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PROXIMATE COMPOSITION AND PHYSICAL-CHEMICAL ANALYSIS OF SALTED COMMON SNOOK FILLETS

COMPOSIÇÃO PROXIMAL E ANÁLISES FÍSICO-QUÍMICAS DE FILÉS SALGADOS DE ROBALO-FLECHA

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Abstract

The common snook (Centropomus undecimalis) is a fish of high economic value. However, it deteriorates quickly, requiring the use of conservation techniques. Salting is one of the simplest and oldest methods of preserving fish. Therefore, this study aimed to compare different salting techniques (wet, mixed, and dry) on proximate composition and physical-chemical parameters (instrumental color - L*, a*, and b*, water activity, and pH) of common snook fillets. The fish were bought fresh, packed in cool boxes with ice in flakes, and transported. The fish were washed under running water in the laboratory and filleted in the "butterfly" format. One fillet from each fish was reserved for fresh fish, while the other fillet underwent different types of salting. Among the salting methods tested, dry salting was the most effective, and it resulted in a more pronounced reduction in moisture and water activity, which could contribute to a longer shelf life for the product. Dry salting also concentrated proteins and lipids, thereby improving the nutritional profile of the fillets.

Keywords: Centropomus undecimalis; fish cured; fish quality; marine fish.

Abstract/ Resumo

O robalo-flecha (Centropomus undecimalis) é um pescado de alto valor econômico, mas se deteriora rapidamente, necessitando de técnicas de conservação. A salga é um dos métodos mais simples e antigos de conservação do pescado.

Portanto, este estudo teve como objetivo comparar diferentes técnicas de salga (úmida, mista e seca) nos parâmetros de composição proximal e análises físico-químicas (cor instrumental – L*, a* e b*, atividade de água e pH) de filés de robalo-flecha. Os peixes foram adquiridos frescos, acondicionados em caixas isotérmicas com gelo em escamas e transportados. Em laboratório, os peixes foram lavados com água corrente e filetados no formato "borboleta". Um dos filés de cada peixe foi separado para o peixe "in natura", enquanto que o outro filé passou pelos diferentes tipos de salga. Observou-se que, entre os métodos de salga testados, a salga seca foi a que ofereceu os melhores resultados para os filés de robalo comum, pois causa uma maior redução na umidade e na atividade da água, o que poderia contribuir para uma maior vida útil do produto. E também por concentrar maior quantidade de proteínas e lipídeos, apresentando melhor qualidade nutricional.

Palavras-chaves: Centropomus undecimalis; pescado curado; qualidade do pescado; pescado marinho.

Introdution

Fishing and aquaculture have been increasingly recognized for their contributions to food and nutritional security worldwide, with total fish production reaching 185.4 million tons in 2022 (FAO, 2024), of which fishing accounted for 92.3 million tons. According to IBGE data (2020), total fish production in Brazil in 2019 was 691.7 thousand tons, with marine extractive fishing representing the majority (55.7%), and 55% of this production came from artisanal fishing (Oliveira et al., 2024).

The common snook (*Centropomus undecimalis*, Bloch, 1792) is a fish native to the Americas and occurs from North Carolina (USA) to southern Brazil (Almeida et al., 2024). This species utilizes marine, estuarine, freshwater, and mangrove environments (Mello et al., 2024). It is an important fishery resource, particularly for artisanal fisheries due to its high commercial value (Oliveira et al., 2024). It is highly sought after by sport fishermen, which in turn drives an important segment of fishing tourism (Sanches et al., 2014). As a predator species, its meat is considered to be of high quality (Herkenhoff et al., 2023). However, the rich nutritional composition of fish means that it is easily spoiled by microorganisms and enzymes that begin their activity soon after slaughter, requiring the use of preservation techniques to increase its shelf life (Moura et al., 2021).

