

Daftar Pustaka

- Alam, M., Pant, K., Brar, D. S., Dar, B. N., & Nanda, V. (2024). Exploring the versatility of diverse hydrocolloids to transform techno-functional, rheological, and nutritional attributes of food fillings. *Food Hydrocolloids*, 146, 109275. <https://doi.org/10.1016/j.foodhyd.2023.109275>
- Alejandre, M., Ansorena, D., Calvo, M. I., Caverro, R. Y., & Astiasarán, I. (2019). Influence of a gel emulsion containing microalgal oil and a blackthorn (*Prunus spinosa* L.) branch extract on the antioxidant capacity and acceptability of reduced-fat beef patties. *Meat Science*, 148, 219–222. <https://doi.org/10.1016/j.meatsci.2018.05.022>
- Alejandre, M., Passarini, D., Astiasarán, I., & Ansorena, D. (2017a). The effect of low-fat beef patties formulated with a low-energy fat analogue enriched in long-chain polyunsaturated fatty acids on lipid oxidation and sensory attributes. *Meat Science*, 134, 7–13. <https://doi.org/10.1016/j.meatsci.2017.07.009>
- Alejandre, M., Passarini, D., Astiasarán, I., & Ansorena, D. (2017b). The effect of low-fat beef patties formulated with a low-energy fat analogue enriched in long-chain polyunsaturated fatty acids on lipid oxidation and sensory attributes. *Meat Science*, 134, 7–13. <https://doi.org/10.1016/j.meatsci.2017.07.009>
- Alemu, T. (2022). *Journal of Agriculture and Horticulture Research*.
- Al-Hatim, R. R., Al-Younis, Z. K., Issa, N. K., & Al-Shawi, S. G. (2021). Application Of Glucono-Delta-Lactone Acid (GDL) In foods System: A Review. *Natural Volatiles & Essential Oils*, 8(4).
- Ali, A., & Ahmed, S. (2019). Chapter 3 Carrageenans: Structure, Properties and Applications. In *Marine Polysaccharides: Advances and Multifaceted Applications*. Pan Stanford Publishing.
- Asyurul-Izhar, A. B., Bakar, J., Sazili, A. Q., Goh, Y. M., & Ismail-Fitry, M. R. (2023). Emulsion Gels Formed by Electrostatic Interaction of Gelatine and Modified Corn Starch via pH Adjustments: Potential Fat Replacers in Meat Products. *Gels*, 9(1), 50. <https://doi.org/10.3390/gels9010050>
- Ayustaningwarno, fitriyono. (2012). Proses pengolahan dan aplikasi minyak sawit merah pada industri pangan. *Vitasphere*, 2, 1–11.
- Badar, I. H., Li, Y., Liu, H., Chen, Q., Liu, Q., & Kong, B. (2023). Effect of vegetable oil hydrogel emulsion as a fat substitute on the physicochemical properties, fatty acid profile, and color stability of modified atmospheric packaged buffalo burgers. *Meat Science*, 199, 109143. <https://doi.org/10.1016/j.meatsci.2023.109143>
- Bakhsh, A., Lee, S.-J., Lee, E.-Y., Hwang, Y.-H., & Joo, S.-T. (2021). Characteristics of Beef Patties Substituted by Different Levels of Textured Vegetable Protein and Taste Traits Assessed by Electronic Tongue System. *Foods*, 10(11), 2811. <https://doi.org/10.3390/foods10112811>
- Barros, J. C., Munekata, P. E. S., De Carvalho, F. A. L., Domínguez, R., Trindade, M. A., Pateiro, M., & Lorenzo, J. M. (2021). Healthy beef burgers: Effect of animal fat replacement by algal and wheat germ oil emulsions. *Meat Science*, 173, 108396. <https://doi.org/10.1016/j.meatsci.2020.108396>

- Barros, J. C., Munekata, P. E. S., De Carvalho, F. A. L., Pateiro, M., Barba, F. J., Domínguez, R., Trindade, M. A., & Lorenzo, J. M. (2020). Use of Tiger Nut (*Cyperus esculentus* L.) Oil Emulsion as Animal Fat Replacement in Beef Burgers. *Foods*, 9(1), 44. <https://doi.org/10.3390/foods9010044>
- Bashir, S., Sharif, M. K., Butt, M. S., & Shahid, M. (2016). *Functional Properties and Amino acid Profile of Spirulina platensis Protein Isolates*.
