S.D.	Mean ±S.D.		Mean ±S.D.	Mean ±S.D.		Mean ±S.D.	Mean ±S.D.		Mean ±S.D.	Mean ±S.D.		Mean ±S.D.	Mean ±S.D.	
0	1.3346 ±0.0001	1.3357 ±0.0003	0.012	6.600 ±0.06	6.61 ±0.03	0.802	5.100 ±0.10	11.98 ±0.04	0.00008	0.91 ±0.07	2.39 ±0.05	0.001	0.87 ±0.03	0.89 ±0.02	0.368
3	1.3371 ±0.0008	1.3394 ±0.0003	0.014	6.630 ±0.02	6.73 ±0.03	0.061	20.11 ±0.14	22.66 ±0.31	0.004	5.64 ±0.58	7.00 ±0.09	0.044	1.89 ±0.02	1.92 ±0.01	0.383
6	1.3395 ±0.0001	1.3452 ±0.0003	0.0004	6.890 ±0.01	6.9 ±0.01	0.225	35.58 ±0.56	39.04 ±0.15	0.014	10.79 ±0.20	16.08 ±0.08	0.001	3.24 ±0.31	4.10 ±0.19	0.089

Table (2): Microbiological evaluation of examined Mullet fish during storage under laboratory and market conditions (log_{10} CFU/g).

Storage period (days)	Total bacterial counts (Log_{10} CFU/g)			Total psychrophilic counts (Log_{10} CFU/g)			*Vibrio* counts (Log_{10} CFU/g)		
	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value	Laboratory samples	Market samples	*P* value
	Mean ± S.D.	Mean ± S.D.		Mean ± S.D.	Mean ± S.D.		Mean ± S.D.	Mean ± S.D.	
0	4.90 ± 0.02	5.95 ± 0.01	0.0001	N/A	4.24 ± 0.06	0.00007	N/A	2.36 ± 0.01	0.002
3	7.58 ± 0.03	7.88 ± 0.03	0.008	5.64 ± 0.02	5.90 ± 0.01	0.004	2.77 ± 0.07	3.62 ± 0.03	0.004
6	9.97 ± 0.02	10.96 ± 0.03	0.0003	6.95 ± 0.01	7.61 ± 0.02	0.0004	4.37 ± 0.04	4.55 ± 0.05	0.014

N/A= Not applicable

Table (3): Changes in organoleptic attributes in examined Mullet fish during storage under laboratory and market conditions.

Days		Laboratory Storage			Market Storage		
		0	3	6	0	3	6
General appearance	Skin	10	7	4	9	5	3
	Stiff	10	6	4.5	8	5	2
	Betty	10	6	3	8	5.5	2
	Odour	10	5	3.5	9	4	1
Eyes	Clarity	10	5.5	3	8	5	2
	Shape	10	6	3	8	6	1
Gill	Colour	10	5	3	8	5	1
	Smell	10	6	3	9	4.5	1
	%	100	58.13	33.75	83.75	50	16.25

REFERENCE

Ababouch, L., M. E. Afilal, S. Rhafiri and F. F. Busta (1991). Identification of histamine-producing bacteria issolated from sardine (*Sardina pilchardus*) stored in ice and ambient temperature (25°C).Food Micro. 8: 127–136.

AMC (1979). Recommended methods for the examination of fish and fish products. Analyst, 104,433.

AOAC (1995). Official methods of analysis of the association of analytical chemists (16th Ed.). Washington, D.C. USA.

APHA, (American Public Health Association) (1992). In C. Vanderzant and D. F. Splittsloesser (Eds.), Compendium of methods for the microbiological examination of foods (3rd Ed.). Washington, DC: APHA.

Awad, H. A. E. (1998). Shelf life of Tilapia nilotica stored in ice. Assiut Vet. Med. J. 39 (77), 133-144.

Barat, J. M., L. Gil, E. García-Breijo, M. Aristoy,F. Toldrá, R. Martínez-Máñez and J. Soto (2008). Freshness monitoring of sea bream (*Sparus aurata*) with a potentiometric sensor. Food Chem., 108 (2): 681-688

Blanch, A. R.; Hispano, C.; Bulto, P.;'Balleste, E.; Gonzâlez-Lòpez, J. and Vilanova, X. (2009) Comparison of *Vibrio* spp. populations found in seawater, in exhibition aquaria, in fish intestine and in fish feed. J. Appl. Micro. 106: 57–65.