Salting is a preservation method that has been used since Mesopotamian and Ancient Egyptian civilizations, making it one of the oldest fish preservation methods ever recorded by man. The process is based on the penetration of salt into the meat tissue by osmotic gradient, reducing water activity (a_w) and microbial growth (Rebouças et al., 2020). There is a wide variety of salting methods applied to fish, such as dry salting, wet salting, dry salting, Gaspé-type salting, "klipfish" salting, mono salting, pit salting, Colombo salting, and vacuum impregnation salting (Moura et al., 2021).

The process of dry salting involves the strategic placement of the fish in alternating layers of salt, ensuring complete encasement. This method effectively drains the water from the fish, preserving its quality and extending its shelf life. Wet salting is a process in which fish are immersed in a container containing a saturated brine with concentrations above 30% salt. Mixed salting is a type of salting where the process begins in the same way as dry salting, but the water that comes out of the fish through the osmotic process must not be drained (Costa et al., 2022).

A number of studies have already been conducted to evaluate the technique of salting fish. For instance, Jesus et al. (2015) conducted a technological comparison of the mixed salting and brine salting processes for curimatã (*Prochilodus nigricans*, Spix & Agassiz, 1829) to obtain a product with good hygiene and health quality at low production costs. The authors observed that the mixed salting process resulted in higher levels of NaCl and lower levels of moisture after six days of processing when compared to the brine salting process. However, the microbiological results indicated benefits from the brine salting process, as the growth of extreme and moderate halophiles was reduced in this treatment, and the molds and yeasts exhibited increased growth in products subjected to the mixed salting process.

In another study, Rebouças et al. (2020) evaluated three salting processes—dry, mixed, and wet—on the quality of tilapia fillets (*Oreochromis niloticus*, Linnaeus, 1758). The salting process enhanced the physical characteristics of the tilapia fillets, particularly their water retention capacity, with dry salting demonstrating the greatest efficiency. It was also effective in maintaining color and texture during storage. Salting led to rapid lipid oxidation of the samples, with wet salting being the method that showed the highest oxidation levels during storage, followed by dry and mixed salting, respectively.

Aiura et al. (2008) monitored the development of saturated brine salting (wet salting) and dry salting processes for Nile tilapia fillets. They evaluated certain characteristics indicative of product quality during storage. Nile tilapia fillets salted in brine maintained their attributes for 45 days, while those salted in dry brine had a low moisture content (6%) and a high concentration of ether extract (4.6%). The authors recommend the process of salting in saturated brine as a way of preserving Nile tilapia fillets. Therefore, there is a lack of consensus among studies regarding the most effective type of salting for fish.

Since common snook is a fish species of economic interest (Oliveira et al., 2024), and there are no scientific studies on the conservation of this species through salting, this study aimed to compare wet, mixed, and dry salting methods applied to common snook (*Centropomus undecimalis*) fillets, focusing on proximate composition and physicochemical characteristics, to identify the most appropriate salting technique.

Material and Methods

Raw material

The fish used in this study (average weight of 624.40 ± 92.70 g) were from specimens (n = 12) of common snook (*C. undecimalis*), purchased from Colony Z1 in Janga, Paulista, PE (34°49'17.0"O; 7°55'50.9"S). The fish were bought fresh, packed in isothermal boxes with ice in flakes, and transported to the experimental approach. In the laboratory, the fish were washed under running water and filleted by hand in the "butterfly" format (figure 1). The yield of the fillets was 33.68 ± 1.00%. The taxonomic classification of common snook follows the hierarchy: Kingdom Animalia, Phylum Chordata, Class Actinopterygii, Order Perciformes, Family Centropomidae, Genus *Centropomus*, and Species *Centropomus undecimalis*.

