HAYYAN JOURNAL
Vol. 3 No. 2, June 2026, page. 55-62
ISSN: 3046-6679

Effect of Liquid and Solid Salting Methods on the Organoleptic Characteristics of Traditional Salted Eggs

Elfira Jumrah[1*]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Makassar State University, Makassar, 90222, Indonesia

**Corresponding Address:* elfira.jumrah@unm.ac.id

Received: April 25, 2026 *Accepted: May 25, 2026* *Online Published: June 05, 2026*

ABSTRACT

This study aimed to evaluate the effect of solid and liquid salting methods on the organoleptic characteristics of traditional salted eggs. The research employed an experimental method using different salt concentrations in both salting media. The solid salting method utilized mixtures of salt and ash at ratios of 1:3, 1:4, and 1:5, while the liquid salting method used salt-water ratios of 1:0.5, 1:0.4, and 1:0.3 supplemented with garlic and chili peppers as natural flavoring agents. Duck eggs were cured for 7 days at room temperature and subsequently boiled before organoleptic evaluation. Sensory analysis was conducted based on color, aroma, taste, texture, and overall acceptance. The results showed that both salting methods significantly affected the sensory quality of salted eggs. In the solid salting treatment, the 1:3 salt-to-ash ratio produced the best characteristics, including bright orange yolk color, firm texture, balanced salty taste, and desirable aroma. Meanwhile, in the liquid salting treatment, the 1:0.5 salt-to-water ratio was the most preferred by panelists due to its attractive orange yolk color, balanced saltiness, soft texture, and pleasant spicy aroma derived from garlic and chili peppers. Higher salt concentrations promoted better osmotic dehydration, protein denaturation, and yolk texture formation, resulting in improved organoleptic quality. In conclusion, both solid and liquid salting methods effectively produced salted eggs with acceptable sensory properties; however, salt concentration and salting media played important roles in determining product quality. Optimization of salting conditions is therefore essential for producing traditional salted eggs with superior organoleptic characteristics and higher consumer acceptance.

Keywords: *salted eggs, salting method, organoleptic characteristics, salt concentration, traditional food.*

I. INTRODUCTION

Salted eggs are one of the traditional food products widely consumed by the community due to their distinctive taste, high nutritional value, affordability, and longer shelf life compared to fresh eggs (Nurbaety & Nurwati, 2021). This product has become popular in many Asian countries, including Indonesia, where salted eggs are commonly served as side dishes, food ingredients, or flavor enhancers in various culinary products (Accelist Pangan Nusantara, 2026). In addition to their unique savory flavor, salted eggs are favored because they contain essential nutrients such as proteins, lipids, vitamins, and minerals that contribute to daily nutritional intake (Li et al., 2022).

Salted eggs are generally produced from duck eggs because duck eggs possess larger yolks, higher fat content, and stronger shell structures than chicken eggs, making them more suitable for the salting process. The production of salted eggs involves a preservation technique based on the penetration of salt into the egg through osmotic diffusion. During this process, salt gradually enters the eggshell pores and diffuses into the egg white and yolk, leading to physical and chemical changes within the egg components. These changes contribute not only to preservation but also to the development of the characteristic sensory properties of salted eggs (Ilyas et al., 2023; Nurliyani et al., 2015; Surya & Nugroho, 2025).

The salting process aims to extend shelf life by reducing water activity and inhibiting the growth of spoilage microorganisms and pathogenic bacteria. Salt acts as a natural preservative that suppresses microbial metabolism, thereby slowing deterioration and maintaining product stability during storage. Furthermore, the salting process enhances several organoleptic characteristics, including flavor, aroma, texture, and yolk appearance. Proper salting can produce a rich savory taste, a pleasant aroma, a firm egg white texture, and a distinctive oily and sandy yolk texture highly preferred by consumers (Barcenilla et al., 2022; Mopera et al., 2021; X. Wang et al., 2024).

In addition to improving preservation and sensory quality, the salting process also affects the internal structure and composition of the eggs. The interaction between salt and egg proteins may alter protein denaturation and water-binding capacity, which subsequently influence the texture and consistency of the final product. Variations in salting methods, salt concentration, and curing duration can therefore significantly affect the quality attributes and consumer acceptance of salted eggs. Consequently, understanding the influence of salting techniques on organoleptic characteristics is important for improving the quality and marketability of traditional salted egg products (Afraz et al., 2020; Kumar et al., 2026).

