

References

- Abbas, L., Bih, L., Yamni, K., Elyahyaouy, A., Attaoui, A. E., & Ramzi, Z. (2024). Determination of latent heats of vaporization and fusion. *Advances in Chemical Engineering and Science*, 14(03), 113–124. <https://doi.org/10.4236/aces.2024.143007>
- Addo-Preko, E., Niilante, G., & Blay, Y. (2023). The relevance of the number of categories in the hedonic scale to the ghanaian consumer in acceptance testing. *The Relevance of the Number of Categories in the Hedonic Scale to the Ghanaian Consumer in Acceptance Testing*, 3(1). <https://doi.org/10.3389/frfst.2023.1071216>
- Agbangba, C. E., Aide, E. S., Honfo, H., & Kakai, R. G. (2024). On the use of post-hoc tests in environmental and biological sciences: A critical review. *Heliyon*, 10(3), e25131–e25131. <https://doi.org/10.1016/j.heliyon.2024.e25131>
- Alpers, T., Tauscher, V., Steglich, T., Becker, T., & Jekle, M. (2020). The self-enforcing starch–gluten system—strain–dependent effects of yeast metabolites on the polymeric matrix. *Polymers*, 13(1), 30. <https://doi.org/10.3390/polym13010030>
- Andersen, B. V., Brockhoff, P. B., & Hyldig, G. (2019). The importance of liking of appearance, -odour, -taste and -texture in the evaluation of overall liking. A comparison with the evaluation of sensory satisfaction. *Food Quality and Preference*, 71, 228–232. <https://doi.org/10.1016/j.foodqual.2018.07.005>
- Arumughan, V., Nypelö, T., Hasani, M., & Larsson, A. (2021). Calcium ion-induced structural changes in carboxymethylcellulose solutions and their effects on adsorption on cellulose surfaces. *Biomacromolecules*, 23(1), 47–56. <https://doi.org/10.1021/acs.biomac.1c00895>
- Benbettaieb, N., Gay, J.-P., Karbowiak, T., & Debeaufort, F. (2016). Tuning the functional properties of polysaccharide-protein bio-based edible films by chemical, enzymatic, and physical cross-linking. *Comprehensive Reviews in Food Science and Food Safety*, 15(4), 739–752. <https://doi.org/10.1111/1541-4337.12210>

- Bi, Y., Lei, H., Fang, Y., Wang, S., & Tang, J. (2025). Study on the physical properties and application of a novel pharmaceutical excipient made from starch and cellulose co-processing. *Pharmaceuticals*, 18(9), 1389–1389. <https://doi.org/10.3390/ph18091389>
- Bouchon, P., & Dueik, V. (2018). Frying of foods. *Food Engineering Series*, 275–309. https://doi.org/10.1007/978-1-4939-3311-2_10
- Cáceres, C. G. M., Quispe, V. I., Baldeón, E. O., Jorge, J. L. C., Llatasi, F. G. C., Areche, F. O., Ticona, D. C. P., Condori, J. M. B., Arata, D. H. C., Vilca, O. M. L., Rivera, T. J. C., Flores, D. D. C., & Huayapa, M. A. C. (2025). Strategic modulation of lime concentration to optimize chemical composition, microbial stability, and sensory quality in quispiño dough formulation. *Discover Food*, 5(1). <https://doi.org/10.1007/s44187-025-00566-5>
- Cappelli, A., Oliva, N., & Cini, E. (2020). A systematic review of gluten-free dough and bread: Dough rheology, bread characteristics, and improvement strategies. *Applied Sciences*, 10(18), 6559. <https://doi.org/10.3390/app10186559>
- Carabante, K. M., & Prinyawiwatkul, W. (2018). Data analyses of a multiple-samples sensory ranking test and its duplicated test: A review. *Journal of Sensory Studies*, 33(4), e12435. <https://doi.org/10.1111/joss.12435>
- Casaburi, A., Montoya Rojo, Ú., Cerrutti, P., Vázquez, A., & Foresti, M. L. (2018). Carboxymethyl cellulose with tailored degree of substitution obtained from bacterial cellulose. *Food Hydrocolloids*, 75, 147–156. <https://doi.org/10.1016/j.foodhyd.2017.09.002>
- Chen, Y., Yin, R., Guo, L., Zhao, D., & Sun, B. (2025). Development and validation of a consumer-oriented sensory evaluation scale for pale lager beer. *Foods*, 14(16), 2834–2834. <https://doi.org/10.3390/foods14162834>
- Chew, C. L., & Loh, J. M. (2025). A review on food deep-fat frying from the perspective of physicochemistry, nutrition, safety, and consumer preference. *Food Reviews International*, 1–29. <https://doi.org/10.1080/87559129.2025.2601972>