Bonkase, N., C. Osterberg and J. Nielsen (2000). Influence of freshness and frozen storage temperature on quality of thowed cod fillets stored in modified atmosphere packaging. Lebensmittel-Wissenschaft und-Technologie, 33(3) 244-248.

Chan, E. J. (2009). What can we expect from omega-3 fatty acids? Cleveland Clinic J. of medicine, 76 (4): 245-251

Connell, J. J. (1995). Control of fish quality (4th ed.). London: Fishing News Boks Limited.

Cutting, C. L. and R. Spencer (1968). Fish and fish products. Quality control in the food industry. Vol.2. Academic press, London, New York.

Dalgaard, P. (2000).Fresh and lightly preserved seafood. C. M. D.Man & A. A. Jones (Eds.), Shelf-life evaluation of foods. Gaithersburg, MD, USA: Aspen Publishing Inc. (2nd ed., pp. 110–139).

Dalgaard, P., L. Gram and H. H. Huss (1993).Spoilage and shelf life of cod fillets packed in vacuum or modified atmospheres. Int. J. Food Microbiol. 19: 283-294.

Dutta, C., K. Dora, S. Sarkar and B. Chand (2004). Storage Characteristics of fish ball prepared surimi of Rohu, Labio rohita. J. Appl. Zool. Res. 15 (1): 78-80.

GAFRD (2004). Report of General Authority for fish Resources Development on Fishery Egyptian. ministry of agriculture, Egypt

GAFRD (2005). Report of General Authority for fish Resources Development on Fishery Egyptian.

Ghoneim, S. I. M. (1974). Comparative studies on the freshness indices of fish. M.Sc. thesis, Faculty of Agriculture, Ain Shams University.

Grigorakis, K., K. D. Taylor and M. N. Alexis (2003). Seasonal patterns of spoilage of ice-stored cultured gilthead sea bream (*Sparus aurata*). Food Chem., 81: 263–268.

Hansen, G. H., E. Strom and J. A. Olafsen (1992). Effect of different holding regimens on the intestinal microflora of herring (*Clupea harengus*) larvae. Appl Environ Microbiol 58, 461–470.

Huidobro, A., R. Mendes and M. L. Nunes (2001). Slaughtering of gilthead seabream (*Sparus aurata*) in liquid ice: Impudence of fish quality. Eur. Food Res. and Techno., 213: 267–272.

Huq, A. and R. R. Colwell (1995). A microbiological paradox: viable but nonculturable bacteria with special reference to Vibrio cholerae. J. Food Prot., 59: 96–101.

Huss, H. H. (1997). Control of indigenous pathogenic bacteria in seafood. Food Control, Vol. 8, No. 2, pp. 91-98, 1997.

ICMSF (1996). Microorganisms in foods. 5. Characteristics of microbial pathogens. International Commission on Microbiological Specifications for Foods (ICMSF) Blackie Academic & Professional, London.

Khuntia, B. K., L. N. Srikar, L. N. Reddy and B. R. Srinivasa (1993). Effect of food additives on quality of salted pink perch (*Nemipterus japonicas*). J. Food Sci. Technol., 30 (4), 261.

Larsen E. P., J. Heldbo, C. M. Jespersen and J. Nielsen (1992). Development of a standard for quality assessment on fish for human consumption. In: H.H. Huss, M. Jacobsen and J. Liston (eds.) Quality Assurance in the Fish Industry. Proceedings of an International Conference, Copenhagen, Denmark, August 1991. Elsevier, Amsterdam, 351-358.

Masyinom, P., S. Benjakul and W. Visessanguan (2002). Shelf-life extension of refrigerated sea bass slices under modified atmosphere packaging. J. Sci. Food Agric. 82, 873–880.

Nishimoto, J., I. K. Suwetja and H. Miki (1985). Estimation of keeping freshness period and practical storage life of mackerel muscle during storage at low temperatures. Mem. Fac. Fish. Kagoshima Univ. 34, pp. 89–96.

Olafsdòttir, G., E. Martinsdòttir, P. Oehlenschlãger, P. Dalgaard, B. Jensen, I. Undeland, I. M. Mackie, G. Henehan, J. Nielsen and H. Nilsen (1997). Methods to evaluate fish freshness in research and industry. Food Sci. and Techno., 8: 258–263.