- Batista, A. P., Niccolai, A., Fradinho, P., Fragoso, S., Bursic, I., Rodolfi, L., Biondi, N., Tredici, M. R., Sousa, I., & Raymundo, A. (2017). Microalgae biomass as an alternative ingredient in cookies: Sensory, physical and chemical properties, antioxidant activity and in vitro digestibility. *Algal Research*, 26, 161–171. <https://doi.org/10.1016/j.algal.2017.07.017>
- Belitz, H.-D., Grosch, W., & Schieberle, P. (2009). *Food Chemistry*. Springer Berlin Heidelberg. <https://doi.org/10.1007/978-3-540-69934-7>
- Benadé, A. J. S. (2013). Red Palm Oil Carotenoids. In *Bioactive Food as Dietary Interventions for Cardiovascular Disease* (pp. 333–343). Elsevier. <https://doi.org/10.1016/B978-0-12-396485-4.00019-0>
- Beriain, M. J., Gómez, I., Sánchez, M., Insausti, K., Sarriés, M. V., & Ibañez, F. C. (2020). The Reformulation of a Beef Patty Enriched with n-3 Fatty Acids and Vitamin D3 Influences Consumers' Response under Different Information Scenarios. *Foods*, 9(4), 506. <https://doi.org/10.3390/foods9040506>
- Biswas, A. K., Sahoo, J., & Chatli, M. K. (2011). A simple UV-Vis spectrophotometric method for determination of β -carotene content in raw carrot, sweet potato and supplemented chicken meat nuggets. *LWT - Food Science and Technology*, 44(8), 1809–1813. <https://doi.org/10.1016/j.lwt.2011.03.017>
- Botella-Martínez, C., Pérez-Álvarez, J. Á., Sayas-Barberá, E., Fernández-López, J., & Viuda-Martos, M. (2021). Assessment of Chemical, Physicochemical, and Lipid Stability Properties of Gelled Emulsions Elaborated with Different Oils Chia (*Salvia hispanica* L.) or Hemp (*Cannabis sativa* L.) and Pseudocereals. *Foods*, 10(7), 1463. <https://doi.org/10.3390/foods10071463>
- Botella-Martínez, C., Pérez-Álvarez, J. Á., Sayas-Barberá, E., Navarro Rodríguez De Vera, C., Fernández-López, J., & Viuda-Martos, M. (2023). Healthier Oils: A New Scope in the Development of Functional Meat and Dairy Products: A Review. *Biomolecules*, 13(5), 778. <https://doi.org/10.3390/biom13050778>
- Botella-Martínez, C., Viuda-Martos, M., Fernández-López, J. A., Pérez-Alvarez, J. A., & Fernández-López, J. (2022). Development of plant-based burgers using gelled emulsions as fat source and beetroot juice as colorant: Effects on chemical, physicochemical, appearance and sensory characteristics. *LWT*, 172, 114193. <https://doi.org/10.1016/j.lwt.2022.114193>
- Boxall, J. A., Koh, C. A., Sloan, E. D., Sum, A. K., & Wu, D. T. (2012). Droplet Size Scaling of Water-in-Oil Emulsions under Turbulent Flow. *Langmuir*, 28(1), 104–110. <https://doi.org/10.1021/la202293t>
- BSN. (2013). *SNI 3741:2013*. Badan Standarisasi Nasional.
- Burgos-Díaz, C., Wandersleben, T., Marqués, A. M., & Rubilar, M. (2016). Multilayer emulsions stabilized by vegetable proteins and polysaccharides.

- Current Opinion in Colloid & Interface Science*, 25, 51–57.
<https://doi.org/10.1016/j.cocis.2016.06.014>
- Cassiday, L. (2017). Red palm oil. *INFORM International News on Fats, Oils, and Related Materials*, 28(2), 6–10. <https://doi.org/10.21748/inform.02.2017.06>
- Chen, H., Lu, Y., Yuan, F., Gao, Y., & Mao, L. (2021). Effect of interfacial compositions on the physical properties of alginate-based emulsion gels and chemical stability of co-encapsulated bioactives. *Food Hydrocolloids*, 111, 106389. <https://doi.org/10.1016/j.foodhyd.2020.106389>
- Chen, X.-H., & Tang, C.-H. (2021). Highly transparent antioxidant high internal phase emulsion gels stabilized solely by C-phycoerythrin: Facilitated formation through subunit dissociation and refractive index matching. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 625, 126866. <https://doi.org/10.1016/j.colsurfa.2021.126866>
- Cheng, H., Jung, E.-Y., Song, S., & Kim, G.-D. (2023). Effect of freezing raw meat on the physicochemical characteristics of beef jerky. *Meat Science*, 197, 109082. <https://doi.org/10.1016/j.meatsci.2022.109082>
- Cui, L., Guo, J., & Meng, Z. (2023). A review on food-grade-polymer-based O/W emulsion gels: Stabilization mechanism and 3D printing application. *Food Hydrocolloids*, 139, 108588. <https://doi.org/10.1016/j.foodhyd.2023.108588>
- Damodaran, S., & Parkin, K. L. (Eds.). (2017). *Fennema's Food chemistry* (5th ed.). CRC press.
- de Alencar, M. G., de Quadros, C. P., Luna, A. L. L. P., Neto, A. F., da Costa, M. M., Queiroz, M. A. Á., de Carvalho, F. A. L., da Silva Araújo, D. H., Gois, G. C., dos Anjos Santos, V. L., da Silva Filho, J. R. V., & de Souza Rodrigues, R. T. (2022). Grape skin flour obtained from wine processing as an antioxidant in beef burgers. *Meat Science*, 194, 108963. <https://doi.org/10.1016/j.meatsci.2022.108963>
- De Leonardis, A., Macciola, V., Niro, S., Nag, A., & Panfili, G. (2017). Limits and potentials of African red palm oils purchased from European ethnic food stores. *European Food Research and Technology*, 243(7), 1239–1248. <https://doi.org/10.1007/s00217-016-2839-1>
- De Lima Guterres, L., Pinton, M. B., Dos Santos, B. A., Correa, L. P., Cordeiro, M. W. S., Wagner, R., Cichoski, A. J., Lorenzo, J. M., & Campagnol, P. C. B. (2023). Hydrogelled emulsion from linseed oil and pea protein as a strategy to produce healthier pork burgers with high technological and sensory quality. *Meat Science*, 195, 109028. <https://doi.org/10.1016/j.meatsci.2022.109028>
- De Oca-Ávalos, J. M. M., Candal, R. J., & Herrera, M. L. (2017). Nanoemulsions: Stability and physical properties. *Current Opinion in Food Science*, 16, 1–6. <https://doi.org/10.1016/j.cofs.2017.06.003>
- deMan, J. M., Finley, J. W., Hurst, W. J., & Lee, C. Y. (2018). *Principles of Food Chemistry*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-63607-8>
