PE8.24 Quality Changes of Fish Burgers Prepared from Deep Flounder (Pseudorhombus elevatus Ogilby, 1912) with and without Coating During Frozen Storage (-18ºC) 251.00

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Abstract: In the present study, chemical, and sensory qualities of fish burgers prepared from deep flounder (Pseudorhombus elevatus Ogilby, 1912) with and without coating (Group A and Group B, respectively) or batter and breading materials were determined during frozen storage at -18ºC for 5 months. According the statistical results, TVB-N of two groups increased significantly ($p<0.05$) but a significant decrease ($p<0.05$) was observed at the third month for Group A. TBA value of Group A decreased significantly ($p<0.05$) with the storage time, whereas a significant increase ($p<0.05$) was observed for Group B as storage time continued. There were significant differences of pH in either the Group A or Group B between the beginning and end of the storage periods ($p<0.05$). sensory parameters for two groups decreased ($p<0.05$) but Group B indicate better scores than Group A at the end of the storage period.

Key words: Deep flounder (Pseudorhombus elevatus Ogilby, 1912), Fish burger, Coating, Frozen storage, Quality

I. INTRODUCTION

Fish burgers are one of the value added and acceptable fast food products in the world [1, 2] These products stored and sold in the frozen status [3]. During the frozen storage deterioration due to lipid oxidation and protein denaturation limit the storage time [4, 5]. Deep flounder as marine fish specie, distributed in the Persian gulf and the sea of Oman [6]. Utilization of less valuable fishes is a serious problem between iranian fisheries [7]. Studies in the production of fishery fast food products in Iran are developing newly. Thus the objective of this research was to produce fish burger from deep flounder with and without coating and evaluate chemical and sensory attributes during storage at -18ºC for 5 months. .

II. MATERIALS AND METHODS:

Formulation of fish burgers were composed of 80% deep flounder meat and and 20% other ingredients. Produced fish burgers were packaged in bags and then stored at -18ºC for 5 months. For production fish burgers without batter and breading materials (Group B) coating and frying stages were eliminated. For determination chemical analyses coating materials from Group A were removed. Thiobarbituric acid value (TBA, mg malonaldehyde/ kg) was determined by a distillation method [8]. pH value was measured et the end of every month too [9]. Total volatile base nitrogen (TVB-N, mg N/100g) were determined according to Safari and Yosefian (2006) [10]. Determination of moisture content were performerd according to ISO 1442 (1973) [11]. For Sensory evaluation, 11 experienced panelists have to scored for sensory parameters using a 8 point hedonic scale (1, dislike extremely to 8, like extremely) [12]. For statistical analysis independent sample t test and Mann- Whitney U using the SPSS 11.5 for windows were performed.

III. RESULTS:

The pH value in the fish burgers of both Group A and Group B significantly increased but then decreased to 6.83 and 6.85 respectively ($p<0.05$) at the end of storage period (Table 1). Moisture content rather than initial of period increased for Group A ($p<0.05$) but indicate a decrease for Group B ($p>0.05$). The TVB-N value of both Group A and Group B significantly increased from 11.66 to 14.60 and 5.78 to 28.15 respectively ($p<0.05$). The TBA value for Group A decreased significantly ($p<0.05$) from 1.01 to 0.22 the end of the storage period, whereas for Group B significantly increased ($p<0.05$) from 0.15 to 0.81 at the end of the third month then decreased significantly to 0.62 the end of frozen storage (Table 1). Sensorial parameters of both Group A and Group B decreased significantly during frozen storage ($p<0.05$). Scores of Group A were lower than Group B at the end of the storage period (Table 2).

IV. DISCUSSION:

Increasing the pH value could be caused by products such as ammonia and trimethylamine as a result of

decomposition, these compounds were produced by the endogenous enzymes of fish and bacterial spoilage [1, 13]. The increasing of TVB-N value at first months could be attributed to bacterial activity and endogenous enzymes of fish [1, 14]. Decreased or constant levels of TVB-N value may be result of CO2 content that have a bacteriostatic effect on aerobic microflora growth and were found that lactic acid bacteria are the final members of microbial flora irrespective of packaging conditions [15]so production of TVB-N could be limited. This hypothesis may be explained reduction at pH value. Group A indicated no moisture loss during storage due to presence of batter and breading materials. These materials were composed of polysaccharids and proteins, that these hydrophilic constituents indicate poor evaporation properties [16] Group A was pre-fried at 180ºC during production processing, heating at 180ºC could be encouraged or accelerated oxidation [17, 18]. So Group A had higher TBA value at the beginning of period. TBA value of Group A decreased as storage time continued, this may be result of interaction of decomposition products of proteins with malonaldehyde and formation of tertiary products [19]. Precooked meats are susceptible to lipid oxidation, and leads to formation of rancid or stale flavor, denoted as warmed-over flavor (WOF), during frozen storage [16]) so Group A because of pre-frying and high amount of lipid, quickly lost its sensory attributes than Group B. also after frozen storage, the fish muscle lost its natural structure due to denaturation of myofibrillar proteins [4].

