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Physical Characteristic and Organoleptic of Egg Tofu with Different Types of Egg for Optimal Protein Requirements

R. Nazilla, Z. Wulandari*, & C. Budiman
Department of Animal Production and Technology, Faculty of Animal Science, IPB University
Jl. Agatis, Kampus IPB Darmaga Bogor 16680, Indonesia
*Corresponding author: zakiahwu@apps.ipb.ac.id
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ABSTRACT

Egg tofu is one of the foods that contains high protein because it is made from a mixture of soybeans and eggs. Eggs have complete nutritional content ranging from protein, fat, vitamins and minerals. This study aims to analyze the physical and organoleptic properties of egg tofu with the addition of various types of eggs, namely chicken eggs, free-range chicken eggs, duck eggs and IPB D1 chicken eggs. The analysis carried out included pH, water holding capacity (WHC), water absorption index (WAI), water solubility index (WSI), and Texture with an ANOVA test followed by Tukey and Duncan's further test, and Organoleptic data were analyzed using the Kruskal–Wallis test. The results of the analysis showed that only the WHC value was significantly different (P <0.05) with the addition of various types of eggs. The use of varying egg types in egg tofu production did not reduce organoleptic quality, as it only affected overall appearance and color.

Keywords: egg, egg tofu, organoleptic, physical, soybeans

ABSTRAK

Egg Tofu merupakan salah satu bahan makanan yang mengandung protein tinggi karena terbuat dari campuran kacang kedelai dan telur. Telur memiliki kandungan gizi yang lengkap mulai dari protein, lemak, vitamin dan mineral. Penelitian ini bertujuan untuk menganalisis sifat fisik dan organoleptik egg tofu dengan penambahan berbagai jenis telur yaitu telur ayam ras, telur ayam kampung, telur bebek dan telur ayam IPB D1. Analisis yang dilakukan meliputi uji pH, water holding capacity (WHC), indeks penyerapan air (IPA), indeks kelarutan air (IKA), dan Tekstur menggunakan uji Anova dengan uji lanjut Tukey dan Duncan, dan data organoleptik dianalisis menggunakan uji Kruskal–Wallis. Hasil analisis ragam menunjukkan bahwa hanya nilai WHC berbeda nyata (P<0,05) dengan penggunaan berbagai jenis telur. Penggunaan berbagai jenis telur dalam pembuatan egg tofu tidak menurunkan mutu organoleptik, tetapi hanya memengaruhi penampilan umum dan warna.

Kata kunci: telur, egg tofu, organoleptik, fisik, kacang kedelai

INTRODUCTION

Food is an essential factor in daily life that can come from animals or plants. Eggs are a food ingredient that can be obtained very easily by the Indonesian people because of their abundant availability and relatively low price, making eggs a food ingredient consumed by the community to meet the needs of animal protein. According to the Central Statistics Agency (BPS) (2025), the production of laying hen eggs has increased from year to year by 7.8% from 2021 to 2022, and by 9.71% from 2022 to 2023. Production in 2024 is 6,342,705 million tons. Free-range chicken egg production, according to BPS (2025), increased by 4.2% in 2022 and by 1.6% in 2023. Free-range chicken egg production in 2024 will be 236,648 million tons. The need for egg food continues to increase due to the awareness of the Indonesian people about the importance of meeting the needs of animal protein. The use of eggs as food is not only needed on a household scale but also for large companies engaged in food processing.

Eggs are products of animal origin that have a rich source of nutrients, but eggs are easily damaged so they need to be preserved (Reliantari *et al.* 2017). The nutritional content of eggs consists of 13% protein, 12% fat, and high B complex vitamins in egg yolks as well as minerals such as iron, phosphorus, and a small amount of calcium (Tooy *et al.* 2021). Protein needs by humans are not only obtained from animal proteins but can also come from vegetable proteins. One of the widely consumed vegetable proteins is tofu, generally made from soybeans. Tofu is often used as a mainstay food ingredient to improve the nutrition of the Indonesian people because tofu contains vegetable protein of the highest quality. Tofu has nutritional content consisting of calcium, carbohydrates, water, protein, fat, phosphorus, iron, as well as vitamins A, B1, and C (Tjiptaningdyah 2010). Tofu making generally only uses soybeans which have a nutritional content that is still inferior to that of eggs. So, food product innovations, namely egg tofu, are carried out.