- Deniz, E., Güneş Altuntaş, E., Ayhan, B., İğci, N., Özel Demiralp, D., & Candoğan, K. (2018). Differentiation of beef mixtures adulterated with chicken or turkey meat using FTIR spectroscopy. *Journal of Food Processing and Preservation*, 42(10), e13767. <https://doi.org/10.1111/jfpp.13767>

- Dickinson, E. (2009). Hydrocolloids as emulsifiers and emulsion stabilizers. *Food Hydrocolloids*, 23(6), 1473–1482. <https://doi.org/10.1016/j.foodhyd.2008.08.005>
- Duran, N. M., Galante, M., Spelzini, D., & Boeris, V. (2018). The effect of carrageenan on the acid-induced aggregation and gelation conditions of quinoa proteins. *Food Research International*, 107, 683–690. <https://doi.org/10.1016/j.foodres.2018.03.015>
- Ebert, S., Gibis, M., Terjung, N., & Weiss, J. (2020). Survey of aqueous solubility, appearance, and pH of plant protein powders from carbohydrate and vegetable oil production. *LWT*, 133, 110078. <https://doi.org/10.1016/j.lwt.2020.110078>
- Edem, D. O. (2002). Palm oil: Biochemical, physiological, nutritional, hematological and toxicological aspects: A review. *Plant Foods for Human Nutrition*, 57(3/4), 319–341. <https://doi.org/10.1023/A:1021828132707>
- Elmadfa, I., & Meyer, A. L. (2017). Animal Proteins as Important Contributors to a Healthy Human Diet. *Annual Review of Animal Biosciences*, 5(1), 111–131. <https://doi.org/10.1146/annurev-animal-022516-022943>
- Fadiloglu, E. E., Yildiz Turp, G., Celebioglu, C., & Sel, G. (2023). Influence of different cooking methods on quality characteristics and nutritional value of gluten-free beef burger patties formulated with walnut oil, safflower oil and buckwheat. *Meat Science*, 204, 109251. <https://doi.org/10.1016/j.meatsci.2023.109251>
- Faridah, M. R., Yusoff, M. M., Rozzamri, A., Ibadullah, W. Z. W., Hairi, A. N. A., Daud, N. H. A., Huda, N., & Ismail-Fitry, M. R. (2023a). Effect of Palm-Based Shortenings of Various Melting Ranges as Animal Fat Replacers on the Physicochemical Properties and Emulsion Stability of Chicken Meat Emulsion. *Foods*, 12(3), 597. <https://doi.org/10.3390/foods12030597>
- Faridah, M. R., Yusoff, M. M., Rozzamri, A., Ibadullah, W. Z. W., Hairi, A. N. A., Daud, N. H. A., Huda, N., & Ismail-Fitry, M. R. (2023b). Effect of Palm-Based Shortenings of Various Melting Ranges as Animal Fat Replacers on the Physicochemical Properties and Emulsion Stability of Chicken Meat Emulsion. *Foods*, 12(3), 597. <https://doi.org/10.3390/foods12030597>
- Farjami, T., & Madadlou, A. (2019a). An overview on preparation of emulsion-filled gels and emulsion particulate gels. *Trends in Food Science & Technology*, 86, 85–94. <https://doi.org/10.1016/j.tifs.2019.02.043>
- Farjami, T., & Madadlou, A. (2019b). An overview on preparation of emulsion-filled gels and emulsion particulate gels. *Trends in Food Science & Technology*, 86, 85–94. <https://doi.org/10.1016/j.tifs.2019.02.043>
- Feng, S., Guo, Y., Liu, F., Li, Z., Chen, K., Handa, A., & Zhang, Y. (2023). The impacts of complexation and glycated conjugation on the performance of soy protein isolate-gum Arabic composites at the o/w interface for emulsion-based delivery systems. *Food Hydrocolloids*, 135, 108168. <https://doi.org/10.1016/j.foodhyd.2022.108168>
- Fennema, O. R. (Ed.). (1996). *Food chemistry* (3rd ed). Marcel Dekker.
- Fradinho, P., Niccolai, A., Soares, R., Rodolfi, L., Biondi, N., Tredici, M. R., Sousa, I., & Raymundo, A. (2020). Effect of *Arthrospira platensis* (spirulina)

- incorporation on the rheological and bioactive properties of gluten-free fresh pasta. *Algal Research*, 45, 101743. <https://doi.org/10.1016/j.algal.2019.101743>
- Freire, M., Bou, R., Cofrades, S., Solas, M. T., & Jiménez-Colmenero, F. (2016). Double emulsions to improve frankfurter lipid content: Impact of perilla oil and pork backfat. *Journal of the Science of Food and Agriculture*, 96(3), 900–908. <https://doi.org/10.1002/jsfa.7163>
- Gao, X., Hao, X., Xiong, G., Ge, Q., Zhang, W., Zhou, G., & Yue, X. (2016). Interaction between carrageenan/soy protein isolates and salt-soluble meat protein. *Food and Bioprocess Processing*, 100, 47–53. <https://doi.org/10.1016/j.fbp.2016.06.014>
- Gao, Y., Li, M., Zhang, L., Wang, Z., Yu, Q., & Han, L. (2021). Preparation of rapeseed oil oleogels based on beeswax and its application in beef heart patties to replace animal fat. *LWT*, 149, 111986. <https://doi.org/10.1016/j.lwt.2021.111986>
- Grand View Research. (2020). *Packaged Burgers Market Size, Share & Trends Analysis Report By Product (Frozen, Fresh), By Patty (Veg, Non-veg), By Distribution Channel, By Region, And Segment Forecasts, 2020–2027* (GVR-4-68038-977-7). <https://www.grandviewresearch.com/industry-analysis/packaged-burgers-market#>
- Guo, A., & Xiong, Y. L. (2021). Myoprotein–phytophenol interaction: Implications for muscle food structure-forming properties. *Comprehensive Reviews in Food Science and Food Safety*, 20(3), 2801–2824. <https://doi.org/10.1111/1541-4337.12733>
- Guo, J., Cui, L., Huang, Y., & Meng, Z. (2022). Spirulina platensis protein isolate nanoparticle stabilized O/W Pickering emulsions: Interfacial adsorption and bulk aggregation. *Food Research International*, 161, 111815. <https://doi.org/10.1016/j.foodres.2022.111815>
- Guo, J., Gu, X., & Meng, Z. (2024). Customized 3D printing to build plant-based meats: Spirulina platensis protein-based Pickering emulsion gels as fat analogs. *Innovative Food Science & Emerging Technologies*, 94, 103679. <https://doi.org/10.1016/j.ifset.2024.103679>
- Hadiyanto, & Azim, maulana. (2012). *Mikroalga: Sumber pangan dan energi masa depan*. UPT UNDIP Press Semarang.