- Choudhary, A., Kumar, V., Kumar, S., Majid, I., Aggarwal, P., & Suri, S. (2020). 5-Hydroxymethylfurfural (HMF) formation, occurrence and potential health concerns: recent developments. *Toxin Reviews*, 1–17. <https://doi.org/10.1080/15569543.2020.1756857>
- Cui, L., Chen, J., Zhai, J., Peng, L., & Xiong, Y. L. (2023). Hydrocolloids-aided control of oil penetration and distribution in deep-fried breaded fish nuggets. *Food Hydrocolloids*, 145, 109028–109028. <https://doi.org/10.1016/j.foodhyd.2023.109028>
- Dadmohammadi, Y., & Datta, A. K. (2020). Food as porous media: a review of the dynamics of porous properties during processing. *Food Reviews International*, 38(5), 953–985. <https://doi.org/10.1080/87559129.2020.1761376>
- Dangal, A., Tahergorabi, R., Acharya, D., Timsina, P., Rai, K., Dahal, S., Acharya, P., & Giuffrè, A. M. (2024). Review on deep-fat fried foods: physical and chemical attributes, and consequences of high consumption. *European Food Research and Technology*, 250. <https://doi.org/10.1007/s00217-024-04482-3>
- Das, R. S., Tiwari, B. K., & Garcia-Vaquero, M. (2023). The fundamentals of bread making: The science of bread. *Springer EBooks*, 1–40. https://doi.org/10.1007/978-3-031-23352-4_1
- Dash, K. K., Sharma, M., & Tiwari, A. (2022). Heat and mass transfer modeling and quality changes during deep fat frying: A comprehensive review. *Journal of Food Process Engineering*, 45(4). <https://doi.org/10.1111/jfpe.13999>
- Davoodi, M. G., Karimi, M., Naghizadeh, F., Rahmanian, A., & Pour, A. (2025). Investigating the possibility of increasing the shelf life of fermented doughnut using edible cellulose films. *Journal of Food Science and Technology (Iran)*, 22(163), 242–254. <https://doi.org/10.22034/FSCT.22.163.242>
- de Mendonça Lima, L. E., Leal, B., & Passos, T. S. (2024). Oil frying processes and alternative flour coatings: Physicochemical, nutritional, and sensory parameters of meat products. *Foods*, 13(4), 512–512. <https://doi.org/10.3390/foods13040512>

- de Oliveira Almeida, A., & da Silveira, W. (2023). Production of carboxymethyl cellulose films incorporating rue (*ruta graveolens*) essential oil. *Materials Research*, 26(suppl 1). <https://doi.org/10.1590/1980-5373-mr-2022-0551>
- Demiray, I. D., Ergezer, H., Demiray, E., & Süfer, Ö. (2025). Deep-fat frying of chicken nuggets: Impacts on mass transfer and some quality indices. *Food Science & Nutrition*, 13(6). <https://doi.org/10.1002/fsn3.70451>
- Drake, M. A., Watson, M. E., & Liu, Y. (2023). Sensory analysis and consumer preference: Best practices. *Annual Review of Food Science and Technology*, 14(1), 427–448. <https://doi.org/10.1146/annurev-food-060721-023619>
- Dubey, A., Choudhary, K., & Bhausheb, U. S. (2025). Equipments and machinery involved in pasta processing. *Advances in Pasta Technology*, 71–90. https://doi.org/10.1007/978-3-031-84497-3_4
- Dunne, R. A., Darwin, E. C., Perez Medina, V. A., Levenston, M. E., St. Pierre, S. R., & Kuhl, E. (2025). Texture profile analysis and rheology of plant-based and animal meat. *Food Research International*, 205, 115876. <https://doi.org/10.1016/j.foodres.2025.115876>
- El Hosry, L., Elias, V., Chamoun, V., Halawi, M., Cayot, P., Nehme, A., & Bou-Maroun, E. (2025). Maillard reaction: Mechanism, influencing parameters, advantages, disadvantages, and food industrial applications: A review. *Foods*, 14(11), 1881. <https://doi.org/10.3390/foods14111881>
- Elechi, J. O. (2022). Product development, nutritional characteristics and consumers acceptability studies of doughnut partially substituted with carrot (*Daucus carota*) and mango (*Mangifera indica* L) flour fortified with date (*Phoenix dactylifera* L) fruits syrup as sweetener. *Food and Applied Bioscience Journal*, 10(2), 1–22.
- Erem, F. (2023). Physicochemical, sensory, and bioactive properties of gluten-free puddings produced with aronia derivatives. *GIDA / the JOURNAL of FOOD*, 243–255. <https://doi.org/10.15237/gida.gd22081>

- Fanari, F., Carboni, G., Grosso, M., & Designs, F. (2019). Thermogravimetric analysis of different semolina doughs: Effect of mixing time and gluten content. *Chemical Engineering Transactions*, 75. <https://doi.org/10.3303/cet1975058>
- Fowler, K., Connolly, P. J., Topping, D. O., & O'Meara, S. (2018). Maxwell–Stefan diffusion: A framework for predicting condensed phase diffusion and phase separation in atmospheric aerosol. *Atmospheric Chemistry and Physics*, 18(3), 1629–1642. <https://doi.org/10.5194/acp-18-1629-2018>
- Gan, Z., Ellis, P. R., & Schofield, J. D. (1995). Gas cell stabilisation and gas retention in wheat bread dough. *Journal of Cereal Science*, 21(3), 215–230. <https://doi.org/10.1006/jcrs.1995.0025>
- Gaurav, K., Mehta, N. K., Majumdar, R. K., Priyadarshini, M. B., Pal, P., Xavier, M., & Sharma, S. (2023). Carboxy methyl cellulose, xanthan gum, and carrageenan coatings reduced fat uptake, protein oxidation, and improved functionality in deep-fried fish strips: An application of the multiobjective optimization (MOO) approach. *ACS Omega*, 8(36). <https://doi.org/10.1021/acsomega.3c04072>
- Geng, J.-T., Takahashi, K., Kaido, T., Kasukawa, M., Okazaki, E., & Osako, K. (2019). Relationship among pH, generation of free amino acids, and Maillard browning of dried Japanese common squid *Todarodes pacificus* meat. *Food Chemistry*, 283, 324–330. <https://doi.org/10.1016/j.foodchem.2019.01.056>
- Gibis, M., Schuh, V., & Weiss, J. (2015). Effects of carboxymethyl cellulose (CMC) and microcrystalline cellulose (MCC) as fat replacers on the microstructure and sensory characteristics of fried beef patties. *Food Hydrocolloids*, 45, 236–246. <https://doi.org/10.1016/j.foodhyd.2014.11.021>
- Göncüoğlu Taş, N., & Gökmen, V. (2017). Maillard reaction and caramelization during hazelnut roasting: A multiresponse kinetic study. *Food Chemistry*, 221, 1911–1922. <https://doi.org/10.1016/j.foodchem.2016.11.159>

