

Chemical composition and sensory quality of fish onion rings made from rainbow trout (*Oncorhynchus mykiss*)

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Received: 11 May 2018, Revised: 12 June 2018, Published Online: 30 June 2018

Abstract

In this study, it was aimed to generate of fish onion rings using *Oncorhynchus mykiss*. Based on the onion rings dough, wheat flour, corn flour, fish meat, salt, onion and cold water were added and stirred until a homogenous dough was obtained. Adding different proportion fish meat into the dough mixture, five different groups of onion rings were produced. After the mixture was formed as the shape of the onion ring by the dough shaping apparatus, the fish onion rings was applied in the freezing form for at least 2 days. Chemical composition (protein, moisture, ash, oil, and carbohydrate), energy values and sensory quality of the samples were obtained. Commenting the data determined as statistically; it was obtained that the difference between these five groups was significant ($p < 0.05$) with regard to food composition. Furthermore, energy values of the fish onion rings were determined the highest as 326.69 ± 13.61 Cal/100 g in all of the groups. As a result of sensory analysis of fish onion rings, samples in the onion rings containing 18% fish meat received the highest rating of likes by the panelists among the onion rings samples that were prepared experimental.

Key words: Fish onion rings, *Oncorhynchus mykiss*, fast food, chemical composition, sensory quality, energy values.

1. Introduction

In the world, snacks known as "Snack Food" are widely consumed. Onion rings are a popular coated snack food (Hurni and Loewe, 1990). Onion (*Allium cepa* L.) is a commonly used vegetable in all world (Khatri et al., 2017; Odhav et al., 2007). A large quantity of onion is used as fresh; however, some of the small amount of onion available in the market are

processed in various form (Raj, 2006). Such foods can be readily and conveniently cooking by deep-fat frying or by oven heating (Suderman, 1993). The pungency in onion is due to volatile oil known as allyl-propyl-disulphide. The most prominent feature of onion is due to presence of unique odour which accounts for its use as food and medicine; because of which it has a paramount effect in diseases (Raj, 2006).

The biggest role to increase fish consumption is to provide processed and manufactured fish products preserving meeting customer expectations and the high nutritional value of fish (Neiva, 2011). Therefore, if snacks are eaten often between meals this might result in high energy intake. It is considered that it would be worth to enrich these products enriched with fish meat since they are consumed in large proportions today (Karaton Kuzgun, 2017). Worldwide, several onion ring products have been developed (Ling et al., 1997; Raj, 2006) and continue to be developed. But, there are no studies related to evaluation of enrichment with fish meat of onion rings can be found in the literature.

The study aims to examine the effect of fish protein on sensory characteristics and chemical composition of fish onion rings in order to supply new an product development, fish onion rings containing meat of *Oncorhynchus mykiss* aquacultured in Turkey.

2. Material and Methods

2.1. Material

Within this study, *Oncorhynchus mykiss* fishes with have economic value were obtained from fisheries in the Keban Dam Lake in Pertek region. Fishes were moved with ice in polyurethane carriage boxes in them to the laboratory in the Pertek Vocational College. Then, fishes were processed in the same day. After fillets were prepared, they were rinsed with 5% salt-water (cold water). Then, they were ground in blender for 10 minutes.

2.2. Creation of fish onion rings

Figure 1 exhibits flow chart of fish onion rings process and Fish Onion Rings are seen in Figure 2. The ingredients of fish onion rings are presented in Table 1. As a result of these process, 5 different groups were prepared and each process was repeated for three times.

Table 1. Ingredients of fish onion rings.

	Minced Fish meat(g)	Minced Onion(g)	Wheat Flour(g)	Corn Flour(g)	Salt (g)	Water (mL)
A	-	530	180	50	20	220
B	90	440	180	50	20	220
C	180	350	180	50	20	220
D	270	260	180	50	20	220
E	360	170	180	50	20	220

A: Control, B: 9% Fish meat, C: 18% Fish meat, D: 27% Fish meat, E: 36% Fish meat