- Han, Z., Liu, S., Cao, J., Yue, X., & Shao, J.-H. (2023). A review of oil and water retention in emulsified meat products: The mechanisms of gelation and emulsification, the application of multi-layer hydrogels. *Critical Reviews in Food Science and Nutrition*, 1–17. <https://doi.org/10.1080/10408398.2023.2199069>
- Hanula, M., Szpicer, A., Górska-Horczyzak, E., Khachatryan, G., Pogorzelski, G., Pogorzelska-Nowicka, E., & Poltorak, A. (2022). Hydrogel Emulsion with Encapsulated Safflower Oil Enriched with Açai Extract as a Novel Fat Substitute in Beef Burgers Subjected to Storage in Cold Conditions. *Molecules*, 27(8), 2397. <https://doi.org/10.3390/molecules27082397>
- Harianti, R., Marliyati, S. A., Rimbawan, R., & Sukandar, D. (2018). Development of High Antioxidant Red Palm Oil Cake as a Potential Functional Food.

- Jurnal Gizi Dan Pangan*, 13(2), 63–70.
<https://doi.org/10.25182/jgp.2018.13.2.63-70>
- Haris, R., Santosa, G. W., & Ridlo, A. (2013). PENGARUH PERENDAMAN AIR KAPUR TERHADAP KADAR SULFAT DAN KEKUATAN GEL KARAGINAN RUMPUT LAUT *Kappaphycus alvarezii*. *Journal Of Marine Research*, 2.
- Hernani, N., Mulyono, E., & Ramadhan, K. (2017). PEMANFAATAN MONODIASILGLISEROL (MDAG) HASIL SINTESA DARI BUTTER BIJI PALA DAN GLISEROL SEBAGAI EMULSIFIER PADA KUALITAS PRODUK SOSIS AYAM. *Jurnal Penelitian Pascapanen Pertanian*, 13(2), 74. <https://doi.org/10.21082/jpasca.v13n2.2016.74-82>
- Horinaka, J., Takagaki, H., Tanaka, T., & Takigawa, T. (2022). Effects of gelation concentration on cyclic deformation behavior of κ -carrageenan hydrogels. *International Journal of Biological Macromolecules*, 218, 634–638. <https://doi.org/10.1016/j.ijbiomac.2022.07.128>
- Huang, M., Mao, Y., Li, H., & Yang, H. (2021). Kappa-carrageenan enhances the gelation and structural changes of egg yolk via electrostatic interactions with yolk protein. *Food Chemistry*, 360, 129972. <https://doi.org/10.1016/j.foodchem.2021.129972>
- Iftari, W., Amalia, R., Savitri, A. N., & Saragih, G. (2022). STUDY OF THE ADDITION OF RED PALM OIL (RPO) TO THE SENSORY AND CHEMICAL CHARACTERISTICS OF BEEF SAUSAGE. *Jurnal Pangan Dan Agroindustri*, 10(4), 194–203. <https://doi.org/10.21776/ub.jp.a.2022.010.04.2>
- Iqbal, S., Xu, Z., Huang, H., & Chen, X. D. (2019a). Controlling the rheological properties of oil phases using controlled protein-polysaccharide aggregation and heteroaggregation in water-in-oil emulsions. *Food Hydrocolloids*, 96, 278–287. <https://doi.org/10.1016/j.foodhyd.2019.05.028>
- Iqbal, S., Xu, Z., Huang, H., & Chen, X. D. (2019b). Structuring of water-in-oil emulsions using controlled aggregation of polysaccharide in aqueous phases. *Journal of Food Engineering*, 258, 34–44. <https://doi.org/10.1016/j.jfoodeng.2019.04.008>
- Jimenez-Colmenero, F., Salcedo-Sandoval, L., Bou, R., Cofrades, S., Herrero, A. M., & Ruiz-Capillas, C. (2015). Novel applications of oil-structuring methods as a strategy to improve the fat content of meat products. *Trends in Food Science & Technology*, 44(2), 177–188. <https://doi.org/10.1016/j.tifs.2015.04.011>
- Kataria, A., Sharma, R., Sharma, S., Singh, B., Kaur, G., & Yakubu, C. M. (2021). Recent applications of bio-engineering principles to modulate the functionality of proteins in food systems. *Trends in Food Science & Technology*, 113, 54–65. <https://doi.org/10.1016/j.tifs.2021.04.055>
- Khader, V. (2016). *Textbook of food science and technology*. Directorate of Knowledge Management in Agriculture Indian Council of Agricultural Research.