V. CONCLUSION

Group B had better quality characteristics rather than Group A at the end of 5th month. This conclusion were not supported by the results of chemical analysis. The suggested maximal holding time for deep flounder fish burgers is not based on the chemical analysis but on sensory factors such as texture, taste and colour of this food. This study showed that batter and breading materials have no effect on rising of shelf life at deep flounder fish burgers.

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Table 1. pH, moisture (%), TVB-N (mg N/100g) and TBA (mg malonaldehyde/kg) in Group A and Group B during frozen storage (-18ºC).[1,2,3]

Analysis	Group	months of storage					
		0	1	2	3	4	5
pH	A	6.53±0.05^{a}	6.78±0.02^{b}	7.03±0.05^{c*}	6.93±0.02^{c}	6.80±0.00^{b}	6.83±0.02^{bc}
	B	6.56±0.05^{a}	6.80±0.05^{ab}	6.90±0.05^{bc}	6.93±0.02^{c}	6.86±0.02^{bc}	6.85±0.00^{b}
Moistur	A	65.58±0.46^{ab*}	66.74±0.27^{ac*}	65.86±0.14^{ab*}	66.23±0.18^{bd*}	66.92±0.1^{c*}	66.86±0.25^{dc}
	B	68.18±0.44^{a}	67.23±0.06^{a}	67.62±0.47^{a}	67.11±0.37^{a}	67.92±0.28^{a}	67.32±0.21^{a}
TVB-N	A	11.66±0.98^{a*}	16.88±0.56^{bd*}	20.97±0.49^{c}	15.25±0.56^{b*}	17.54±0.49^{d*}	14.60±0.49^{b*}
	B	5.78±0.00^{a}	15.25±0.56^{b}	20.31±1.41^{c}	26.85±1.47^{cd}	28.81±0.00^{d}	28.15±1.49^{d}
TBA	A	1.01±0.00^{a*}	0.68±0.00^{b*}	0.72±0.02^{b*}	0.35±0.00^{c*}	0.27±0.00^{de*}	0.22±0.02^{e*}
	B	0.15±0.03^{a}	0.56±0.01^{bd}	0.62±0.02^{be}	0.81±0.00^{c}	0.50±0.01^{d}	0.62±0.02^{e}

[1] Data are expressed as means± standard deviation (n=3).
[2] Means within the same column shown in * are satisfactory different at $p<0.05$.
[3] Means within the same row having different superscripts are significantly different at $p<0.05$.

Table 2. Changes in sensory attributes of fish burgers (Group A and Group B) during storage period at -18ºC.[1,2,3]

	Group	months of storage					
		0	1	2	3	4	5
Colour	A	7.18±0.40^{a*}	7.54±0.52^{b*}	5.27±0.64^{c*}	5.18±0.6^{c*}	4.27±0.78^{d}	3.18±0.87^{e}
	B	6.36±0.50^{a}	6.45±1.29^{a}	4.00±1.26^{bc}	3.90±1.37^{bc}	4.63±0.80^{b}	3.72± 0.78^{c}
Texture	A	7.72±0.46^{a*}	7.63±0.50^{a*}	6.18±0.98^{b*}	6.27±1.00^{b*}	4.09±0.70^{c*}	3.27±0.64^{d*}
	B	6.90±0.94^{a}	6.36±0.50^{a}	5.09±0.94^{b}	5.18±0.87^{b}	4.90±0.30^{b}	4.09±0.94^{c}
Taste	A	7.27±0.90^{a}	7.63±0.50^{a}	5.54±0.68^{b*}	5.45±0.68^{b*}	4.09±0.30^{c*}	3.18±0.75^{d*}
	B	6.81±1.25^{a}	6.90±1.51^{a}	4.27±0.90^{b}	4.00±1.09^{b}	4.90±0.30^{c}	4.18±0.87^{b}
General Acceptability	A	7.72±0.46^{a*}	8.00±0.00^{a*}	5.63±0.92^{b}	5.54±0.93^{b}	3.72±0.64^{c*}	3.00±0.77^{d*}
	B	6.72±0.78^{a}	6.72±0.78^{a}	4.90±1.04^{b}	4.63±1.12^{b}	4.63±0.80^{b}	4.18±1.07^{b}

[1] Data are expressed as means± standard deviation (n=11).
[2] Means within the same column shown in * are satisfactory different at $p<0.05$.
[3] Means within the same row having different superscripts are significantly different at $p<0.05$.