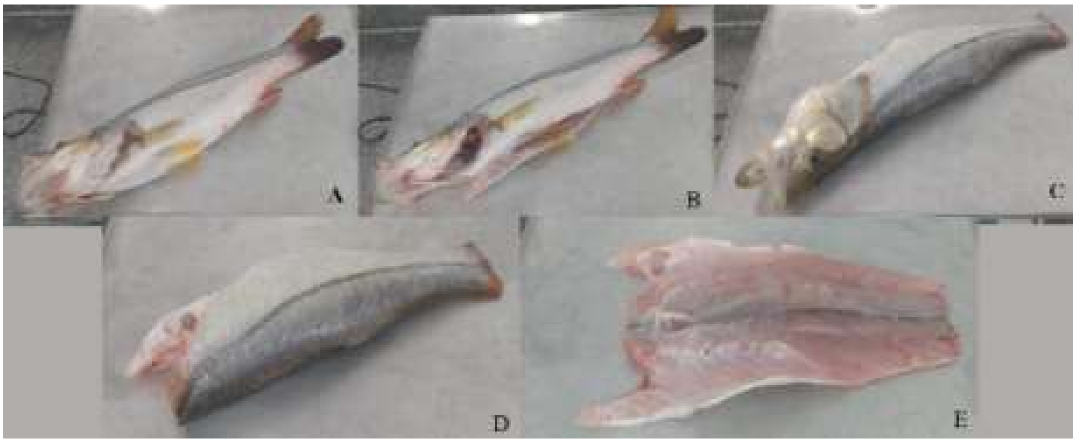

Figure 1. a) whole common snook without scales; b) common snook without entrails; c) common snook without fins; d) common snook without head and backbone; e) butterfly-cut fillet with skin.

Experimental design

The experimental design used was entirely randomized with 3 treatments (wet, mixed, and dry salting). A total of 12 common snook were used, with 3 allocated to each type of salting, and the analyses were performed in triplicate.

Salting Methods

Dry salting

For dry salting, a salt mixture consisting of fine salt and coarse salt (1:1) was prepared. The amount of this salt mixture was calculated based on 50% of the weight of the fish. In a plastic grid, layers of salt were alternated with the fish, ending with a layer of salt. This grid was placed inside another larger basin to receive the exudate from the salting. A weight was also placed on top to press down on the fish and ensure that the water transpired from the muscles, forming a brine that was drained (Costa et al., 2022).

Mixed salting

For the mixed salting, a mixture of fine salt and coarse salt (1:1) was prepared. In a plastic bowl (approximately 26 cm × 40 cm × 7 cm), layers of salt were alternated with the fish, ending with a layer of salt. A weight was placed on top to press down on the fish and ensure that the water exuded from the muscles formed the brine needed to cover the fish (Costa et al., 2022).

Wet salting

For wet salting, a brine with 30% saturation was prepared based on the weight of the fish, which was prepared in a ratio of 1:5 (fish: brine). The fish were placed in plastic trays (approximately 26 cm × 40 cm × 7 cm) and added to the brine, and a weight was placed on top to ensure that all the fish were submerged in the brine (Costa et al., 2022).

All the common snook fillets were salted for 72 hours. After this period, the fish were washed and dried in an air circulation oven at 50°C for 48 hours. The fish were then cooled in a desiccator, packed in freezer bags, stored in a freezer (-18°C), and then analyzed.

Figure 2. Common snook fillets after salting (left) and after salting and drying (right).

Laboratory Analysis

Proximate composition analysis

The proximate composition of the common snook fillets was analyzed according to the official AOAC methodology (AOAC, 2012). Firstly, moisture was analyzed by gravimetry in an oven with air circulation at 105°C until constant weight. After the moisture analysis, the dry matter was submitted to the other proximate composition analyses. Crude protein was determined using the Kjeldahl method (N × 6.25), lipids extracted with petroleum ether in a Soxhlet extractor, and ash content by incineration in a muffle furnace at 550°C for 5 hours.