- Kim, Y.-J., Shin, D.-M., Yune, J.-H., Jung, H.-S., Kwon, H.-C., Lee, K.-W., Oh, J.-W., Kim, B.-G., & Han, S.-G. (2022). Development of β -

- Cyclodextrin/Konjac-Based Emulsion Gel for a Pork Backfat Substitute in Emulsion-Type Sausage. *Gels*, 8(6), 369. <https://doi.org/10.3390/gels8060369>
- Lee, J., Wi, G., & Choi, M.-J. (2023). The rheological properties and stability of gelled emulsions applying to κ -carrageenan and methyl cellulose as an animal fat replacement. *Food Hydrocolloids*, 136, 108243. <https://doi.org/10.1016/j.foodhyd.2022.108243>
- Lei, Y., Ouyang, H., Peng, W., Yu, X., Jin, L., & Li, S. (2022). Effect of NaCl on the Rheological, Structural, and Gelling Properties of Walnut Protein Isolate- κ -Carrageenan Composite Gels. *Gels*, 8(5), 259. <https://doi.org/10.3390/gels8050259>
- Li, A., Gong, T., Li, X., Li, X., Yang, X., & Guo, Y. (2020). Preparation of thermally stable emulsion gels based on Glucono- δ -lactone induced gelation of gellan gum. *International Journal of Biological Macromolecules*, 156, 565–575. <https://doi.org/10.1016/j.ijbiomac.2020.04.099>
- Li, C., Xie, W., Zhang, X., Liu, J., Zhang, M., & Shao, J. (2023). Pickering emulsion stabilized by modified pea protein-chitosan composite particles as a new fat substitute improves the quality of pork sausages. *Meat Science*, 197, 109086. <https://doi.org/10.1016/j.meatsci.2022.109086>
- Li, G., Wang, B., Lv, W., Mu, R., & Zhong, Y. (2024). Effect of induction mode on 3D printing characteristics of whey protein isolate emulsion gel. *Food Hydrocolloids*, 146, 109255. <https://doi.org/10.1016/j.foodhyd.2023.109255>
- Li, R., Guo, Y., Dong, A., & Yang, X. (2023). Protein-based emulsion gels as materials for delivery of bioactive substances: Formation, structures, applications and challenges. *Food Hydrocolloids*, 144, 108921. <https://doi.org/10.1016/j.foodhyd.2023.108921>
- Li, Y., Cheng, Y., Zhang, Z., Wang, Y., Mintah, B. K., Dabbour, M., Jiang, H., He, R., & Ma, H. (2020). Modification of rapeseed protein by ultrasound-assisted pH shift treatment: Ultrasonic mode and frequency screening, changes in protein solubility and structural characteristics. *Ultrasonics Sonochemistry*, 69, 105240. <https://doi.org/10.1016/j.ultsonch.2020.105240>
- Lin, D., Kelly, A. L., Maidannyk, V., & Miao, S. (2020). Effect of concentrations of alginate, soy protein isolate and sunflower oil on water loss, shrinkage, elastic and structural properties of alginate-based emulsion gel beads during gelation. *Food Hydrocolloids*, 108, 105998. <https://doi.org/10.1016/j.foodhyd.2020.105998>
- Liu, C., Li, Y., Liang, R., Sun, H., Wu, L., Yang, C., & Liu, Y. (2023). Development and characterization of ultrastable emulsion gels based on synergistic interactions of xanthan and sodium stearyl lactylate. *Food Chemistry*, 400, 133957. <https://doi.org/10.1016/j.foodchem.2022.133957>
- Liu, W., Gao, H., McClements, D. J., Zhou, L., Wu, J., & Zou, L. (2019). Stability, rheology, and β -carotene bioaccessibility of high internal phase emulsion gels. *Food Hydrocolloids*, 88, 210–217. <https://doi.org/10.1016/j.foodhyd.2018.10.012>
- Ljubic, A., Safafar, H., Holdt, S. L., & Jacobsen, C. (2018). Biomass composition of *Arthrospira platensis* during cultivation on industrial process water and

- harvesting. *Journal of Applied Phycology*, 30(2), 943–954.
<https://doi.org/10.1007/s10811-017-1332-y>
- Loveday, S. M. (2019). Food Proteins: Technological, Nutritional, and Sustainability Attributes of Traditional and Emerging Proteins. *Annual Review of Food Science and Technology*, 10(1), 311–339.
<https://doi.org/10.1146/annurev-food-032818-121128>
- Lu, Y., Mao, L., Cui, M., Yuan, F., & Gao, Y. (2019). Effect of the Solid Fat Content on Properties of Emulsion Gels and Stability of β -Carotene. *Journal of Agricultural and Food Chemistry*, 67(23), 6466–6475.
<https://doi.org/10.1021/acs.jafc.9b01156>
- Lu, Y., Mao, L., Zheng, H., Chen, H., & Gao, Y. (2020). Characterization of β -carotene loaded emulsion gels containing denatured and native whey protein. *Food Hydrocolloids*, 102, 105600.
<https://doi.org/10.1016/j.foodhyd.2019.105600>
- Mabrouki, S., Abid, K., Kaihara, H., Patrucco, S. G., Tassone, S., & Barbera, S. (2024). Assessing texture profile analysis in natural state versus texture profile analysis with back extrusion post-homogenization of cooked pea protein-based and meat patties: A comparative study. *Future Foods*, 9, 100345. <https://doi.org/10.1016/j.fufo.2024.100345>
- Martins, J. T., Bourbon, A. I., Pinheiro, A. C., Fasolin, L. H., & Vicente, A. A. (2018). Protein-Based Structures for Food Applications: From Macro to Nanoscale. *Frontiers in Sustainable Food Systems*, 2, 77.
<https://doi.org/10.3389/fsufs.2018.00077>
- Marti-Quijal, F. J., Zamuz, S., Tomašević, I., Gómez, B., Rocchetti, G., Lucini, L., Remize, F., Barba, F. J., & Lorenzo, J. M. (2019). Influence of different sources of vegetable, whey and microalgae proteins on the physicochemical properties and amino acid profile of fresh pork sausages. *LWT*, 110, 316–323.
<https://doi.org/10.1016/j.lwt.2019.04.097>
- McClements, D. J. (2016). *Food Emulsions PRINCIPLES, PRACTICES, AND TECHNIQUES* (3rd ed.). CRC press.
- Menegotto, A. L. L., Souza, L. E. S. D., Colla, L. M., Costa, J. A. V., Sehn, E., Bittencourt, P. R. S., Moraes Flores, É. L. D., Canan, C., & Colla, E. (2019). Investigation of techno-functional and physicochemical properties of *Spirulina platensis* protein concentrate for food enrichment. *LWT*, 114, 108267. <https://doi.org/10.1016/j.lwt.2019.108267>
- Mitrea, L., Teleky, B.-E., Leopold, L.-F., Nemes, S.-A., Plamada, D., Dulf, F. V., Pop, I.-D., & Vodnar, D. C. (2022). The physicochemical properties of five vegetable oils exposed at high temperature for a short-time-interval. *Journal of Food Composition and Analysis*, 106, 104305.