Papadopoulos, V., I. Chouliara, A. Badeka, I. N. Savvaidis and M. G. Kontominas (2003). Effect of gutting on microbiological, chemical, and sensory properties of aquacultured sea bass (*Dicentrarchus labrax*) stored in ice. Food Micro., 20: 411–420.

Rhodehamel, E. J. (1992). FDA's concerns with sous vide processing. Food Technol., 46:73-76.

Russell, S. M. (1997). Capacitance Microbiology as a means of determining the quality of spoilage bacteria on fish fillets. J. Food Prot., 61: (7):844-848.

SAS (1990). SAS/ STAT user's guide. Cary, NC, USA: Statistical Analysis System Institute.

Simeonidou, S., A. Govaris and K. Vareltzis (1998). Quality assessment of seven Mediterranean fish species during storage on ice. Food Res.Int., 30: 479–484.

Siu, G. M. and H. H. Draper (1978). A survey of the malonaldehyde content of retail meats and fish. J. Food Sci., 43: 1147–1149.

Snoussi, M., E. Noumi, H. Hajlaoui, D. Usai, L. A. Sechi, S. Zanetti and A. Bakhrouf (2009). High potential of adhesion to abiotic and biotic materials in fish aquaculture facility by *Vibrio alginolyticus* strains. J. Applied Micro., 106 (5): 1591 – 1599.

Tejada, M. and A. Huidobro (2002). Quality of farmed gilthead sea bream (Sparus aurata) during ice storage related to the slaughter method and gutting. Eur. Food Res. Technol. 215, 1–7.

Ward, D. R. and N. J. Bay (1988). Factors affecting microbiological quality of sea food. Food Technol., 42: 85-89.

Wetterskog, D. and I. Undeland (2004). Loss of redness as a tool follow hemoglobin-mediated lipid oxidation in washed cod mince. J. Agric. Food Chem. 52 (24): 7214-7221.

Youssef, H., A. El-Timawy and Y. Hefnawy (1985). Microbial quality of fresh water fish. Assiut Veterinary Medical J. 14 (28): 109-114.

تأثير طرق التداول والحفظ التقليدية علي جودة اسماك بحيرة البردويل أثناء التخزين فى الثلج

شيماء رضا حطب- أيمن عبد المجيد الشبيني- مجدي غانم عبد الفضيل- سمير إبراهيم غنيم
قسم علوم وتكنولوجيا الأغذية والألبان- كلية العلوم الزراعية البيئية بالعريش- جامعة قناة السويس- مصر

أجريت هذه الدراسة بمعامل قسم علوم وتكنولوجيا الأغذية والألبان، كلية العلوم الزراعية البيئية بالعريش، جامعة قناة السويس خلال الفترة من ٢٠٠٧-٢٠٠٨ م وقد تمت هذه الدراسة على أسماك العائلة البورية المنتجة من بحيرة البردويل بمحافظة شمال سيناء.

تم استخدام ٢٠ كجم من اسماك العائلة البورية بعد الصيد مباشرة وكان وزن السمكة حوالي ٢٥٠ جرام تقريبا و قسمت الأسماك إلي مجموعتين بواقع ١٠ كجم سمك لكل مجموعة. المجموعة الأولي تم نقلها إلي المعمل بعد الصيد مباشرة تحت ظروف محكمة وخزنت في المعمل تحت ظروف كاملة الإحكام. المجموعة الثانية نقلت الأسماك إلي السوق بالطريقة التقليدية المتبعة وخزنت تحت ظروف التخزين في المعمل علي درجة حرارة الغرفة. أظهرت النتائج وجود فروق معنوية بين مجموعة الأسماك المخزنة بالمعمل ومجموعة العرض السوقي ، حيث أمكن خلال هذه الدراسة اثبات حدوث انخفاض في الخواص الظاهرية للأسماك العرض السوقي مقارنة بالأسماك التي نقلت إلي المعمل (المجموعة الضابطة) حيث كان متوسط النتائج المتحصل للخواص الظاهرية عليها عند اليوم صفر ١٠٠ % للمجموعة الضابطة و٨٣،٧٥% لعينات السوق، كما أوضحت النتائج وجود فروق معنوية بالنسبة للاختبارات الميكروبيولوجية والكيميائية بما يشير إلي التأثير السلبي لعمليات التداول والعرض السوقي للأسماك والتي تؤثر علي جودة الأسماك.