Egg Tofu is one of the food innovations made from mixing eggs and soybeans which has a higher nutritional content than tofu in general. Egg tofu has a yellower color than other types of tofu, has a soft texture and is easy to destroy, which makes egg tofu have a special manufacturing process (Supriadianto 2017). The addition of eggs in egg tofu has a role that utilizes the functional properties of eggs such as natural developers, colorists, emulsifiers, and coagulators (Evanuarini *et al.* 2021). However, in the development of egg tofu products, the use of eggs is still dominated by purebred chicken eggs, even though Indonesia has various local poultry species with unique egg characteristics and great potential for development. Several types of local eggs commonly found in the market include free-range chicken eggs, duck eggs, and eggs from locally bred lines such as IPB-D1 chickens. Free-range chicken eggs and IPB-D1 chicken eggs are local egg types that have the potential to serve as good sources of protein. Free-range chicken eggs, IPB-D1 chicken eggs, and duck eggs are local eggs whose processing technologies need to be improved to increase their consumption by the community.

The lack of information regarding the most optimal type of egg for egg tofu production forms the basis for the need to conduct a comparative study among different types of local eggs. This study aims to determine the physical characteristics and organoleptic of egg tofu using different egg types. This research is expected to provide scientific information useful for the development of functional food products based on local eggs, as well as to promote the utilization and increase the economic value of Indonesia's local poultry genetic resources. In addition, through the utilization of various types of local eggs, it is expected that an egg tofu formulation with superior characteristics can be obtained, particularly in terms of texture, flavor, and shelf life.

MATERIALS AND METHODS

The equipment used in the preparation of egg tofu included a blender (Sanex, China), filter, steamer (Global Eagle, Indonesia), stove (Rinnai, China), thermometer (Dial Food Thermometer, China) and thinwall (Victory, Indonesia). The equipment used for the analysis included a pH meter (Ionix, India), texture analyzer (Perten TVT 6700, Sweden), centrifuge (Z323K, Germany), analytical balance (Precisa, Switzerland), oven, and centrifugal bottles. The materials used in this study were eggs aged 1–5 days (commercial chicken eggs, native chicken eggs, IPB D1 chicken eggs, and duck eggs), soybeans, Glucono Delta Lactone (GDL), salt, and water.

Methods

Egg Tofu Making Process

The procedure for making egg tofu was based on Murad *et al.* (2015) with modifications. In the initial stages, soybeans were soaked in clean water for approximately 12 hours, then cleaned of the skin pulp and then blended with the water added (3:1). The blended soybeans were then filtered to obtain the soybean juice and boiled for ±15 minutes at 90 °C. Next, prepare the eggs to be used and stir until the yolks and egg whites are well mixed. The boiled soybean juice is cooled and mixed with eggs that have been stirred in a 4:3 ratio. The mixture is then mixed until evenly distributed, with GDL added at 1% of the total ingredients. The mixture was then put into a container and steamed for 15-30 minutes at a temperature of about 90 °C.

Sample Analysis.

The analysis carried out in this study consisted of physic analysis includes pH measurement, texture based on the Texture Profile Analysis (TPA) method (Maskyur *et al.* 2016), water holding capacity (WHC) carried out based on Cao *et al.* (2017), water absorption index (WAI) and Water solubility index (WSI) method (Patria *et al.* 2020), and organoleptic tests.

Data Analysis

The data obtained were statistically analyzed using analysis of variance (ANOVA) based on a Randomized Group Design (RGD) with one factor and three groups of manufacturing periods. If there is a difference in influence between treatments, it will be continued with the Tukey Test and Duncan's further test. Organoleptic test data analysis was carried out using a non-parametric test, namely the Kruskal-Wallis test.