<https://doi.org/10.1016/j.jfca.2021.104305>
- Morcillo, F., Vaissayre, V., Serret, J., Avallone, S., Domonh do, H., Jacob, F., & Dussert, S. (2021). Natural diversity in the carotene, tocochromanol and fatty acid composition of crude palm oil. *Food Chemistry*, 365, 130638.
<https://doi.org/10.1016/j.foodchem.2021.130638>
- Nacak, B.,  zt rk-Kerimo lu, B., Yildız, D.,  a ındı,  ., & Serdaro lu, M. (2021). Peanut and linseed oil emulsion gels as potential fat replacer in emulsified

- sausages. *Meat Science*, 176, 108464.
<https://doi.org/10.1016/j.meatsci.2021.108464>
- Necas, J., & Bartosikova, L. (2013). Carrageenan: A review. *Veterinárni Medicína*, 58(4), 187–205. <https://doi.org/10.17221/6758-VETMED>
- Nege, A. S., Dewi Masithah, E., & Khotib, J. (2020). Trends in the Uses of Spirulina Microalga: A mini-review. *Jurnal Ilmiah Perikanan Dan Kelautan*, 12(1), 149–166. <https://doi.org/10.20473/jipk.v12i1.17506>
- Niakousari, M., Damyeh, M. S., Gahruie, H. H., Bekhit, A. E. A., Greiner, R., & Roohinejad, S. (2018). Conventional Emulsions. In S. Roohinejad, R. Greiner, I. Oey, & J. Wen (Eds.), *Emulsion-based Systems for Delivery of Food Active Compounds* (1st ed., pp. 1–27). Wiley. <https://doi.org/10.1002/9781119247159.ch1>
- Nishinari, K., & Fang, Y. (2018). Perception and measurement of food texture: Solid foods. *Journal of Texture Studies*, 49(2), 160–201. <https://doi.org/10.1111/jtxs.12327>
- Oh, M., Kim, E.-K., Jeon, B.-T., Tang, Y., Kim, M. S., Seong, H.-J., & Moon, S.-H. (2016). Chemical compositions, free amino acid contents and antioxidant activities of Hanwoo (*Bos taurus coreanae*) beef by cut. *Meat Science*, 119, 16–21. <https://doi.org/10.1016/j.meatsci.2016.04.016>
- Ozvural, E. B., & Huang, Q. (2018). Quality differences of hamburger patties incorporated with encapsulated β carotene both as an additive and edible coating. *Journal of Food Processing and Preservation*, 42(1), e13353. <https://doi.org/10.1111/jfpp.13353>
- Paglarini, C. D. S., Martini, S., & Pollonio, M. A. R. (2019). Using emulsion gels made with sonicated soy protein isolate dispersions to replace fat in frankfurters. *LWT*, 99, 453–459. <https://doi.org/10.1016/j.lwt.2018.10.005>
- Pargiyanti, P. (2019). Optimasi Waktu Ekstraksi Lemak dengan Metode Soxhlet Menggunakan Perangkat Alat Mikro Soxhlet. *Indonesian Journal of Laboratory*, 1(2), 29. <https://doi.org/10.22146/ijl.v1i2.44745>
- Paula, M. M. D. O., De Moura, A. P. R., Buchili, A. F. M., Zitha, E. Z. M., Cassimiro, D. M. D. J., Ramos, A. D. L. S., & Ramos, E. M. (2023). Technological and sensory characteristics of hamburgers made with polyunsaturated gelled emulsions. *Food Science and Technology International*, 10820132231205621. <https://doi.org/10.1177/10820132231205621>
- Pei, Z., Wang, H., Xia, G., Hu, Y., Xue, C., Lu, S., Li, C., & Shen, X. (2023). Emulsion gel stabilized by tilapia myofibrillar protein: Application in lipid-enhanced surimi preparation. *Food Chemistry*, 403, 134424. <https://doi.org/10.1016/j.foodchem.2022.134424>
- Phan-Thi, H., Durand, P., Prost, M., Prost, E., & Waché, Y. (2016). Effect of heat-processing on the antioxidant and prooxidant activities of β -carotene from natural and synthetic origins on red blood cells. *Food Chemistry*, 190, 1137–1144. <https://doi.org/10.1016/j.foodchem.2015.06.088>
- Phillips, G. O., & Williams, P. A. (2009). *Handbook of hydrocolloids* (2nd ed). CRC press Woodhead publ.

- Pindi, W., Siang, O. W., Munsu, E., Mohd Zaini, H., Sulaiman, N. S., Matanjun, P., Wahab, N. Ab., & Mantihal, S. (2024). The influence of utilizing red tropical *Kappaphycus alvarezii* gel as a fat substitute on the quality of chicken patties. *Journal of Applied Phycology*, 36(2), 857–865. <https://doi.org/10.1007/s10811-023-03018-8>
- Pintado, T., Muñoz-González, I., Salvador, M., Ruiz-Capillas, C., & Herrero, A. M. (2021). Phenolic compounds in emulsion gel-based delivery systems applied as animal fat replacers in frankfurters: Physico-chemical, structural and microbiological approach. *Food Chemistry*, 340, 128095. <https://doi.org/10.1016/j.foodchem.2020.128095>
- Purdi, T. S., Setiowati, A. D., & Ningrum, A. (2023). Ultrasound-assisted extraction of *Spirulina platensis* protein: Physicochemical characteristic and techno-functional properties. *Journal of Food Measurement and Characterization*, 17(5), 5474–5486. <https://doi.org/10.1007/s11694-023-02051-y>
- Rahma, A. S. (2021). *Production Technology for Adding GDL (Glucono Delta Lactone) to Soy-Based Foods*. 2(2).