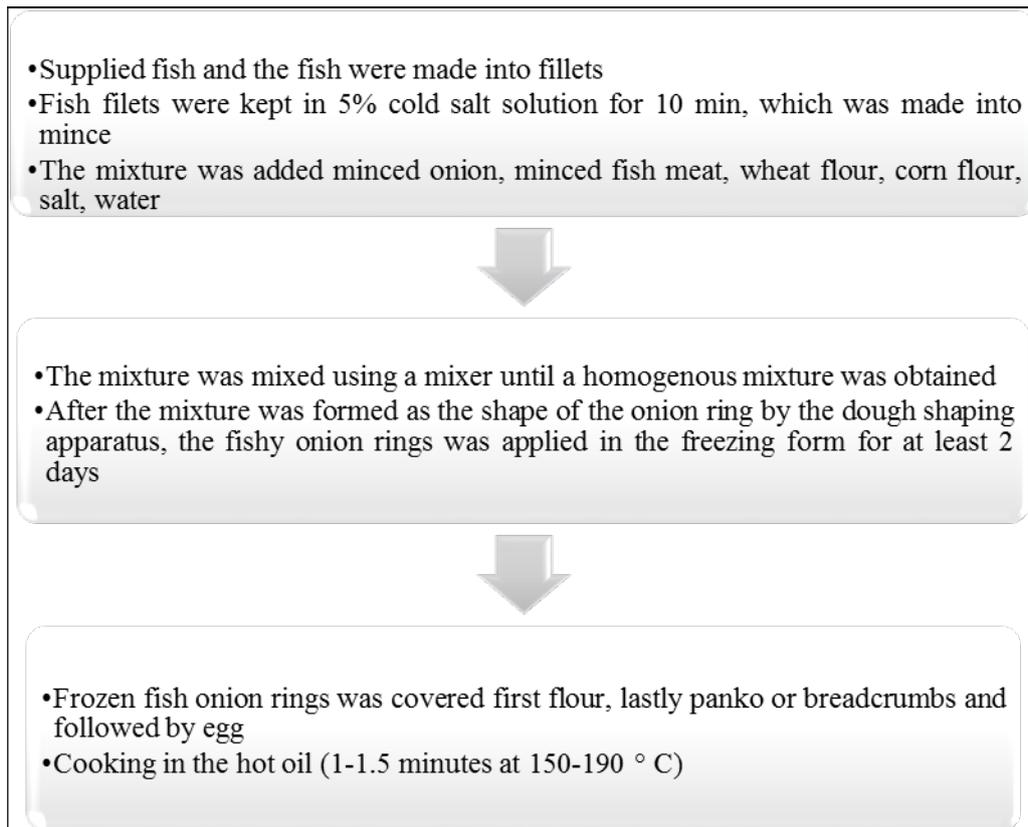


Figure 1. Flow chart of fish onion rings.



Figure 2. Fish onion rings.

2.3. Chemical analysis

Moisture content % was determined according to AOAC method by drying the sample at 100 °C until constant weight was obtained. (AOAC, 2002a). Protein % content was measured according to AOAC method with protein % analysis (AOAC, 2002). In analysis of fat%, Soxhlet method (Extraction) was used (AOAC, 2002b). The ash % content was measured according to AOAC method with burning method (AOAC, 2002). Carbohydrate value was obtained by subtracting total protein %, moisture, ash % and fat % amount percentages found during analysis from 100 (Gibson, 1990). Energy values were obtained according to Gibson method (Gibson, 1990).

2.4. Sensory analysis

Sensory evaluation on samples were determined by a group of panelist (n=65, aged 18-65). Panelists sensorial observed fish onion ring samples in terms of their odour, colour, crispiness, appearance, flavour and general acceptability (From 5-Very Good to 1, to Very Bad) (Altuğ Onoğur and Elmacı, 2011).

2.5. Statistical analysis

In statistical analysis of acquired data within the scope of the present study, IBM SPSS®22 (SPSS Inc., USA) statistical software package program was used. The significance ($p < 0.05$) of the statistical difference among groups was investigated by means of variance analysis (ANOVA) (Özdamar, 2001).

3. Results and Discussions

Table 2 exhibits chemical compositions of prepared fish onion rings. According to the Table 2, average protein%, moisture%, fat%, ash%, carbohydrate% contents of fish meat ingredient of samples were determined as follows 18,98±0.00%, 72.22±0.00%, 5.35±0.00, %0.98±0.00% and 2.47±0.00%, respectively.