In traditional salted egg processing, the commonly used salting methods are liquid and solid salting methods. The liquid salting method is carried out by soaking the eggs in a salt solution for a certain period, while the solid salting method uses a mixture of salt with materials such as ash, clay, or brick powder applied to the eggshell surface. Differences in salting media may affect the rate of salt penetration and influence the sensory characteristics of the resulting salted eggs (Afraz et al., 2020; Kumar et al., 2026).

The liquid salting method is considered more practical and easier to apply because the eggs are directly immersed in a homogeneous salt solution, allowing salt diffusion to occur more evenly throughout the egg. This method is often preferred for large-scale production due to its simplicity and shorter preparation time. However, excessive salt penetration during liquid curing may result in overly salty eggs and softer egg white textures, which can reduce consumer acceptance. In some cases, prolonged immersion may also affect the appearance and consistency of the yolk (Kastaman et al., 2009; Kumar et al., 2026).

On the other hand, the solid salting method is a more traditional technique widely used by local producers. In this method, the coating material functions not only as a salt carrier but also as a medium that gradually regulates salt penetration into the egg. This slower diffusion process often produces salted eggs with firmer textures, oilier yolks, and a characteristic sandy texture that is highly favored by consumers. Nevertheless, the solid salting method generally requires a longer curing period and more labor-intensive preparation compared to the liquid method (Rukmiasih et al., 2015).

The differences in salt diffusion mechanisms between liquid and solid salting methods may lead to variations in the organoleptic properties of salted eggs, including color, aroma, taste, and texture. Sensory quality is an important factor influencing consumer preference and product acceptability because consumers tend to select salted eggs with balanced saltiness,

attractive yolk color, pleasant aroma, and desirable texture. Therefore, evaluating the sensory characteristics of salted eggs produced by different salting methods is essential for identifying the most suitable processing technique (Ramdayani et al., 2020; Rokana et al., 2018).

Several previous studies have reported that variations in salting methods can influence the quality of salted eggs; however, studies specifically focusing on the comparison of organoleptic characteristics between liquid and solid salting methods remain limited. Information regarding consumer sensory responses to these processing methods is important for improving traditional salted egg production and enhancing product competitiveness in the food market. Based on this background, this study aimed to analyze the effect of liquid and solid salting methods on the organoleptic characteristics of traditional salted eggs. The results of this study are expected to provide scientific information regarding the salting method capable of producing better sensory quality and higher consumer acceptance (Hasdar et al., 2021; Li et al., 2022; Nurliyani et al., 2015; Shodiqin & Ma, 2025).

Organoleptic characteristics are important parameters in determining product quality and consumer acceptance of food products. In salted eggs, sensory attributes such as yolk color, aroma, taste, and texture are major factors influencing consumer preference. Different salting methods are suspected to produce different sensory characteristics. Liquid salting tends to produce a more uniform saltiness, whereas solid salting often results in yolks that are oilier and have a sandy texture. Therefore, selecting an appropriate salting method is essential to produce salted eggs with desirable organoleptic quality (Hasdar et al., 2021; Shodiqin & Ma, 2025).

Several previous studies have reported that variations in salting methods can affect the quality of salted eggs; however, studies specifically comparing the organoleptic characteristics of traditional salted eggs produced by liquid and solid salting methods are still limited. Such information is necessary as a basis for developing more effective salted egg processing technologies that align with consumer preferences.

Based on this background, this study aimed to analyze the effect of liquid and solid salting methods on the organoleptic characteristics of traditional salted eggs. The results of this study are expected to provide information regarding the salting method capable of producing the best sensory acceptance, thereby supporting the development of higher-quality traditional salted egg products preferred by consumers.

II. METHODS

2.1 Research Design

This study employed an experimental method using two different salting treatments, namely the liquid salting method and the solid salting method, to evaluate their effects on the organoleptic characteristics of traditional salted eggs.

2.2 Materials and Equipment

The materials used in this study included fresh duck eggs, salt, clean water, garlic, chili peppers, ash, and clay as coating materials for the solid salting treatment. Garlic and chili peppers were added as natural flavoring ingredients to enhance the sensory characteristics of the salted eggs. The equipment used consisted of plastic containers, mixing bowls, measuring cups, weighing scales, knives, blenders, boiling pans, and labels for sample identification.