- Rahmadi, A., Saragih, B., & Bohari (Eds.). (2020). *EMULSI LABU, MINYAK SAWIT, DAN BUAH NAGA*. IPB Press.
- Rahman, M. M., & Lamsal, B. P. (2021). Ultrasound-assisted extraction and modification of plant-based proteins: Impact on physicochemical, functional, and nutritional properties. *Comprehensive Reviews in Food Science and Food Safety*, 20(2), 1457–1480. <https://doi.org/10.1111/1541-4337.12709>
- Ren, Y., Huang, L., Zhang, Y., Li, H., Zhao, D., Cao, J., & Liu, X. (2022). Application of Emulsion Gels as Fat Substitutes in Meat Products. *Foods*, 11(13), 1950. <https://doi.org/10.3390/foods11131950>
- Rustagi, S. (2020). Food Texture and Its Perception, Acceptance and Evaluation. *Biosciences Biotechnology Research Asia*, 17(03), 651–658. <https://doi.org/10.13005/bbra/2869>
- Sá, A. G. A., Moreno, Y. M. F., & Carciofi, B. A. M. (2020). Plant proteins as high-quality nutritional source for human diet. *Trends in Food Science & Technology*, 97, 170–184. <https://doi.org/10.1016/j.tifs.2020.01.011>
- Schneider, A. A., Bu, F., & Ismail, B. P. (2023). Enhancement of pea protein solubility and thermal stability for acidic beverage applications via endogenous Maillard-induced glycation and chromatography purification. *Current Research in Food Science*, 6, 100452. <https://doi.org/10.1016/j.crfs.2023.100452>
- Serdaroglu, M., Nacak, B., Karabiyikoglu, M., & Keser, G. (2016). Effects of Partial Beef Fat Replacement with Gelled Emulsion on Functional and Quality Properties of Model System Meat Emulsions. *Korean Journal for Food Science of Animal Resources*, 36(6), 744–751. <https://doi.org/10.5851/kosfa.2016.36.6.744>
- Shin, K.-O., Hwang, H.-J., Han, K.-S., & Lee, Y.-J. (2022). Quality Characteristics of Substitute Meat Patties Developed Using *Aruncus dioicus* var. *Kamtschaticus* Hara. *Foods*, 11(9), 1341. <https://doi.org/10.3390/foods11091341>

- Soni, R. A., Sudhakar, K., & S. Rana, R. (2021). Biochemical and Thermal Analysis of Spirulina Biomass through FTIR, TGA, CHN. *Energy Engineering*, 118(4), 1045–1056. <https://doi.org/10.32604/EE.2021.016082>
- Soukoulis, C., Tsevdou, M., Andre, C. M., Cambier, S., Yonekura, L., Taoukis, P. S., & Hoffmann, L. (2017). Modulation of chemical stability and in vitro bioaccessibility of beta-carotene loaded in kappa-carrageenan oil-in-gel emulsions. *Food Chemistry*, 220, 208–218. <https://doi.org/10.1016/j.foodchem.2016.09.175>
- Steinbüchel, A., & Hofrichter, M. (Eds.). (2001). *Biopolymers*. Wiley-VCH.
- Suarez, S. E., & Añón, M. C. (2018). Comparative behaviour of solutions and dispersions of amaranth proteins on their emulsifying properties. *Food Hydrocolloids*, 74, 115–123. <https://doi.org/10.1016/j.foodhyd.2017.07.042>
- Sutariya, S. G., & Salunke, P. (2023). Effect of Hyaluronic Acid and Kappa-Carrageenan on Milk Properties: Rheology, Protein Stability, Foaming, Water-Holding, and Emulsification Properties. *Foods*, 12(5), 913. <https://doi.org/10.3390/foods12050913>
- Swiss Import Promotion Programme & kementrian kelautan dan perikanan. (2018). *CARRAGEENAN AND AGAR Indonesia, beyond the land of cottonii and gracilaria*.
- Tan, C. H., Lee, C. J., Tan, S. N., Poon, D. T. S., Chong, C. Y. E., & Pui, L. P. (2021). Red Palm Oil: A Review on Processing, Health Benefits and Its Application in Food. *Journal of Oleo Science*, 70(9), 1201–1210. <https://doi.org/10.5650/jos.ess21108>
- Taylor, J., Ahmed, I. A. M., Al-Juhaimi, F. Y., & Bekhit, A. E.-D. A. (2020). Consumers' Perceptions and Sensory Properties of Beef Patty Analogues. *Foods*, 9(1), 63. <https://doi.org/10.3390/foods9010063>
- Tobin, B. D., O'Sullivan, M. G., Hamill, R. M., & Kerry, J. P. (2012). Effect of varying salt and fat levels on the sensory quality of beef patties. *Meat Science*, 91(4), 460–465. <https://doi.org/10.1016/j.meatsci.2012.02.032>
- Tomlekova, N. B., White, P. J., Thompson, J. A., Penchev, E. A., & Nielen, S. (2017). Mutation increasing β -carotene concentrations does not adversely affect concentrations of essential mineral elements in pepper fruit. *PLOS ONE*, 12(2), e0172180. <https://doi.org/10.1371/journal.pone.0172180>
- Truong, T., Bansal, N., & Bhandari, B. (2014). Effect of Emulsion Droplet Size on Foaming Properties of Milk Fat Emulsions. *Food and Bioprocess Technology*, 7(12), 3416–3428. <https://doi.org/10.1007/s11947-014-1352-4>
- Vonshak, A. (Ed.). (1997). *Spirulina platensis (Arthrospira): Physiology, cell-biology, and biotechnology*. Taylor & Francis.