Physicochemical analysis

To determine the instrumental color of the fresh and salted common snook fillets, a portable colorimeter (Konica Minolta®, model CR - 400) was used, previously calibrated with a white standard before each analysis, using a xenon lamp as the light source, illuminant C (Y=92.78; x=0.3139; y=0.3200), an observation angle of 2° and a measuring area of 8 mm in diameter at 3 points on the fillets from each treatment. The color was expressed using the color standards of the CIELAB system: L* [lightness ranging from 0 to 100, where 0 is black and 100 is white], a* [intensity of red (+) to green (-)], and b* [intensity of yellow (+) to blue (-)].

The water activity (a_w) of common snook fillets was determined after pre-homogenization in a food processor at a temperature of 25°C in an Aqualab CX-2 (Decagon Devices).

The pH of the common snook fillets was measured using a pH meter with an immersion electrode, previously calibrated with buffer solutions of pH 4 and 7. The electrode was immersed in a solution of 10g of the sample previously homogenized with 40 mL of distilled water according to Oliveira Filho et al. (2012).

Statistical Analysis

The results of the analysis were initially assessed for normality and homogeneity of variance. When the prerequisites (normality and homogeneity) were met, analysis of variance with 1 factor (one-way ANOVA) was used, and then the comparison of means test (Tukey's test) was applied using a 5% significance level (P<0.05). The analyses were carried out using the Jamovi® statistical program (Jamovi, 2022).

Results and Discussion

Proximate composition

Moisture

The moisture content of common snook fillets subjected to wet and mixed salting lost approximately 46.8% compared to fresh common snook fillets. On the other hand, fillets subjected to dry salting lost approximately 56.3% of moisture compared to the raw material (Table 1).

Table 1. Results (mean ± standard deviation)[1] of the proximate composition (moisture, crude protein, lipids, ash) of common snook fillets (*C. undecimalis*) subjected to wet, mixed, and dry salting[2]

Proximate composition (%)	Salting types			Fresh common snook fillets
	Wet	Mixed	Dry	
Moisture	42.05 ± 3.68a	40.17 ± 0.76a	33.71 ± 0.82b	77.13 ± 0.06
Protein	23.81 ± 2.52a	27.01 ± 1.64a	27.74 ± 3.24a	22.04 ± 0.16
Lipid	0.98 ± 0.09a	1.00 ± 0.11a	1.03 ± 0.11a	0.98 ± 0.05
Ash	0.34 ± 0.02b	0.42 ± 0.02a	0.38 ± 0.01a	0.22 ± 0.01

[1]Average of 3 analyses.

[2]Different letters on the same line indicate a significant difference according to Tukey's test (P<0.05).

It can therefore be seen that common snook fillets subjected to dry salting lost a higher percentage of moisture than fillets subjected to wet and mixed salting. The moisture content of common snook fillets subjected to damp and mixed salting showed no significant difference between them (P>0.05) and was higher (P<0.05) than that observed in dry salting (Table 1). This may have occurred due to the greater difference in osmotic pressure in dry salting and the absence of external water to replenish moisture (Freitas et al., 2011).

According to Normative Instruction No. 1, of January 15, 2019 (Brasil, 2019), which comments on the identity and quality characteristics of salted and dry salted fish, it is established that salted fish is treated with salt, with a minimum moisture of 53% and a maximum of 58% and dry salted fish is that treated with salt and subsequent drying by natural or artificial evaporation, with a maximum moisture of 52.9%. If we compare this with the Normative Instruction, we can see that common snook fillets salted using wet or mixed salting would have a moisture content below that recommended by the legislation (salted fish). Regarding product identity, this could be a problem, but for preservation, the current levels are better than those stipulated by Brazilian legislation. However, those salted using dry salting would comply (dry salted fish), since they had a final moisture content below 52.9%.