2.3 Liquid Salting Method

Fresh duck eggs were first cleaned and gently scrubbed to remove stains, dirt, and microorganisms attached to the eggshell surface. A liquid salting medium was then prepared

using salt and heated water at different salt-to-water ratios of 1:0.5, 1:0.4, and 1:0.3. Garlic and chili peppers were washed thoroughly, cut into small pieces, and weighed prior to use. The composition added to each container consisted of 40 g of large chili peppers, 30 g of curly chili peppers, 10 g of bird's eye chili peppers, 40 g of garlic, and 5 g of garlic peels. After the salt solution had cooled to room temperature, the prepared spices were added into the container. The cleaned duck eggs were then immersed in the soaking medium containing the salt solution, garlic, and chili peppers. A weight was placed on top of the solution to prevent the eggs from floating during the curing process. The eggs were soaked for 7 days at room temperature. After the curing period, the salted eggs were removed, washed thoroughly with clean water, and boiled until fully cooked. The cooked salted eggs were then subjected to organoleptic evaluation.

2.4 Solid Salting Method

Fresh duck eggs were cleaned and gently scrubbed to remove dirt, stains, and microorganisms attached to the eggshell surface. The solid salting medium was prepared by mixing ash and salt at ratios of 1:3, 1:4, and 1:5 using 100 g of ash as the base material. Each egg was then evenly coated with the solid salting mixture until the entire surface of the eggshell was covered. The coated eggs were carefully placed into plastic bags, tied securely, and labeled according to the treatment. All treated eggs were subsequently arranged in a basin and covered with cloth to maintain stable storage conditions during the curing process. The eggs were stored at room temperature for 7 days to allow the salting process to occur and produce salted eggs. After the storage period, the salted eggs were washed thoroughly with clean water and boiled until fully cooked. The cooked salted eggs were then cooled and subjected to organoleptic evaluation.

III. RESULTS AND DISCUSSION

This study evaluated the effect of solid and liquid salting methods on the organoleptic characteristics of traditional salted eggs. Different salt concentrations were applied to determine their influence on yolk color, texture, aroma, taste, and overall consumer acceptance. The solid salting method utilized a mixture of salt and ash at ratios of 1:3, 1:4, and 1:5, whereas the liquid salting method used salt-water ratios of 1:0.5, 1:0.4, and 1:0.3 supplemented with garlic and chili peppers as flavoring agents. The results demonstrated that variations in salting media and salt concentration significantly affected the sensory quality of salted eggs.

The observed differences among treatments can be attributed to variations in salt diffusion and osmotic dehydration during the curing process that uses high salt concentrations to inhibit microbial growth and enzymatic activity. The preservation mechanism is based on osmotic pressure and salt diffusion, in which sodium and chloride ions penetrate the eggshell pores while water molecules migrate out of the egg. This process decreases water activity, suppresses microbial development, and induces physicochemical changes in egg proteins and lipids. Duck eggs were selected in this study because they possess larger yolks, higher lipid content, and shell pores that facilitate more effective salt penetration compared to other types of eggs (Hasdar et al., 2021; T.-H. Wang, 2017; Xiao et al., 2023).

Prior to salting, the eggs were cleaned and scrubbed to remove dirt and microorganisms attached to the shell surface. This step was important to optimize osmotic diffusion during curing. In the solid salting treatment, the eggs were coated with a paste mixture of salt and ash. Ash functioned as a moisture absorber and salt-binding medium that promoted gradual and stable salt penetration into the eggs. During curing, salt ions diffused through the shell and interacted with albumen proteins, resulting in protein denaturation and reduced moisture

content. Consequently, the egg white became firmer and the yolk developed an oily and compact texture characteristic of high-quality salted eggs (Xu et al., 2017).

The results of the solid salting (Figure 1.) method indicated that the 1:3 salt-to-ash ratio produced the best overall sensory quality. Eggs treated with this ratio exhibited bright orange yolks, firmer textures, slightly oily yolk surfaces, and balanced saltiness. These characteristics suggested that salt diffusion occurred optimally at higher salt concentrations. Increased osmotic dehydration promoted protein coagulation in the egg white and lipid aggregation in the yolk, leading to the formation of a dense and desirable yolk texture. In contrast, the 1:4 treatment produced slightly lighter yolk color and softer texture, although the sensory quality remained acceptable. Meanwhile, the 1:5 treatment generated the lowest quality salted eggs, characterized by paler yolks, softer textures, and lower salt intensity. Insufficient salt penetration in this treatment reduced the formation of the typical sandy and oily yolk texture commonly preferred by consumers (Xu et al., 2017).