- Grenier, D., Rondeau-Mouro, C., Dedey, K. B., Morel, M.-H., & Lucas, T. (2021). Gas cell opening in bread dough during baking. *Trends in Food Science & Technology*, 109, 482–498. <https://doi.org/10.1016/j.tifs.2021.01.032>
- Guo, L., Chen, H., Zhang, Y., Yan, S., Chen, X., & Gao, X. (2023). Starch granules and their size distribution in wheat: Biosynthesis, physicochemical properties and their effect on flour-based food systems. *Computational and Structural Biotechnology Journal*, 21, 4172–4186. <https://doi.org/10.1016/j.csbj.2023.08.019>
- Halim, A. F., Zainuddin, N. F., Ismail, Z., Mohd, S., & Jamaludin, M. (2023). The prevalence of fast-food consumption among university students in the northern area of malaysia. *International Journal of Academic Research in Progressive Education and Development*, 12(1), 1583–1588. <http://dx.doi.org/10.6007/IJARPED/v12-i1/16514>
- He , W., Chen, X., Sun, J., Chen, H., & Sun, B. (2025). Unveiling the formation of key aroma compounds in yunnan arabica coffee roasting: A molecular sensory science perspective. *SSRN 5257220*.
- Heitmann, M., Zannini, E., & Arendt, E. (2017). Impact of *Saccharomyces cerevisiae* metabolites produced during fermentation on bread quality parameters: A review. *Critical Reviews in Food Science and Nutrition*, 58(7), 1152–1164. <https://doi.org/10.1080/10408398.2016.1244153>
- Hill, V. M., Ledward, D. A., & Ames, J. M. (1996). Influence of high hydrostatic pressure and pH on the rate of maillard browning in a glucose–lysine system. *Journal of Agricultural and Food Chemistry*, 44(2), 594–598. <https://doi.org/10.1021/jf950317w>
- Huppertz, T., Shkembi, B., Brader, L., & Geurts, J. (2024). Dairy matrix effects: Physicochemical properties underlying a multifaceted paradigm. *Nutrients*, 16(7), 943. <https://doi.org/10.3390/nu16070943>
- Huq, S., Das, P. C., Islam, Md. A., Jubayer, Md. F., Ranganathan, T. V., & Mazumder, Md. A. R. (2021). Nutritional, textural, and sensory quality of oil fried donut enriched with extracted dietary fiber and okara flour. *Journal of Food Processing and Preservation*, 45(3). <https://doi.org/10.1111/jfpp.15310>

- J.P Selecta. (2019). *Fat extraction instruction manual booklet*.
- Janssen, F., Wouters, A. G. B., & Delcour, J. A. (2021). Gas cell stabilization by aqueous-phase constituents during bread production from wheat and rye dough and oat batter: Dough or batter liquor as model system. *Comprehensive Reviews in Food Science and Food Safety*, 20(4), 3881–3917. <https://doi.org/10.1111/1541-4337.12761>
- Jarvis, M. C. (2022). Hydrogen bonding and other non-covalent interactions at the surfaces of cellulose microfibrils. *Cellulose*, 30(2), 667–687. <https://doi.org/10.1007/s10570-022-04954-3>
- Jiang, Y., Cheng, S., He, J., Zhou, Z., & Ge, X. (2025). Performance comparison between different hydrocolloids to improve properties of dough and noodles made from maize-based composite dough. *Food Chemistry: X*, 27, 102361. <https://doi.org/10.1016/j.fochx.2025.102361>
- Jin, X., Qu, R., Wang, Y., Li, D., & Wang, L. (2022). Effect and mechanism of acid-induced soy protein isolate gels as influenced by cellulose nanocrystals and microcrystalline cellulose. *Foods*, 11(3), 461. <https://doi.org/10.3390/foods11030461>
- Jitpinit, S., Siraworakun, C., Sookklay, Y., & Nuithitikul, K. (2022). Enhancement of omega-3 content in sacha inchi seed oil extracted with supercritical carbon dioxide in semi-continuous process. *Heliyon*, 8(1), e08780. <https://doi.org/10.1016/j.heliyon.2022.e08780>
- Juvvi, P., Kumar, R., & Semwal, A. D. (2024). Recent studies on alternative technologies for deep-fat frying. *Journal of Food Science and Technology/Journal of Food Science and Technology*, 57(6). <https://doi.org/10.1007/s13197-023-05911-z>
- Kalaskar, M., Yele, S. U., Ayyanar, M., Gurav, N., Beldar, V., & Surana, S. J. (2025). Methods of extraction. *Pharmacognosy and Phytochemistry: Principles, Techniques, and Clinical Applications*, 121–142. <https://doi.org/10.1002/9781394203680.ch07>