Hilsa (*Tenualosa ilisha,* Hamilton, 1822), a fish widely consumed in Bangladesh, subjected to dry salting had a moisture content of 48.16% (Sarkar et al., 2023), which is higher than that observed in the same type of salting for common snook. Atlantic bonito (*Sarda sarda,* Bloch, 1793) subjected to wet salting at a 10% concentration showed a moisture content of 52.22% (Ormanci & Colakoglu, 2015). On the other hand, curimatã (*P. nigricans*) subjected to wet salting exhibited 53% moisture, while mixed salting resulted in 49% moisture (Jesus et al., 2022). In these two studies, salted fish had a higher percentage of moisture than salted common snook. Nile tilapia (*O. niloticus*) subjected to wet salting had 29.2% moisture, while those subjected to dry salting had 16.1% moisture (Aiura et al., 2008). In contrast, in this study with Nile tilapia, there was a lower percentage of moisture than that observed with salted common snook.

Since dry salting removed more moisture from the common snook fillets, the texture of these fillets could be different, as could the sensory acceptance of texture. According to Nates et al. (2014), in dry salting, there is a more severe osmotic pressure difference, forcing a greater outflow of intracellular water, compacting the muscle fibers, and making the fish fillet stiff. In wet salting, dehydration is moderate, and the presence of external brine prevents the fish from losing as much water and allows it to remain more succulent.

Protein

Common snook fillets subjected to wet salting showed an approximately 7.4% increase in protein concentration compared with fresh common snook fillets. By contrast, the protein concentration of common snook fillets subjected to mixed and dry salting was higher, at around 18.4% (Table 1). This may be because fillets from dry and mixed salting lost more moisture than those subjected to wet salting. In addition, wet salting causes greater leaching of sarcoplasmic proteins than dry salting, due to the direct and constant contact of the fish with the aqueous solution (Freitas et al., 2011), resulting in possible losses of vitamins and minerals, greater leaching of compounds responsible for flavor and aroma, and softer fillets (Chaijan, 2011). The percentage of protein in the common snook fillets did not vary significantly ($P>0.05$) between the three types of salting applied (Table 1).

Hilsa (*T. ilisha*) subjected to dry salting had 29.95% protein (Sarkar et al., 2023), which is higher than that observed in the same type of salting for common snook. Pacu (*Piaractus mesopotamicus,* Holmberg, 1887) subjected to wet salting had 16.22% protein, while those subjected to dry salting had 16.87% protein (Freitas et al., 2011). As in the present study, pacu subjected to dry salting had a higher percentage of protein than those subjected to wet salting. However, when the protein percentages are compared, it can be seen that common snook are higher in protein. Atlantic bonito (*S. sarda*) subjected to wet salting had 14.64% protein (Ormanci & Colakoglu, 2015), which is lower than the common snook fillets in this study. Nile tilapia (*O. niloticus*) subjected to wet salting had 29.4% protein, while those subjected to dry salting had 51.8% protein (Aiura et al., 2008). These protein values for tilapia are higher than those found in this study of salted common snook when compared to the same types of salting.

Lipid

The concentration of lipids in salted common snook fillets compared to fresh was low and was only observed when they were subjected to mixed and dry salting, with an approximate value of 2% (Table 1). However, in statistical terms, the three salting methods did not cause any variation (P>0.05) in the percentage of lipids in common snook fillets.

Hilsa (*T. ilisha*) subjected to dry salting showed 4.36% lipids (Sarkar et al., 2023). Pacu (*P. mesopotamicus*) subjected to wet salting had 13.12% lipids, and those subjected to dry salting had 18.76% lipids (Freitas et al., 2011). Atlantic bonito (*S. sarda*) subjected to wet salting showed 17.39% lipids (Ormanci & Colakoglu, 2015). Nile tilapia (*Oreochromis niloticus*) subjected to wet salting had 3.8% lipids, while those subjected to dry salting had 7.5% lipids (Aiura et al., 2008).

It can be seen that the salted common snook fillets had lower lipid values than those observed for Hilsa, pacu, Atlantic bonito, and Nile tilapia. This reflects the specific physical and chemical characteristics of each fish species.