Table 2 exhibits moisture 71.73±1.16% (group A), protein 9.82±0.59% (group E), fat 3.15±0.21% (group E) , ash 3.36±0.46% (group D) and carbohydrate 24.51±1.06% (group A) the highest amount of prepared fish onion ring dough mixture as they were containing fish meat in various proportions. The fish onion ring samples, whereas the highest moisture% amount was determined as 56.42±2.16 % at group A, the lowest moisture% amount was determined with group E as 38.73±0.81% (Table 2). In terms of moisture% content of fish

onion rings samples, statistically significant difference was determined among groups ($p < 0.05$). Of considered samples, whereas the highest protein % amount was obtained with the group E at $12.05 \pm 0.53\%$, the lowest protein% amount was obtained with $6.55 \pm 0.33\%$ at group A (Table 2). Statistically significant difference ($p < 0.05$) between samples in terms of protein% was determined. Of fish onion rings, whereas the highest fat% amount was obtained with $12.05 \pm 0.53\%$ at group E, the lowest fat% amount was determined at group A with $3.33 \pm 0.31\%$ (Table 2). Five groups show resemblance in terms of ash% ratio in fish onion rings samples, others was showed significant ($p < 0.05$) statistically difference among groups (Table 2). Whereas the lowest carbohydrate% was determined with group E at $25.88 \pm 0.67\%$, the highest percentage measured with onion ring samples enriched with fish meat was estimated with group A at $30.86 \pm 1.42\%$ (Table 2). In terms of carbohydrate% content of samples, was obtained among groups significant difference as statistically ($p < 0.05$). In another study on cake mixture, moisture %, protein %, fat %, ash % and carbohydrate% content of mixture were expressed as $44.5 \pm 0.50\%$, $16.75 \pm 0.75\%$, $19.50 \pm 0.50\%$, $2.05 \pm 0.25\%$ and $17.00 \pm 1.00\%$, respectively. These findings are parallel with our findings. Though, protein and fat quantity were determined to be lower than the values in our found (Karaton Kuzgun, 2017). This situation could be associated with the different rations in sample mixture. According to other study in the literature, moisture amounts of dehydrated onion rings were measured as 48.0 (Raj et al., 2006). In the same line, Ling et al. (2005), onions content moisture and fat were determined as 31.20 ± 1.50 , 24.70 ± 1.00 , respectively. These findings displayed similarity with our findings. Though, fat% ratio were determined lower than the values found in our study. This condition could be associated with the different rations in onion rings dough mixture. As it was exhibited by Table 2, when each fish onion rings sample was analyzed of their energy values, group A, B, C, D and E samples were measured as 179.63 ± 6.88 , 201.92 ± 5.66 , 209.42 ± 2.41 , 286.58 ± 5.62 and 326.69 ± 13.61 Cal/100 g, respectively. The difference between groups in terms of energy value wasn't found statistically significant ($p > 0.05$). According to other study, the value was reported as 342 Cal/100 g for prepared onion rings and similar onion products (URL1-2018). According to another study, the respective value was reported as 236 Cal/100 g for onion rings (URL2-2018).

Table 2. Chemical composition of fish onion rings.

		Moisture %	Protein %	Fat %	Ash %	Carbohydrate %	Energy value
Fish		72.22±0.00	18.98±0.00	5.35±0.00	0.98±0.00	2.47±0.00	-
Dough	A	71.73±1.16 ^d	1.68±0.55 ^a	0.00±0.00 ^a	2.07±0.05 ^a	24.51±1.06 ^c	-
	B	67.38±0.41 ^c	6.64±0.09 ^b	1.36±0.33 ^b	2.40±0.08 ^a	22.20±0.36 ^b	-
	C	65.78±0.55 ^{bc}	7.28±0.51 ^b	2.89±0.16 ^c	2.25±0.18 ^a	21.79±0.15 ^b	-
	D	64.85±0.67 ^{ab}	9.36±1.17 ^c	2.36±0.06 ^d	3.36±0.46 ^b	20.05±0.04 ^a	-
	E	63.20±0.77 ^a	9.82±0.59 ^c	3.15±0.21 ^c	3.30±0.23 ^b	20.52±0.36 ^a	-
Onion rings	A	56.42±2.16 ^a	6.55±0.33 ^a	3.33±0.31 ^a	2.83±0.60 ^a	30.86±1.42 ^b	179.63±6.88
	B	54.55±0.56 ^{ab}	8.85±0.14 ^b	6.21±0.91 ^b	2.96±0.04 ^a	27.42±1.00 ^a	201.92±5.66
	C	53.58±0.56 ^b	9.44±0.41 ^b	7.48±0.72 ^b	3.41±0.18 ^{ab}	26.08±1.36 ^a	209.42±2.41
	D	43.31±0.77 ^c	11.70±0.96 ^c	14.74±0.97 ^c	3.47±0.40 ^{ab}	26.76±0.20 ^a	286.58±5.62
	E	38.73±0.81 ^d	12.05±0.53 ^c	19.44±2.02 ^d	3.89±0.08 ^b	25.88±0.67 ^a	326.69±13.61