- Karuppuchamy, V., & Campanella, O. (2026). Standardization of solvent type and extraction time for lipid extraction from brewers' spent grain (BSG) by soxhlet method. *Food Science & Nutrition*, 14(1). <https://doi.org/10.1002/fsn3.71398>
- Keller, J. D. (2020). *Sodium carboxymethylcellulose (CMC)* (Food hydrocolloids, pp. 43–109). CRC Press.
- Kokol, V. (2022). Influence of hydroxyethyl and carboxymethyl celluloses on the rheology, water retention and surface tension of water-suspended microfibrillated cellulose. *Cellulose*, 29(13), 7063–7081. <https://doi.org/10.1007/s10570-022-04737-w>
- Kunjalukkal Padmanabhan, S., Lamanna, L., Friuli, M., Sannino, A., Demitri, C., & Licciulli, A. (2023). Carboxymethylcellulose-Based hydrogel obtained from bacterial cellulose. *Molecules*, 28(2), 829. <https://doi.org/10.3390/molecules28020829>
- Kurek, M., Ščetar, M., & Galić, K. (2017). Edible coatings minimize fat uptake in deep fat fried products: A review. *Food Hydrocolloids*, 71, 225–235. <https://doi.org/10.1016/j.foodhyd.2017.05.006>
- Kwak, S. G., & Kim, J. H. (2017). Central limit theorem: The cornerstone of modern statistics. *Korean Journal of Anesthesiology*, 70(2), 144–156. <https://doi.org/10.4097/kjae.2017.70.2.144>
- Lähdeniemi, A. (2026). *Modifying the structure of microcrystalline cellulose by different drying methods and mechanical treatments*. [Doctoral Thesis].
- Lee, J.-C., & Ahn, S.-H. (2018). Bulk density measurement of porous functionally graded materials. *International Journal of Precision Engineering and Manufacturing*, 19(1), 31–37. <https://doi.org/10.1007/s12541-018-0004-4>
- Lee, X. F., Naim, M. N., Azmi, N. S. M., Mohammed, M. A. P., Othman, S. H., Abu Bakar, N. F., & Adam, F. (2025). Dynamic modelling of oil and water molecules of methylcellulose-coated fried potato during and in the post-frying condition. *Food Research*, 9(3), 67–75. [https://doi.org/10.26656/fr.2017.9\(3\).164](https://doi.org/10.26656/fr.2017.9(3).164)

- Li, Y., Guo, Q., Wang, K., Nverjiang, M., Wu, K., Wang, X., & Xia, X. (2022). Monitoring the changes in heat transfer and water evaporation of french fries during frying to analyze its oil uptake and quality. *Foods*, 11(21), 3473–3473. <https://doi.org/10.3390/foods11213473>
- Li, Y., Wang, Y., Wu, Y., Bai, H., Zhao, Y., Xiang, H., & Li, J. (2025). Regulation of oil penetration, lipid oxidation, and flavor characteristics in batter-coated fried fish cubes: The functional implications of hydrocolloids. *Gels*, 11(10), 781–781. <https://doi.org/10.3390/gels11100781>
- Lin, D., Zheng, Y., Wang, X., Huang, Y., Ni, L., Chen, X., Wu, Z., Huang, C., Yi, Q., Li, J., Qin, W., Zhang, Q., Chen, H., & Wu, D. (2020). Study on physicochemical properties, antioxidant and antimicrobial activity of okara soluble dietary fiber/sodium carboxymethyl cellulose/thyme essential oil active edible composite films incorporated with pectin. *International Journal of Biological Macromolecules*, 165, 1241–1249. <https://doi.org/10.1016/j.ijbiomac.2020.10.005>
- Lin, H.-T. V., Tsai, J.-S., Liao, H.-H., & Sung, W.-C. (2023). The effect of hydrocolloids on penetration tests and syneresis of binary gum gels and modified corn starch–gum gels. *Gels*, 9(8), 605–605. <https://doi.org/10.3390/gels9080605>
- Liu, X., Mu, T., Sun, H., Zhang, M., Chen, J., & Fauconnier, M. (2018). Influence of different hydrocolloids on dough thermo-mechanical properties and in vitro starch digestibility of gluten-free steamed bread based on potato flour. *Food Chemistry*, 239, 1064–1074. <https://doi.org/10.1016/j.foodchem.2017.07.047>
- Lohinova, A., & Petrusha, O. (2023). Maillard reaction in food technologies. *Journal of Food Science*, 11(2).
- Lü, W., Li, X., & Fang, Y. (2021). Introduction to food hydrocolloids. *Springer EBooks*, 1–28. https://doi.org/10.1007/978-981-16-0320-4_1
- Lumanlan, J. C., Fernando, W. M. A. D. B., & Jayasena, V. (2020). Mechanisms of oil uptake during deep frying and applications of predrying and hydrocolloids in reducing fat content of chips. *International Journal of Food Science & Technology*, 55(4), 1661–1670. <https://doi.org/10.1111/ijfs.14435>