RESULTS AND DISCUSSION

Physical Characteristics of Egg Tofu

pH

The results of the pH analysis (Table 1) of egg tofu showed some variation; however, the differences were not statistically significant ($P>0.05$) with the addition of different egg types. This may occur due to the main factors, namely the composition of raw materials and the chemical mechanisms involved. Soy milk, which has a neutral to slightly acidic pH of around 6.5–7.6 (Picauly and Tetelepta 2015), tends to neutralize pH variations that may arise from differences in egg types. The pH of fresh eggs ranges from 7.6–7.9 (Nigsih and Triawan 2024), the pH of native chicken eggs is around 8.03 (Widyantara *et al.* 2017), and the pH of duck eggs is around 7.01–7.04 (Septiana *et al.* 2015). This buffering effect is associated with the presence of globulin proteins (7S and 11S) in soy milk, which have a strong buffering capacity against pH fluctuations, thereby stabilizing the pH despite minor variations in the chemical composition of the eggs (Duc *et al.* 2021). In addition, the consistency of the egg tofu production process, including

Table 1. Physical and texture analysis results on egg tofu

Observed variables	Treatment			
	P1	P2	P3	P4
pH	6.82±0.18	6.87±0.04	6.73±0.09	6.75±0.11
WHC (%)	71.61±1.14c	77.44±1.57a	75.55±1.96ab	73.29±1.90bc
WAI (g/g)	0.83±0.02	0.85±0.04	0.86±0.03	0.80±0.06
WSI (%)	14.26±1.53	15.32±0.57	15.89±2.60	14.37±2.22
Texture				
Hardness (N)	2.52±1.41	2.61±2.10	2.70±1.16	2.57±1.04
Cohensive	0.721±0.09	0.723±0.06	0.734±0.11	0.725±0.08
Elazticity	0.86±0.07	0.91±0.03	0.89±0.10	0.90±0.05

The different letters a,b,c, and d on the same line, show a noticeable difference (P<0.05). P1 = addition of purebred chicken eggs; P2 = addition of free-range chicken eggs; P3 = addition duck eggs; P4 = addition of IPB D1 chicken eggs. WSI = Water Solubility Index, WAI =Water absorption Index, WHC = Water Holding Capacity.

controlled temperature and heating duration, also contributes to the absence of variation in pH values.

Water Holding Capacity (WHC)

The results (Table 1) showed that the water holding capacity (WHC) of egg tofu differed significantly (P<0.05) among the egg types used. Protein plays an important role in gel formation, where higher concentrations can enhance water-binding ability through protein denaturation and coagulation during heating (Murad *et al.* 2015). Similarly, Swarno *et al.* (2015) reported that a high WHC value is mainly influenced by protein content, as proteins contribute to water retention during gel formation. The analysis of variance indicated that egg tofu made with purebred chicken eggs (P1) had the lowest WHC value, suggesting that P1 exhibited a better ability to retain water compared to the other treatments, making the lowest WHC value the most desirable result. These variations may also relate to the protein composition of different egg types, where native chicken eggs contain about 13.86% protein, purebred chicken eggs about 12.76%, and duck eggs about 12.26% (Wulandari 2018). In addition, differences might have been affected by egg storage duration, as eggs used in each treatment were obtained from different sources. Prolonged storage is known to reduce protein quality and functional properties, including the ability to denature and form gel networks (Djaelani *et al.* 2019).

This finding demonstrates that WHC is determined not only by protein content but also by protein structural conditions. The formation of compact gel networks with appropriate aggregate sizes can enhance gel strength and reduce excess water in the matrix, thereby producing a more stable texture (Li *et al.* 2023). Therefore, higher protein content does not always correspond to increased WHC, as water-binding capacity is more strongly influenced by protein functionality and structural integrity resulting from coagulation and degradation processes (Widjajaseputra *et al.* 2020).

WAI and WSI

Based on the results presented in Table 1, the values of the water absorption index (WAI) and water solubility index (WSI) did not show a significant difference (P>0.05) with the addition of different types of eggs. This may be due to factors such as the proteins and gel structures formed during coagulation. Although each type of egg has a different nutritional composition—including variations in protein, fat, and minerals—they share similar structural and functional properties.

These similarities are related to the heating process during the uniform egg tofu production, which causes protein denaturation. Oikunomou and Krokida (2011) explained that manufacturing factors such as temperature and heating time have a dominant influence on the functional properties of food products, including solubility and water absorption. The protein coagulation process is consistent due to the controlled heating temperature of 90°C for approximately 30 minutes. Furthermore, the combination of plant and animal proteins in the coagulation system results in a gel structure that tends to be uniform, provided that the proportions and processing conditions remain the same.