Ash

Concerning fresh fillets, the ash concentration was 35.29% in common snook fillets subjected to wet salting, 47.62% in mixed salting, and 42.11% in dry salting (Table 1). This concentration of ash was probably due to the decrease in moisture during the salting process, and also to the addition of salt to the product itself. Between treatments, there was a lower (P<0.05) percentage of ash in common snook fillets salted using wet salting compared to the other two techniques tested. This lower percentage of ash may have been due to the higher percentage of moisture.

Hilsa (*T. ilisha*) subjected to dry salting showed 17.53% ash (Sarkar et al., 2023). Pacu (*P. mesopotamicus*) subjected to wet salting had 19.48% ash, and those subjected to dry salting had 19.03% ash (Freitas et al., 2011). Atlantic bonito (*S. sarda*) subjected to wet salting showed 15.14% ash (Ormanci & Colakoglu, 2015). Nile tilapia (*O. niloticus*) subjected to wet salting had 28.6% ash, while those subjected to dry salting had 28.5% ash (Aiura et al., 2008).

The results of these studies showed higher ash percentages than the fillets of common snook. This may have been due to the variation in chemical composition between the species, and also the variations between the different salting techniques.

Physicochemical Analysis

Instrumental color

The common snook fillets showed no significant variation (P>0.05) in the L* value between the different types of salting tested (Table 2). However, when compared to the fresh fillets, it can be seen that the fillets increased their luminosity (L* value) by around 30% (Table 2).

Table 2 - Results (mean ± standard deviation)[1] of the instrumental color (L*, a*, and b*) of common snook fillets (*C. undecimalis*) subjected to wet, mixed, and dry salting[2]

Color	Salting types			Fresh common snook fillets
	Wet	Mixed	Dry	
L*	69.33 ± 4.35a	74.60 ± 2,45a	70.80 ± 2.70a	49.20 ± 0.72
a*	-0.61 ± 0.24a	0.01 ± 0,96a	0.38 ± 1.36a	2.60 ± 0.64
b*	10.67 ± 2.18a	12,57 ± 1,69a	13.51 ± 0.98a	2.26 ± 0.96

[1]Average of 3 analyses.

[2]Different letters on the same line indicate a significant difference according to Tukey's test (P<0.05).

Tilapia fillets subjected to dry salting had an L* value of 70.83, mixed salting of 68.24, and wet salting of 70.67 (Rebouças et al., 2020). As with common snook, the authors also found no variation in luminosity between the salting methods tested for tilapia. Despite being different species, the luminosity (L* value) of salted tilapia and common snook fillets was similar. In another study, milkfish fillets subjected to wet salting at a concentration of 9% salt saturation had an L* value of 57.83 (Tsai et al., 2022). When compared with common snook fillets subjected to wet salting, it can be seen that salted milkfish fillets were less luminous, which can be attributed to variations between species and differences in salting concentrations.

The common snook fillets showed no significant variation (P>0.05) in red intensity (a* value) between the fillets subjected to wet, mixed, and dry salting (Table 2). When compared to fresh common snook fillets, there was a decrease in redness in all treatments.

Tilapia fillets subjected to dry salting had a* value of 0.99, mixed salting of 1.06, and wet salting of 1.10 (Rebouças et al., 2020). As with common snook, the authors did not observe any variation in the a* value between the salting methods tested for tilapia, and also found a decrease in the a* values of the raw material. In milkfish fillets subjected to wet salting, the a* value was 0.88 (Tsai et al., 2022). When compared with common snook subjected to wet salting, milkfish fillets were redder.

The b* value (yellow intensity) of common snook fillets was not influenced (P>0.05) by wet, mixed, and dry salting (Table 2). Compared to fresh common snook fillets, the wet, mixed, and dry salting process made the fillets approximately 81% yellow (higher b* value). Tilapia fillets subjected to dry salting had a b* value of 5.26, mixed salting of 5.23, and wet salting of 5.22 (Rebouças et al., 2020).