- Maghsoud, M., Heshmati, A., Taheri, M., Emamifar, A., & Esfarjani, F. (2023). The influence of carboxymethyl cellulose and hydroxypropyl methylcellulose on physicochemical, texture, and sensory characteristics of gluten-free pancake. *Food Science & Nutrition*, 12(2), 1304–1317. <https://doi.org/10.1002/fsn3.3844>
- Mahmud, N., Islam, J., Oyom, W., Adrah, K., Adegoke, S. C., & Tahergorabi, R. (2023). A review of different frying oils and oleogels as alternative frying media for fat-uptake reduction in deep-fat fried foods. *Heliyon*, 9(11), e21500–e21500. <https://doi.org/10.1016/j.heliyon.2023.e21500>
- Manjunatha, S. S., Ravi, N., Negi, P. S., Raju, P. S., & Bawa, A. S. (2012). Kinetics of moisture loss and oil uptake during deep fat frying of Gethi (*Dioscorea kamoensis* Kunth) strips. *Journal of Food Science and Technology*, 51(11), 3061–3071. <https://doi.org/10.1007/s13197-012-0841-6>
- Marques, C., Correia, E., Dinis, L.-T., & Vilela, A. (2022). An overview of sensory characterization techniques: From classical descriptive analysis to the emergence of novel profiling methods. *Foods*, 11(3), 255. <https://doi.org/10.3390/foods11030255>
- Martínez-Pineda, M., Yagüe-Ruiz, C., & Vercet, A. (2021). Frying conditions, methyl cellulose, and k-carrageenan edible coatings: Useful strategies to reduce oil uptake in fried mushrooms. *Foods*, 10(8), 1694. <https://doi.org/10.3390/foods10081694>
- Maurya, N. K. (2024). Selection and performance of sensory panelists: A comprehensive review of factors influencing sensory evaluation outcomes. *Nutrition and Food Processing*, 07(15), 01–07. <https://doi.org/10.31579/2637-8914/278>
- McClements, D. J., & Grossmann, L. (2022). Eggs and egg products. *Next-Generation Plant-Based Foods*, 341–388. https://doi.org/10.1007/978-3-030-96764-2_7
- Mehrabi, A., Jalise, S. Z., Hivechi, A., Habibi, S., Kebria, M. M., Haramshahi, M. A., Latifi, N., Karimi, A., & Milan, P. B. (2023). Evaluation of inherent properties of the carboxymethyl cellulose (CMC)

- for potential application in tissue engineering focusing on bone regeneration. *Polymers for Advanced Technologies*, 35(1). <https://doi.org/10.1002/pat.6258>
- Mihafu, F. D., Issa, J. Y., & Kamiyango, M. W. (2020). Implication of sensory evaluation and quality assessment in food product development: A review. *Current Research in Nutrition and Food Science Journal*, 8(3), 690–702. <https://doi.org/10.12944/crnfsj.8.3.03>
- Mir, S. A., Shah, M. A., Naik, H. R., & Zargar, I. A. (2016). Influence of hydrocolloids on dough handling and technological properties of gluten-free breads. *Trends in Food Science & Technology*, 51, 49–57. <https://doi.org/10.1016/j.tifs.2016.03.005>
- Murata, M. (2020). Browning and pigmentation in food through the Maillard reaction. *Glycoconjugate Journal*, 38. <https://doi.org/10.1007/s10719-020-09943-x>
- Nielsen, S. (2017). *Food analysis: laboratory manual 3rd edition*. Springer: US.
- Nishinari, K., Fang, Y., & Rosenthal, A. (2019). Human oral processing and texture profile analysis parameters: Bridging the gap between the sensory evaluation and the instrumental measurements. *Journal of Texture Studies*, 50(5), 369–380. <https://doi.org/10.1111/jtxs.12404>
- Nsor-Atindana, J., Chen, M., Goff, H. D., Zhong, F., Sharif, H. R., & Li, Y. (2017). Functionality and nutritional aspects of microcrystalline cellulose in food. *Carbohydrate Polymers*, 172, 159–174. <https://doi.org/10.1016/j.carbpol.2017.04.021>
- Obi, O. F., Ezeoha, S. L., & Egwu, C. O. (2015). Evaluation of air oven moisture content determination procedures for pearl millet (*pennisetum glaucum*L.). *International Journal of Food Properties*, 19(2), 454–466. <https://doi.org/10.1080/10942912.2015.1038566>
- Oke, E. K., Idowu, M. A., Sobukola, O. P., Adeyeye, S. A. O., & Akinsola, A. O. (2017). Frying of food: A critical review. *Journal of Culinary Science & Technology*, 16(2), 107–127. <https://doi.org/10.1080/15428052.2017.1333936>

- Olakanmi, S. J., Jayas, D. S., & Paliwal, J. (2023). Applications of imaging systems for the assessment of quality characteristics of bread and other baked goods: A review. *Comprehensive Reviews in Food Science and Food Safety*, 22(3), 1817–1838. <https://doi.org/10.1111/1541-4337.13131>
- Oncel, B., & Ozer, M. S. (2024). The effect of use of hydrocolloids in different types and ratios on the quality of gluten-free breads. *Carpathian Journal of Food Science and Technology*, 179–189. <https://doi.org/10.34302/crpfst/2024.16.1.14>
- Ong, E. E. S., O’Byrne, S., & Liow, J. L. (2019). Yield stress measurement of a thixotropic colloid. *Rheologica Acta*, 58(6-7), 383–401. <https://doi.org/10.1007/s00397-019-01154-y>
- Ooms, N., & Delcour, J. A. (2019). How to impact gluten protein network formation during wheat flour dough making. *Current Opinion in Food Science*, 25, 88–97. <https://doi.org/10.1016/j.cofs.2019.04.001>
- Ortiz Cabrera, N., Miranda Zanardi, L., & Masuelli, M. (2025). Mechanical characteristics of tara gum/orange peel films influenced by the synergistic effect on the rheological properties of the film-forming solutions. *Polymers*, 17(13), 1767. <https://doi.org/10.3390/polym17131767>
- Oyom, W., Awuku, R. B., Bi, Y., & Tahergorabi, R. (2024). Mitigating toxic compounds in deep-fried meat: The antioxidant potential of edible coatings. *Food and Bioprocess Technology*, 18. <https://doi.org/10.1007/s11947-024-03606-7>
- Palanisamy, K., Palanisamy, G., Im, Y. M., Thangarasu, S., Phutela, U. G., & Oh, T. H. (2025). Recent progress in cellulose-based aerogels for sustainable oil–water separation technologies. *Polymers*, 17(20), 2723. <https://doi.org/10.3390/polym17202723>
- Pambo, K. O., Okello, J. J., Mbeche, R. M., Kinyuru, J. N., & Alemu, M. H. (2018). The role of product information on consumer sensory evaluation, expectations, experiences and emotions of cricket-flour-containing buns. *Food Research International*, 106, 532–541. <https://doi.org/10.1016/j.foodres.2018.01.011>
- Paramita, V. D., Panyoyai, N., & Kasapis, S. (2025). The mechanical glass transition temperature affords a fundamental quality control in condensed gels for innovative application in