Texture

The addition of different egg types to egg tofu did not result in significant differences (P>0.05) in hardness, cohesiveness, or elasticity values (Table 1). This lack of significant variation may be attributed to the relatively small differences in protein content among treatments. The formation of a more structured and compact protein network in tofu contributes to improved textural properties (Aryanti *et al.* 2016). These three parameters are interrelated—greater hardness supported by good cohesiveness enhances the resistance of egg tofu to pressure. Thus, despite minor variations in protein and fat content, the primary protein structure remains similar and consistently contributes to gel formation.

Another factor influencing texture is the processing method. The use of constant temperature and fixed ingredient proportions produces a uniform and consistent gel structure, thereby reducing textural variation among treatments (Zhao *et al.* 2021). In addition, the amount of soybean used in egg tofu preparation greatly affects the textural profile, including cutting force and hardness (Nicole *et al.* 2014). This is in line with the differences in moisture content, which significantly impact the texture of egg tofu. According to

Table 2. Hedonic and hedonic quality analysis data on egg tofu

Parameter	P1	P2	P3	P4
Hedonic test				
Demonstration	4.95±1.38ab	5.45±0.99a	4.60±1.35b	5.70±1.02a
Color	4.93±1.61ab	5.38±1.08a	4.40±1.58b	5.65±1.03a
Egg aroma	4.70±0.99	4.40±1.32	4.73±1.09	4.68±1.44
Soy aroma	4.58±1.08	4.63±1.25	4.63±1.17	4.45±0.99
Taste	4.18±1.41	4.30±1.22	4.58±1.22	4.23±1.46
Texture	4.70±1.30	4.53±1.38	4.43±1.50	5.15±1.31
chewability	4.78±1.21	4.75±1.28	4.58±1.39	5.13±1.36
Hedonic quality test				
Color	3.20±0.97b	4.30±0.82a	2.03±0.62c	4.50±1.01a
Egg aroma	3.78±1.39	4.25±1.37	4.38±1.63	4.55±1.22
Soy aroma	3.63±1.23	3.58±1.45	3.38±1.17	3.70±1.30
Taste	4.25±1.13	4.38±1.23	4.00±1.48	4.75±1.03
Texture	5.53±0.88	5.55±0.81	5.23±1.05	5.30±1.26
Chewability	6.33±0.80	6.25±0.87	6.03±0.89	6.13±0.85

P1= egg tofu purebred chicken eggs; P2= egg tofu free-range chicken eggs; P3= egg tofu duck egg; P4=egg tofu chicken eggs IPB D1. The different letters a,b,c, and d on the same line, show a noticeable difference (p<0.05). The value of each of the attributes ranges from (scale 1-7), where 1= strongly dislikes; 2= dislikes; 3= somewhat dislikes; 4= neutral; 5= somewhat likes; 6= likes; 7=Very likes. The value of each attribute ranges from (scale 1-7), where the color value on a scale of 1 = Very Pallor; 2= pale; 3= slightly pale; 4= medium yellow; 5 = Bright Yellow; 6 = Solid Yellow; 7 = Very yellow. The value of egg and soy aroma on a scale of 1= is very weak; 2= weak 3= somewhat weak; 4= enough; 5= strong enough; 6= strong; 7= very strong. The value of the balance sense of the scale 1= is very unbalanced; 2=unbalanced; 3= almost unbalanced; 4= enough to contribute; 5= balanced; 6= very balanced; 7= perfect. The texture value of scale 1= is very hard; 2= hard; 3= a bit hard; 4= quite soft; 5= soft enough; 6= soft; 7= very soft. The chewability value of a scale of 1= is very difficult; 2= difficult; 3= a bit difficult; 4= medium; 5= easy enough; 6= easy; 7= very easy.

Zhao *et al.* (2021), texture is influenced not only by the type of raw materials but also by the concentration and ratio of water used.

Organoleptic of Egg Tofu

Organoleptic testing is an evaluation of food products based on consumer preference and acceptance (Gusnadi *et al.* 2021). Organoleptic quality refers to the sensory characteristics of a product, which are assessed using human senses. In this study, the sensory evaluation components included overall appearance, color, egg aroma, soybean aroma, taste, texture, and chewiness, as presented in Table 2. The results of the organoleptic analysis showed significant differences (P<0.05) only in overall appearance and color (Table 2).