^{a,b,c,d}: The difference between average values with different letters on the same column

Sample fish onion rings were also evaluated by participants in terms of appearance, odour, color, flavour, crispiness and general acceptability (Figure 3). When fish onion rings samples were evaluated by participants in terms of their appearance, the highest score was given to samples from group C (8.47±0.50), the lowest score was given to the samples from group E (6.82±0.98) (Figure 3). The difference between groups was found statistically significant in terms of appearance ($p < 0.05$). As it is seen from Figure 3, in sensorial analysis for their odour of samples, whereas group C samples were given 4.47±0.50 score, group E samples were given 6.64±0.76. The difference between groups was then found statistically significant in terms of odour ($p < 0.05$). When the experimental samples were examined in terms of color, they were found to have values of 8.18±0.71-6.71±0.90. When fish onion rings evaluated in terms of flavour, they were the most popular group C (The onion rings containing 18% fish meat). The difference between groups was found statistically significant in terms of flavour ($p < 0.05$). As it is seen from Figure 3, in sensorial analysis for their crispiness of samples, groups C of experimental samples were had the highest values. The difference between groups was then found statistically significant in terms of crispiness ($p < 0.05$). In addition, according to panelists opinion determined that as fish meat increases, it decreases. The panelists in terms of crispiness gave maximum point the A B C groups. According to Figure 1, when samples were evaluated by respondents in terms of general acceptability, it is seen that the highest score (8.35±0.58) was given to group C; and the lowest score (6.59±0.91) was given to group E. The difference between groups was then found statistically significant in terms of general acceptability ($p < 0.05$). Raj (2006), determined in their study conducted on onion rings that Colour, appearance, texture, flavour,

taste and general acceptability score of the onion rings as 6.50, 7.00, 6.50, 6.25 and 6.50 point, respectively. This values low on our findings. The reason of this, it may be due to the contain of fish meat in our samples.

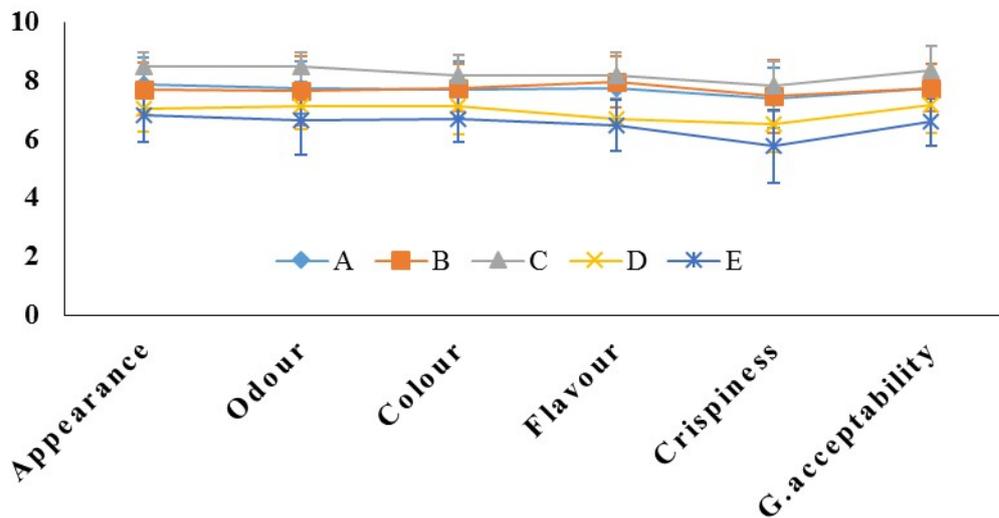


Figure 3. Sensory change of fish onion rings.

4. Conclusion

As a result; we have come to the conclusion that the onion rings, processing with add to fish meat, which are presented and marketed for consumption as more sample onion rings in our world and consumer likes can be presented as ready-made food in different types and Additionally, It has come to the idea that groups containing 18% fish meat will be more appropriate to consume in terms of crispiness and general acceptability.

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