- functional foods and nutraceuticals. *Foods*, 14(12), 2098–2098.
<https://doi.org/10.3390/foods14122098>
- Paredes, J., Cortizo-Lacalle, D., Imaz, A. M., Aldazabal, J., & Vila, M. (2022). Application of texture analysis methods for the characterization of cultured meat. *Scientific Reports*, 12(1).
<https://doi.org/10.1038/s41598-022-07785-1>
- Parreidt, T. S., Müller, K., & Schmid, M. (2018). Alginate-Based edible films and coatings for food packaging applications. *Foods*, 7(10), 170. <https://doi.org/10.3390/foods7100170>
- Phule, A. S., & Annapure, U. S. (2013). Effect of hydrocolloid coating on oil uptake and moisture loss in deep-fat fried products. *International Food Research Journal*, 20(2), 565–573.
- Pirsa, S., & Hafezi, K. (2023). Hydrocolloids: Structure, preparation method, and application in food industry. *Food Chemistry*, 399, 133967. <https://doi.org/10.1016/j.foodchem.2022.133967>
- Pongsawatmanit, R., Ketjarut, S., Choosuk, P., & Hanucharoenkul, P. (2018). Effect of carboxymethyl cellulose on properties of wheat flour-tapioca starch-based batter and fried, battered chicken product. *Agriculture and Natural Resources*, 52(6), 565–572.
<https://doi.org/10.1016/j.anres.2018.11.025>
- Rahman, H., & Ngadi, M. (2023). Electromagnetic, air and fat frying of plant protein-based batter-coated foods. *Foods*, 12(21), 3953–3953. <https://doi.org/10.3390/foods12213953>
- Rahman, Md. S., Hasan, Md. S., Nitai, A. S., Nam, S., Karmakar, A. K., Ahsan, Md. S., Shiddiky, M. J. A., & Ahmed, M. B. (2021). Recent developments of carboxymethyl cellulose. *Polymers*, 13(8), 1345. <https://doi.org/10.3390/polym13081345>
- Rani, L., Kumar, M., Kaushik, D., Kaur, J., Kumar, A., Oz, F., Proestos, C., & Oz, E. (2023). A review on the frying process: Methods, models and their mechanism and application in the food industry. *Food Research International*, 172, 113176.
<https://doi.org/10.1016/j.foodres.2023.113176>
- Rasheed, M., Fan, X., Guo, B., Jiang, J., Li, M., Zhang, Y., Zhang, B., & Cui, Y. (2025). Unveiling the dynamic interactions of gluten–starch–water in frozen dough: An in-depth review.

- Comprehensive Reviews in Food Science and Food Safety*, 24(2).
<https://doi.org/10.1111/1541-4337.70120>
- Rasheed, M., Jawaid, M., Parveez, B., Hussain Bhat, A., & Alamery, S. (2021). Morphology, structural, thermal, and tensile properties of bamboo microcrystalline cellulose/poly(lactic acid)/poly(butylene succinate) composites. *Polymers*, 13(3), 465.
<https://doi.org/10.3390/polym13030465>
- Rathnayake, H. A., Navaratne, S. B., & Navaratne, C. M. (2018). Porous crumb structure of leavened baked products. *International Journal of Food Science*, 2018, 1–15.
<https://doi.org/10.1155/2018/8187318>
- Ray, S. (2021). Sensory properties of foods and their measurement methods. *Techniques to Measure Food Safety and Quality*, 345–381. https://doi.org/10.1007/978-3-030-68636-9_15
- Ren, H., Shen, J., Pei, J., Wang, Z., Peng, Z., Fu, S., & Zheng, Y. (2019). Characteristic microcrystalline cellulose extracted by combined acid and enzyme hydrolysis of sweet sorghum. *Cellulose*, 26(15), 8367–8381. <https://doi.org/10.1007/s10570-019-02712-6>
- Ringga, P. (2017). *Rencana bisnis abata donuts yogyakarta* [Doctoral Dissertation].
- Salehi, F. (2020). Effect of coatings made by new hydrocolloids on the oil uptake during deep-fat frying: A review. *Journal of Food Processing and Preservation*.
<https://doi.org/10.1111/jfpp.14879>
- Sarkar, T., Salaudinn, M., Kirtonia, K., Pati, S., Rebezov, M., Khayrullin, M., Panasenko, S., Tretyak, L., Temerbayeva, M., Kapustina, N., Azimova, S., Gruzdeva, L., Makhmudov, F., Nikitin, I., Kassenov, A., Shariati, M. A., & Lorenzo, J. M. (2022). A review on the commonly used methods for analysis of physical properties of food materials. *Applied Sciences*, 12(4), 2004.
<https://doi.org/10.3390/app12042004>
- Sarraf, M., Sani, A. M., & Atash, M. M. S. (2016). Physicochemical, organoleptic characteristics and image analysis of the doughnut enriched with oleaster flour. *Journal of Food Processing and Preservation*, 41(4), e13021. <https://doi.org/10.1111/jfpp.13021>