Organoleptic evaluation further confirmed these findings. The 1:3 and 1:4 treatments received the highest sensory scores, with average values ranging from 8.5–9 for taste, 9 for texture, 8–9 for aroma, and 9 for color. Panelists described these eggs as having balanced saltiness, attractive yolk appearance, pleasant aroma, and compact yet tender texture. Conversely, the 1:5 treatment received lower scores because the eggs were perceived as less salty and possessed softer textures.

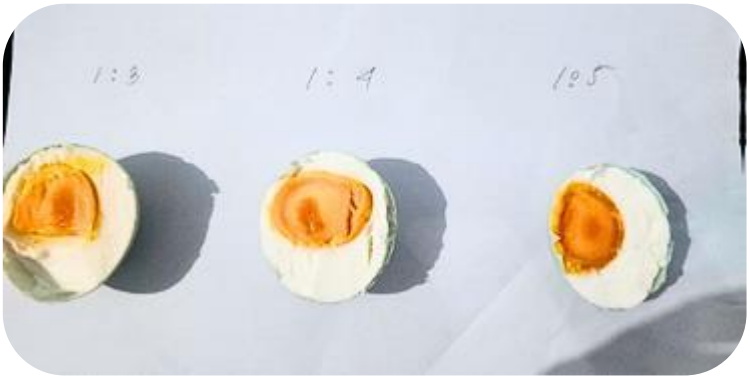

Figure 1. Solid-Salted eggs

In addition to the solid salting treatment, this study also evaluated salted egg production using the liquid salting method. The liquid curing medium consisted of heated salt solution prepared at ratios of 1:0.5, 1:0.4, and 1:0.3. Garlic, large chili peppers, curly chili peppers, bird's eye chili peppers, and garlic peels were added as natural spices to enhance flavor and potentially improve microbial stability during storage. The eggs were immersed completely in the solution and stored at room temperature for 7 days. Differences in sensory characteristics among liquid-salted eggs were influenced by variations in salt concentration and the incorporation of natural spices in the curing medium.

The liquid salting process also relied on osmotic diffusion principles. Salt ions penetrated the shell pores and migrated into the egg white and yolk, while water molecules moved outward due to differences in osmotic pressure. Higher salt concentrations accelerated salt penetration and dehydration, thereby affecting yolk color intensity and texture formation. The addition of spices contributed not only to flavor enhancement but also to aroma development and potential antimicrobial effects during curing (Li et al., 2022).

Visual observations after curing revealed distinct differences among treatments. Eggs treated with the 1:0.3 salt-water ratio exhibited darker yellow yolks, while the 1:0.4 treatment produced slightly orange yolks. The 1:0.5 treatment generated the most attractive orange-yellow yolk color (Figure 2.). These changes indicated Water loss from the yolk during curing increased the concentration of lipids and lipoproteins. This process promoted the development of a compact and slightly oily yolk texture, which is considered a desirable characteristic of high-quality salted eggs that the salting process reduced water content within the yolk, resulting in more concentrated pigments and firmer textures. Increased salt penetration also contributed to protein coagulation and lipid aggregation within the yolk structure.

The organoleptic evaluation of liquid-salted eggs showed that all treatments produced salty flavor and soft textures; however, differences were observed in yolk color intensity and aroma characteristics. Eggs treated with the 1:0.5 ratio were the most preferred by panelists because The superior performance of the 1:0.5 treatment suggests that this salt concentration provided an optimal balance between salt diffusion and moisture loss. Excessively low salt concentrations may not induce sufficient physicochemical changes, whereas an optimal concentration promotes desirable yolk coloration, texture formation, and flavor development.