For overall appearance, panelists rated the egg tofu made with different egg types from “slightly like” to “like.” The most preferred appearance was observed in egg tofu made with IPB-D1 chicken eggs and native chicken eggs. Overall appearance is an essential attribute to consider in food processing, as it serves as a key indicator of the sensory quality of food products (Samudera and Malik 2018). Regarding color, both hedonic and quality tests showed that panelists preferred the color of egg tofu prepared with native chicken eggs, IPB-D1 chicken eggs, or commercial layer chicken eggs. This indicates that panelists accepted the color characteristics of egg tofu, ranging from slightly pale to bright yellow. Color is one of the main visual attributes that attracts consumers before they evaluate other characteristics of a food product (Fausiah *et al.* 2019).

Sensory evaluation results (Tables 2) showed that the use of different egg types did not significantly affect (P>0.05) the aroma, taste, texture, or chewiness of egg tofu. Panelists perceived the aroma of egg and soybean as balanced, while the taste was relatively similar across treatments due to the comparable characteristics of the eggs used. Texture and chewiness were also rated positively in all treatments, supported by the consistent ingredient ratio (egg to soybean juice 3:4) and standardized processing. Overall, these findings indicate that different egg types can be used in egg tofu production without reducing its organoleptic quality, as all treatments were equally well accepted by the panelists.

CONCLUSION

The characteristics of egg tofu with different types of eggs have a significant effect only on water holding capacity (WHC). The use of uniform raw materials is also a factor in determining the characteristics of the egg tofu produced. Treatment P2, namely by adding free-range chicken eggs, showed the highest WHC value. The use of different egg types in egg tofu production did not significantly affect the organoleptic quality, except for general appearance and color. Panelists consistently accepted the aroma, taste, texture, and chewability across all treatments, indicating that differences in egg type did not reduce consumer acceptance.

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REFERENCES

Aryanti, N., D. Kurniawati, A. Maharani, & D.H. Wardhani. 2016. Karakteristik kimia produk susu fermentasi "kefir" berantioksidan selama penyimpanan. Journal of Tropical Animal Science. 4(2):321-336.

BPS (Badan Pusat Statistik). 2025. Produksi telur ayam petelur menurut provinsi (Ton) (2024). Jakarta: BPS.

BPS (Badan Pusat Statistik). 2025. Produksi telur ayam buras menurut provinsi (Ton) (2021-2024). Jakarta: BPS.

Cao, F.H., X.J. Li., S.Z. Luo., D.D. Mu., X.Y. Zhong., S.T. Jiang., Z. Zheng., & Y.Y. Zhao. 2017. Effects of organic acid coagulants on the physical properties of and chemical interactions in tofu. Food Science and Technology. 85(1):58-65.

Djaelani, M.A., Z. Novika., & N. Azizah. 2019. Pengaruh pencucian, pembungkusan dan penyimpanan suhu rendah terhadap kualitas telur ayam ras (Gallus L.). BAF. 4(1):29-34.

Duc, N.Q., N.T. Que, N.D. Doan, N.X. Phoung, & L.H. Nga. 2021. Effect of soymilk coagulating pH on tofu qualities. Vietnam Journal of Science and Technology. 59(2):196-205.

Evanuarini, H., I. Thohari, & S.R. Safitri. 2021. Industri Pengolahan Telur. Malang: UB Press.

Fausiah, A., A.T.B.A. Mahmud, & S.A. Rab. 2019. Uji organoleptic daging persilangan ayam broiler dengan kepadatan kendang yang berbeda. Jurnal Ternak. 10(2): 60-63.

Gusnadi, D., R. Taufiq, & E. Baharta. 2021. Uji organoleptik dan daya terima pada produk mousse berbasis tapai singkong sebagai komoditi UMKM di Kabupaten Bandung. JIP. 1(12):2883–2888.

Li, X., L. Fu, Z. He, M. Zeng, Q. Chen, F. Qin, Z. Wang, & J. Chen. 2023. Effect of protein glutaminase on calcium sulphate-induced gels of SPI with different thermal treatments. Molecules. 28(4):1-16.