- Shah, Y., & Takhar, P. S. (2022). Pressure development and volume changes during frying and post-frying of potatoes. *LWT*, 172, 114243. <https://doi.org/10.1016/j.lwt.2022.114243>
- Sharif, M. K., Butt, M. S., Sharif, H. R., & Nasir, M. (2017). Sensory evaluation and consumer acceptability. *Handbook of Food Science and Technology*, 10, 362–386.
- Shi, X., Wu, B., Dong, X., Zhang, Q., Lu, W., & Chen, X. (2024). Preparation and rheological properties of the pva/cmc/gel composite for mining. *ACS Omega*, 9(26), 28253–28267. <https://doi.org/10.1021/acsomega.4c01502>
- Sipos, L., Nyitrai, Á., Hitka, G., Friedrich, L. F., & Kókai, Z. (2021). Sensory panel performance evaluation—comprehensive review of practical approaches. *Applied Sciences*, 11(24), 11977. <https://doi.org/10.3390/app112411977>
- Soupeze, J.-B. R. G., Dages, B. A. S., Pavar, G. S., Fabian, J., Thomas, J. M., & Eirini Theodosiou. (2024). Mechanical properties and texture profile analysis of beef burgers and plant-based analogues. *Journal of Food Engineering*, 385, 112259–112259. <https://doi.org/10.1016/j.jfoodeng.2024.112259>
- Su, T., Du, W.-K., Deng, B., Zeng, J., Gao, H., Zhou, H., Li, G., Zhang, H., Gong, Y., & Zhang, J. (2023). Effects of sodium carboxymethyl cellulose on storage stability and qualities of different frozen dough. *Heliyon*, 9(8), e18545–e18545. <https://doi.org/10.1016/j.heliyon.2023.e18545>
- Sun, F., Cheng, T., Ren, S., Yang, B., Liu, J., Huang, Z., Guo, Z., & Wang, Z. (2024). Soy protein isolate/carboxymethyl cellulose sodium complexes system stabilized high internal phase Pickering emulsions: Stabilization mechanism based on noncovalent interaction. *International Journal of Biological Macromolecules*, 256, 128381–128381. <https://doi.org/10.1016/j.ijbiomac.2023.128381>
- Sun, Y., Ma, Y., Chen, S., Xu, Y., & Tang, K. (2021). Exploring the mystery of the sweetness of baijiu by sensory evaluation, compositional analysis and multivariate data analysis. *Foods*, 10(11), 2843. <https://doi.org/10.3390/foods10112843>

- Susi, S., Ainuri, M., Wagiman, W., & Affan, M. (2024). Characterization and selection of microcrystalline cellulose from oil palm empty fruit bunches for strengthening hydrogel films. *Journal of Renewable Materials*, 0(0), 1–10. <https://doi.org/10.32604/jrm.2024.045586>
- Timmermans, E., Brutal, A., Brijs, K., Scheirlinck, I., Van der Meulen, R., & Courtin, C. M. (2022). Sugar levels determine fermentation dynamics during yeast pastry making and its impact on dough and product characteristics. *Foods*, 11(10), 1388. <https://doi.org/10.3390/foods11101388>
- Ugwu, J. U., Joseph, U., Uwaoma, C. J., & Nduaka, C. E. (2025). Specific heat capacity, density and viscosity determined using different combinations of coconut oil and palm kernel oil. *Nigerian Journal of Physics*, 34(2). <https://doi.org/10.62292/njp.v34i2.2025.443>
- Van der Sman, R. G. M., & Schenk, E. (2024). Causal factors concerning the texture of french fries manufactured at industrial scale. *Current Research in Food Science*, 100706–100706. <https://doi.org/10.1016/j.crfs.2024.100706>
- van Koerten, K. N., Schutyser, M. A. I., Somsen, D., & Boom, R. M. (2015). Crust morphology and crispness development during deep-fat frying of potato. *Food Research International*, 78, 336–342. <https://doi.org/10.1016/j.foodres.2015.09.022>
- van Koerten, K. N., Somsen, D., Boom, R. M., & Schutyser, M. A. I. (2017). Modelling water evaporation during frying with an evaporation dependent heat transfer coefficient. *Journal of Food Engineering*, 197, 60–67. <https://doi.org/10.1016/j.jfoodeng.2016.11.007>
- Vidal, L. M., Braun, A., Jekle, M., & Becker, T. (2022). Micro-Scale shear kneading—gluten network development under multiple stress–relaxation steps and evaluation via multiwave rheology. *Polymers*, 14(4), 846. <https://doi.org/10.3390/polym14040846>
- Wang, Y., Wu, X., McClements, D. J., Chen, L., Miao, M., & Jin, Z. (2021). Effect of new frying technology on starchy food quality. *Foods*, 10(8), 1852. <https://doi.org/10.3390/foods10081852>