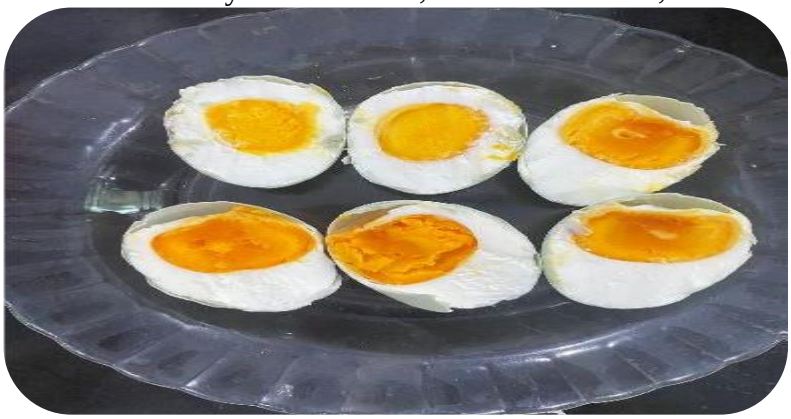

Figure 2. liquid-salted eggs

Overall, both solid and liquid salting methods effectively produced salted eggs with desirable organoleptic properties. However, the salting medium and salt concentration played crucial roles in determining the final sensory quality. Higher salt concentrations generally promoted better preservation, firmer textures, and more intense yolk coloration due to enhanced osmotic dehydration and protein denaturation. In the solid salting method, the 1:3 ratio produced the best sensory characteristics, while in the liquid salting method, the 1:0.5 ratio yielded the highest panelist preference because of its balanced saltiness and enhanced flavor from added spices. These findings indicate that optimization of salting media and salt concentration is essential for producing traditional salted eggs with superior physical and sensory quality (Hasdar et al., 2021).

IV. CONCLUSION

The results of this study demonstrated that both solid and liquid salting methods significantly influenced the organoleptic characteristics of traditional salted eggs. Variations in salt concentration affected yolk color, texture, aroma, taste, and overall panelist acceptance. In the solid salting method, the salt-to-ash ratio of 1:3 produced the best sensory quality, characterized by a bright orange yolk, firm texture, balanced salty taste, and desirable aroma. Meanwhile, in the liquid salting method, the salt-to-water ratio of 1:0.5 yielded the highest

panelist preference due to its attractive yolk color, balanced saltiness, soft texture, and distinctive aroma from the addition of garlic and chili peppers.

The study also confirmed that higher salt concentrations enhanced osmotic dehydration and protein denaturation, resulting in improved texture formation and more intense yolk coloration. Furthermore, the incorporation of natural spices in the liquid salting method contributed positively to flavor enhancement and sensory acceptance. Overall, optimization of salting media and salt concentration is essential for producing traditional salted eggs with superior organoleptic quality and higher consumer preference.

V. REFERENCES

Accelist Pangan Nusantara. (2026). *Salted Egg: A Delicacy from Tradition to Modern Favorite*. Https://Pangan.Accelist.Com/En/Blog/Salted-Egg-Is/.

Afraz, M. T., Khan, M. R., Roobab, U., Noranizan, M. A., Tiwari, B. K., Rashid, M. T., Inam-ur-Raheem, M., Hashemi, S. M. B., & Aadil, R. M. (2020). Impact of novel processing techniques on the functional properties of egg products and derivatives: A review. *Journal of Food Process Engineering*, *43*(12), e13568. https://doi.org/https://doi.org/10.1111/jfpe.13568

Barcenilla, C., Álvarez-Ordóñez, A., López, M., Alvseike, O., & Prieto, M. (2022). Microbiological Safety and Shelf-Life of Low-Salt Meat Products-A Review. *Foods (Basel, Switzerland)*, *11*(15). https://doi.org/10.3390/foods11152331

Hasdar, M., Purwanti, Y., & Nurwati, N. (2021). Organoleptic Quality of Salted Quail Eggs Using Boiled Salt From Brebes. *Bantara Journal of Animal Science*, *3*(1), 22–29. https://doi.org/10.32585/bjas.v3i1.1327

Ilyas, S., It Jamilah, & Nursal. (2023). The Production of Salted-Egg With Low Levels of Sodium and Cholesterol. *International Journal of Ecophysiology*, *5*(1), 63–72. https://doi.org/10.32734/ijoep.v5i1.12383

Kastaman, R., Sudaryanto, & Nopianto, B. H. (2009). Study on the Egg Salting Process Using Reverse Osmosis Method At Various Immersion Times. *Jurnal Teknologi Industri Pertanian, 19(1)*(1), 30–39.