- Wang, M., Ma, L., Xie, P., Li, C., Yang, X., & Lang, Y. (2023). Improved antioxidant properties of pork patties by replacing fat with resveratrol-loaded MP-CS complex stabilized pickering emulsion. *Food Science and Technology International*, 10820132231196202. <https://doi.org/10.1177/10820132231196202>
- Wang, Y., Ai, C., Wang, H., Chen, C., Teng, H., Xiao, J., & Chen, L. (2023). Emulsion and its application in the food field: An update review. *eFood*, 4(4), e102. <https://doi.org/10.1002/efd2.102>

- Wei, L., Ren, Y., Huang, L., Ye, X., Li, H., Li, J., Cao, J., & Liu, X. (2024). Quality, Thermo-Rheology, and Microstructure Characteristics of Cubic Fat Substituted Pork Patties with Composite Emulsion Gel Composed of Konjac Glucomannan and Soy Protein Isolate. *Gels*, 10(2), 111. <https://doi.org/10.3390/gels10020111>
- Wilfong, A. K., McKillip, K. V., Gonzalez, J. M., Houser, T. A., Unruh, J. A., Boyle, E. A. E., & O'Quinn, T. G. (2016). *Determination of the effect of brand and product identification on consumer palatability ratings of ground beef patties*1,2,3.
- World Health Organization (WHO) (Ed.). (2023). *WHO guideline: Total fat intake for the prevention of unhealthy weight gain in adults and children*. World Health Organization. <https://www.who.int/publications/i/item/9789240073654>
- Wu, X., Wu, S., Ji, M., & Yoong, J. H. (2018). Influence of red palm oil on the physicochemical and sensory qualities of flavouring oil gravy for instant noodles. *RSC Advances*, 8(2), 1148–1158. <https://doi.org/10.1039/C7RA12387F>
- Xi, Z., Liu, W., McClements, D. J., & Zou, L. (2019). Rheological, structural, and microstructural properties of ethanol induced cold-set whey protein emulsion gels: Effect of oil content. *Food Chemistry*, 291, 22–29. <https://doi.org/10.1016/j.foodchem.2019.04.011>
- Xiong, T., Sun, H., Niu, Z., Xu, W., Li, Z., He, Y., Luo, D., Xi, W., Wei, J., & Zhang, C. (2022). Carrageenan-Based Pickering Emulsion Gels Stabilized by Xanthan Gum/Lysozyme Nanoparticle: Microstructure, Rheological, and Texture Perspective. *Foods*, 11(23), 3757. <https://doi.org/10.3390/foods11233757>
- Xu, Y., Yu, J., Xue, Y., & Xue, C. (2023). Enhancing gel performance of surimi gels via emulsion co-stabilized with soy protein isolate and κ -carrageenan. *Food Hydrocolloids*, 135, 108217. <https://doi.org/10.1016/j.foodhyd.2022.108217>
- Yada, R. Y. (Ed.). (2004). *Proteins in food processing*. CRC press.
- Yang, X., Li, Y., Li, S., Oladejo, A. O., Wang, Y., Huang, S., Zhou, C., Ye, X., Ma, H., & Duan, Y. (2018). Effects of ultrasound-assisted α -amylase degradation treatment with multiple modes on the extraction of rice protein. *Ultrasonics Sonochemistry*, 40, 890–899. <https://doi.org/10.1016/j.ultsonch.2017.08.028>
- Youssef, M. K., & Barbut, S. (2009). Effects of protein level and fat/oil on emulsion stability, texture, microstructure and color of meat batters. *Meat Science*, 82(2), 228–233. <https://doi.org/10.1016/j.meatsci.2009.01.015>
- Yu, J., Wang, X., Li, D., Wang, L., & Wang, Y. (2022). Development of soy protein isolate emulsion gels as extrusion-based 3D food printing inks: Effect of polysaccharides incorporation. *Food Hydrocolloids*, 131, 107824. <https://doi.org/10.1016/j.foodhyd.2022.107824>
- Yüçetepe, A., Yavuz-Düzgün, M., Şensu, E., Bildik, F., Demircan, E., & Özçelik, B. (2021). The impact of pH and biopolymer ratio on the complex coacervation of *Spirulina platensis* protein concentrate with chitosan. *Journal*

- of Food Science and Technology*, 58(4), 1274–1285.
<https://doi.org/10.1007/s13197-020-04636-7>
- Zhang, H., Huang, Z., Guo, P., Guo, Q., Zhang, H., Jiang, L., Xia, N., & Xiao, B. (2023). Tuning egg yolk granules/sodium alginate emulsion gel structure to enhance β -carotene stability and in vitro digestion property. *International Journal of Biological Macromolecules*, 232, 123444.
<https://doi.org/10.1016/j.ijbiomac.2023.123444>
- Zhang, Z., Holden, G., Wang, B., & Adhikari, B. (2023). Maillard reaction-based conjugation of Spirulina protein with maltodextrin using wet-heating route and characterisation of conjugates. *Food Chemistry*, 406, 134931.
<https://doi.org/10.1016/j.foodchem.2022.134931>
- Zhao, C., Chu, Z., Mao, Y., Xu, Y., Fei, P., Zhang, H., Xu, X., Wu, Y., Zheng, M., & Liu, J. (2023). Structural characteristics and acid-induced emulsion gel properties of heated soy protein isolate–soy oligosaccharide glycation conjugates. *Food Hydrocolloids*, 137, 108408.
<https://doi.org/10.1016/j.foodhyd.2022.108408>
- Zhi, L., Liu, Z., Wu, C., Ma, X., Hu, H., Liu, H., Adhikari, B., Wang, Q., & Shi, A. (2023). Advances in preparation and application of food-grade emulsion gels. *Food Chemistry*, 424, 136399.
<https://doi.org/10.1016/j.foodchem.2023.136399>
- Zhu, Y., Huang, S., Jia, D., Zhao, Y., Zhang, J., Bai, J., & Xiao, X. (2022). Application of barley flour processed by different methods as an alternative to fat in emulsion-type sausage. *Food Bioengineering*, 1(1), 82–90.
<https://doi.org/10.1002/fbe2.12005>