- Wangiyana, I. G. A. S., Kurnia, N., Hari, A., & Fatihatun, F. (2024). Sensory evaluation of palm sugar candy from Arenga sap water and agarwood leaves infusion using a 9-point hedonic scale. *Jurnal Agrotek UMMat*, 11(2), 142–142. <https://doi.org/10.31764/jau.v11i2.22756>
- Wankhede, M. (2020). *Drying characteristics of microwave pre- heated green chilli by hot air oven drying* [Thesis].
- Wilde, P. (2012). Foam formation in dough and bread quality. *Elsevier EBooks*, 370–399. <https://doi.org/10.1533/9780857095695.2.370>
- Williams, P. A., & Phillips, G. O. (2021). Introduction to food hydrocolloids. *Handbook of Hydrocolloids*, 3–26. <https://doi.org/10.1016/B978-0-12-820104-6.00017-6>
- Xie, D., Guo, D., Guo, Z., Hu, X., Luo, S., & Liu, C. (2021). Reduction of oil uptake of fried food by coatings: A review. *International Journal of Food Science & Technology*, 57(6), 3268–3277. <https://doi.org/10.1111/ijfs.15266>
- Xiong, J., Li, Q., Shi, Z., & Ye, J. (2017). Interactions between wheat starch and cellulose derivatives in short-term retrogradation: Rheology and FTIR study. *Food Research International*, 100, 858–863. <https://doi.org/10.1016/j.foodres.2017.07.061>
- Xu, F., Zhang, L., Liu, W., Liu, Q., Wang, F., Zhang, H., Hu, H., & Blecker, C. (2021). Physicochemical and structural characterization of potato starch with different degrees of gelatinization. *Foods*, 10(5), 1104. <https://doi.org/10.3390/foods10051104>
- Xu, K., & Kuang, J. (2024). Effects of thermal treatment on the physicochemical and structural properties of wheat gluten proteins: insights from gluten, glutenin, and gliadin fractions. *International Journal of Food Science & Technology*, 59(4), 2275–2285. <https://doi.org/10.1111/ijfs.16953>
- Xu, Y., Zhang, R., Wang, K., Chisoro, P., Huang, F., Wang, J., & Zhang, C. (2025). Effect of carboxymethyl cellulose and/or wheat gluten on the pasting, rheological and quality properties of wheat starch-based batter for deep-fried products. *Food Chemistry: X*, 26, 102262. <https://doi.org/10.1016/j.fochx.2025.102262>

- Yang, J., & Lee, J. (2018). Korean consumers' acceptability of commercial food products and usage of the 9-point hedonic scale. *Journal of Sensory Studies*, 33(6), e12467. <https://doi.org/10.1111/joss.12467>
- Ye, H., Zhang, Y., Wang, L., Ban, J., Wei, Y., Fan, F., & Guo, B. (2024). Dynamic study on water state and water migration during gluten–starch model dough development under different gluten protein contents. *Foods*, 13(7), 996–996. <https://doi.org/10.3390/foods13070996>
- Yılmaz, B., Şahin, T. Ö., & Ağagündüz, D. (2023). Oxidative changes in ten vegetable oils caused by the deep-frying process of potato. *Journal of Food Biochemistry*, 2023, 1–11. <https://doi.org/10.1155/2023/6598528>
- Yu, A.-N., Li, Y., Yang, Y., & Yu, K. (2017). The browning kinetics of the non-enzymatic browning reaction in L-ascorbic acid/basic amino acid systems. *Food Science and Technology*, 38(3), 537–542. <https://doi.org/10.1590/1678-457x.08717>
- Zang, P., Gao, Y., Chen, P., Chenyan Lv, & Zhao, G. (2022). Recent advances in the study of wheat protein and other food components affecting the gluten network and the properties of noodles. *Foods*, 11(23), 3824–3824. <https://doi.org/10.3390/foods11233824>
- Zhang, C., Chen, L., Lu, M., Ai, C., Cao, H., Xiao, J., Zhong, S., & Teng, H. (2023). Effect of cellulose on gel properties of heat-induced low-salt surimi gels: Physicochemical characteristics, water distribution and microstructure. *Food Chemistry*. X, 19, 100820–100820. <https://doi.org/10.1016/j.fochx.2023.100820>
- Zhang, J., Li, J., & Fan, L. (2024). Application of innovative techniques in modifying microstructures and reducing oil uptake of fried food: A review. *Food Research International*, 196, 115049. <https://doi.org/10.1016/j.foodres.2024.115049>
- Zhang, K., Zhang, T.-T., Guo, R.-R., Ye, Q., Zhao, H.-L., & Huang, X.-H. (2023). The regulation of key flavor of traditional fermented food by microbial metabolism: A review. *Food Chemistry: X*, 19, 100871. <https://doi.org/10.1016/j.fochx.2023.100871>

- Zhang, N., Zhou, Q., Fan, D., Xiao, J., Zhao, Y., Cheng, K.-W., & Wang, M. (2021). Novel roles of hydrocolloids in foods: Inhibition of toxic maillard reaction products formation and attenuation of their harmful effects. *Trends in Food Science & Technology*, 111, 706–715. <https://doi.org/10.1016/j.tifs.2021.03.020>
- Zhang, X., Astivia, O. L. O., Kroc, E., & Zumbo, B. D. (2022). How to think clearly about the central limit theorem. *Psychological Methods*, 28(6). <https://doi.org/10.1037/met0000448>
- Zhu, Y., Chen, T., Cui, Z., Dai, H., & Cai, L. (2020). Stimuli-Responsive biomass cellulose particles being able to reversibly self-assemble at fluid interface. *Frontiers in Chemistry*, 8. <https://doi.org/10.3389/fchem.2020.00712>