Milkfish fillets subjected to wet salting had a b* value of 6.42 (Tsai et al., 2022). It can therefore be seen that salted tilapia and milkfish were less yellowish (lower b* value) than salted common snook. These variations may be due to the natural differences in flesh pigmentation between different fish species.

Water activity

Water activity (a_w) indicates the intensity of the forces that unite water molecules with other components that are not in a liquid state, and also the water that is available for the growth of microorganisms, which enables different chemical and biochemical reactions to take place (Costa et al., 2022).

The a_w of the sampled fillets of common snook varied ($P<0.05$) among the different salting methods analyzed (Table 3). The fillets subjected to wet salting had the highest a_w, followed by fillets subjected to mixed salting and dry salting, which had the lowest a_w (Table 3). When compared with fresh fillets, it can be seen that common snook fillets subjected to wet salting showed a 25.42% reduction in a_w, 28.12% in mixed salting, and 29.88% in dry salting, showing greater effectiveness in reducing a_w in common snook fillets subjected to dry salting.

Curimatã (*P. nigricans*) fillets after 6 days of processing showed a_w of 0.78 in wet salting and 0.75 in mixed salting (Jesus et al. 2022). This a_w in salted curimatã is higher than that observed in salted common snook. According to Moura et al. (2021), the salting process causes salt to penetrate the interior of the tissues, a phenomenon controlled by various physical-chemical factors, dehydrating the fish due to a difference in osmotic pressure, reducing a_w. This slows down the decomposition of the fish by microorganisms, as well as providing changes to the meat that affect its color, aroma, flavor, and texture, making the product more sensorially attractive. It can therefore be seen that the lower the a_w of the salted fillets, the more efficient the salting process.

Table 3 - Results (mean ± standard deviation)[1] of the water activity and pH of common snook fillets (*C. undecimalis*) subjected to wet, mixed, and dry salting[2]

	Salting types			Fresh common snook fillets
	Wet	Mixed	Dry	
a_w	0.719 ± 0.005a	0.693 ± 0.006b	0.676 ± 0.006c	0.964 ± 0.001
pH	6.29 ± 0.07a	6.41 ± 0.11a	6.52 ± 0.15a	6.75 ± 0.09

[1]Average of 3 analyses.

[2]Different letters on the same line indicate a significant difference according to Tukey's test ($P<0.05$).

pH value

The salted common snook fillets showed no variation ($P>0.05$) in the pH of the meat between the salting methods tested. Although the pH of the fresh and salted common snook fillets was close, there was a decrease between the fresh and salted fillets (Table 3). This decrease in pH can be attributed to the increase in ionic strength of the solution inside the cells (Sarkar et al., 2023), which contributes to extending the shelf life of salted fish fillets. Hilsa (*T. ilisha*) subjected to dry salting had a pH of 6.21 (Sarkar et al., 2023), and Atlantic bonito (*S. sarda*) subjected to wet salting, in which the pH of the meat was 5.90 (Ormanci & Colakoglu, 2015). The latter study also found a decrease in the pH of the fresh fillet compared to the salted Atlantic bonito fillet (6.44 to 5.90).

The salting techniques used in the study with arrowhead common snook are simple to perform, can be used on a commercial scale, add value to fish from artisanal fishing, and are options for cured fish with high nutritional value and extended shelf life. Future studies should include sensory evaluation of salted arrowhead common snook, a study of the kinetics of desalting, preparation of products using salted common snook, and evaluation of the quality of these products, a study of the shelf life of salted common snook at different storage temperatures, with different packaging, and potential uses of natural antioxidants in salted products.

Conclusion

Among the salting methods tested for common snook fillets, dry salting gives the best results because it causes a greater reduction in moisture and water activity, which could contribute to a longer shelf life for the product. It also concentrates a greater amount of proteins and lipids, giving it better nutritional quality. In addition, if it were to be produced commercially, dry salting was the technique that provided a percentage of moisture in the common snook fillets within the limits allowed by Brazilian legislation.

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