Kumar, Y., Khalangre, A., Drudi, F., Ghanghas, N., & Suhag, R. (2026). Rheological behavior of egg yolk: Processing impacts and applications in food systems. *Journal of Food Engineering*, *408*, 112892. https://doi.org/https://doi.org/10.1016/j.jfoodeng.2025.112892

Li, X., Chen, S., Yao, Y., Wu, N., Xu, M., Zhao, Y., & Tu, Y. (2022). The Quality Characteristics Formation and Control of Salted Eggs: A Review. *Foods (Basel, Switzerland)*, *11*(19). https://doi.org/10.3390/foods11192949

Mopera, L. E., Saludo, P. M., Flores, F. P., Sumague, M. J. V., Oliveros, B. R. R., & Tan, W. T. (2021). Physicochemical, nutritional and sensory qualities of salted philippine mallard duck (Anas platyrhynchos l.) eggs. *Food Research*, *5*(4), 279–287. https://doi.org/10.26656/fr.2017.5(4).025

Nurbaety, H. R., & Nurwati, N. (2021). Process Of Egg Salt Smoke In Htm Jaya Brebes. *Journal of Technology and Food Processing (JTFP)*, *1*(01), 31–36. https://doi.org/10.46772/jtfp.v1i01.340

Nurliyani, N., Hartawan, A., Nugroho, Y. A., & Indratiningsih, I. (2015). The Characteristics of Salted Chicken and Duck Egg by Using Traditional Roasting. *The 6th International Seminar on Tropical Animal Production*, 738–742.

Ramdayani, S., Lukman, H., & Resmi. (2020). Pengaruh Konsentrasi Garam Terhadap Sifat Organoleptik Telur Asin Oven Yang Dibuat Dengan Cara Basah (The Effect Of Salt Concentration On The Organoleptic Properties Of Oven Salt. *Jurnal Ilmiah Ilmu-Ilmu Peternakan*, *23*(12), 69–82.

Rokana, E., Helilusiatiningsih, N., & Nurtantyo Sarbini, R. (2018). Diversifikasi Produk Telur Asin Melalui Penambahan Tanaman Herbal dan Proses Penyangraian. *Jurnal Dedikasi*, *1*(4), 90–99. http://ejournal.umm.ac.id/index.php/dedikasi/issue/view/584

Rukmiasih, Ulupi, N., & Indriani, W. (2015). Sifat fisik, kimia dan organoleptik telur asin melalui penggaraman dengan tekanan dan konsentrasi garam yang berbeda. *Jurnal Ilmu Produksi Dan Teknologi Hasil Peternakan*, *3*(3), 142–145.

Shodiqin, M. A., & Ma, I. (2025). Organoleptic and Hedonic Quality of Salted Chicken Eggs with the Brick Salting Method This study aims to analyze the organoleptic and hedonic quality of salted chicken eggs against the duration of incubation using the brick salting method . This study has. *Agaricus*, *4*(3).

Surya, R., & Nugroho, D. (2025). Microbiological characteristics of traditionally-produced salted eggs in Indonesia. *BIO Web of Conferences*, *169*. https://doi.org/10.1051/bioconf/202516902006

Wang, T.-H. (2017). Salting Yolks Directly Using Fresh Duck Egg Yolks with Salt and Maltodextrin. *The Journal of Poultry Science*, *54*(1), 97–102. https://doi.org/10.2141/jpsa.0160027

Wang, X., Zhang, J., Vidyarthi, S. K., Xu, M., Liu, Z., Zhang, C., & Xiao, H. (2024). A comprehensive review on salted eggs: quality formation mechanisms, innovative pickling technologies and value-added applications. *Sustainable Food Technology*, *2*(5), 1409–1427. https://doi.org/https://doi.org/10.1039/d4fb00129j

Xiao, C., Zhang, Y., Gong, T., Lu, W., Chen, D., Zhang, C., Wang, H., & Guan, R. (2023). A Comparative Study of Pickled Salted Eggs by Positive and Negative Pressure-Ultrasonic Method. *Foods*, *12*(7). https://doi.org/10.3390/foods12071477

Xu, L., Zhao, Y., Xu, M., Yao, Y., Nie, X.-L., Du, H., & Tu, Y. (2017). Effects of salting treatment on the physicochemical properties, textural properties, and microstructures of duck eggs. *PLoS ONE*, *12*. https://api.semanticscholar.org/CorpusID:31056769