Masykur, S.F., D.R. Adawiyah, Hoerudin, & P. Hariyadi. 2016. Pengaruh ukuran partikel tepung kedelai dan konsentrasi glukono delta lakton (GDL) terhadap sifat fisik tahu instan. Jurnal Mutu Pangan. 3(1):28-34.

Murad, M., A. Abdullah, & W.A.W. Mustapha. 2015. Optimization of egg tofu formulations containing carrageenan, gum arabic and corn starch by descriptive sensory analysis. American Journal of Applied Sciences. 12(1):47-57.

Nicole, M., Z. Caimeng, K. Eric, & Y. Hua. 2014. Salt and acid-induced soft tofu-type gels: rheology, structure and fractal analysis of viscoelastic properties as a function of coagulant concentration. Int. J. of Food Engineering. 10(4):595–611.

Nigsih, A.A., & D.A. Triawan. 2024. Pengaruh variasi konsentrasi dan lama perendaman ekstrak daun belimbing wuluh (*Averrhoa blimbi* L) terhadap pengawetan telur ayam kampung. JLST. 1(1):18-26.

Oikonomou, N.A., & M.K. Krokida. 2011. Literature data compilation of WAI and WSI of extrudate food products. Int. JFP. 14(1):199-240.

Patria, D.G., A. Sutrisno, J.L. Hsu., & J. Lin. 2020. Physical properties and cooking quality of extruded restructured rice: impact of water temperature and water level. Food Research. 4(5):1616-1622.

Picauly, P., & G. Tetelepta. 2015. Karakteristik Fisik Bubur Instan Tersubstitusi Tepung Pisang Tongka Langit. Jurnal Teknologi Pertanian. 4(2):41-44.

Reliantari, I.F., H. Evanuarini, & I. Thohari. 2017. Pengaruh konsentrasi NaOH terhadap pH, kadar protein putih telur dan warna kuning telur pidan. Jurnal Ilmu dan Teknologi Hasil Ternak. 12(2):69-75.

Samudera, R., & A. Malik. 2018. Berbagai media pembuatan telur asin terhadap kualitas organoleptik. J Sains dan Teknol. 4(1):46.

Septiana, N., Riyanti, & K. Nova. 2015. Pengaruh lama simpan dan warna kerabang telur itik tegal terhadap indeks albumen, indeks yolk, dan pH telur. JIPT. 3(1): 81-86.

Supriadianto. 2017. Keunggulan wisata kuliner tahu di Korea. Jurnal Pariwisata Terapan. 1(1):63-76.

Swarno, G., D. Rosyidi, & I. Thohari. 2015. Kualitas fisik (ph, susut masak, tekstur) dan organoleptik daging kalkun. Disertasi. Universitas Brawijaya, Malang.

Tjiptaningdyah, R. 2010. Studi Keamanan Pangan Pada Tahu Putih Yang Beredar Di Pasar Sidoarjo (kajian dari kandungan formalin). Berk. Penel. Hayati. 15(2):159-164

Tooy, M.D., N.N. Lontaan, L.C.M. Karisoh, & I. Wahyuni. 2021. Kualitas Fisik Ayam Ras yang direndam dalam Larutan Teh Hijau (Camellia Sinensis) Komersial. Zootec. 41(1):283-290.

Widjajaseputra, A.I., T.E.W. Widyastuti, M.M. Suprijono, & C.Y. Trisnawati. 2020. Peran jenis dan konsentrasi koagulan pada karakteristik tahu dan tingkat penerimaan konsumen. JTPG. 19(2):114-122.

Widyantara, P.R.A., G.A.M.K. Dewi, & I.N.T. Ariana. 2017. Pengaruh lama penyimpanan terhadap kualitas telur konsumsi ayam kampung dan ayam lohman brown. MIP. 20(1):5-11.

Wulandari, Z. 2018. Karakteristik lisozim dari telur unggas lokal sebagai pemanis. Disertasi. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

Zhao X, D. Zhang, J. Liu, & T. Zhang. 2021. Physicochemical and sensory properties of egg curd as affected by raw materials and lecithin. JFPP. 1(1): 1-15.