



DAFTAR PUSTAKA

- Agustin, R., D. R. Arta, dan R. Nofita. 2023. Pengecilan ukuran partikel dan karakterisasi kolagen dari kulit ikan gabus (*Channa striata*) dengan metode ball milling. *Jurnal Sains Farmasi & Klinis*. 10 (1): 44 – 53.
- Ahmad, M. and S. Benjakul. 2010. Extraction and characterization of pepsin-soluble collagen from the skin of unicorn leatherjacket (*Aluterus monoceros*). *Food Chemistry*. 120: 817 – 824.
- Al Ghani, Y. A., O. R. Puspitarini, dan I. D. Retnaningtyas. 2022. Pengaruh metode *thawing* dan lama *thawing* terhadap nilai pH dan susut masak daging beku bebek hibrida. *Jurnal Dinamika Rekasatwa*. 5(3): 310 – 320.
- Alhana., P. Suptijah, dan K. Tarman. 2015. Ekstraksi dan karakterisasi kolagen dari daging teripang gamma. *JPHPI*. 150 – 161.
- Andiati, H. A., W. S. Putranto, dan J. Gumilar. 2022. Pengaruh penggunaan asam klorida terhadap rendemen, kadar air, dan kadar abu gelatin ceker itik (*Anas platyrhynchos javanica*). *Jurnal Teknologi Hasil Peternakan*, 3(2):83-91.
- Araujo, J., P. Sica, C. Costa, and M. C. Marquez. 2020. Enzymatic hydrolysis of fish waste as an alternative to produce high value-added products. *Waste and Biomass Valorization*. 12: 847 – 855.
- Asharaf, F., S. R. R. Rajasree, and R. Rajan. 2024. Bioconversion of eel skin waste into valuable collagen: isolation, spectral characterization, and biocompatibility assessment. *Waste and Biomass Valorization*. 15: 4773 – 4783.
- Association of Official Analytical Chemistry, 46(2), 481-489. AOAC (2005). *Official Methods of Analysis (18th edition)*, Chemists International, Maryland, USA
- Astawan, M. dan T. Aviana. 2003. Pengaruh jenis larutan perendaman serta metode pengeringan terhadap sifat fisik, kimia, dan fungsional gelatin dari kulit ikan cucut. *Jurnal Teknol dan Ind Pangan*. 16 (1): 7 – 13.
- Auwal, S. M., M. Zarei, A. A. Hamid, and N. Saari. 2017. Response surface optimisation for the production of antioxidant hydrolysates from stone fish protein using bromelain. *Evidence-Based Complementary and Alternative Medicine*. 1 – 10.
- Blanco, M., J. A. Vázquez, Pérez-Martín, R.I, and C. G. Sotelo. 2019. Collagen extraction optimization from the skin of the small-spotted catshark (*S. canicula*) by response surface methodology. *Marine Drugs* 17, 40.
- Buck, R. P., S. Rondinini, A. K. Covington, F. G. K. Baucke, C. M. A. Brett, M. F. Camoes, M. J. T. Milton, T. Mussini, R. Naumann, K. W. Pratt, P. Spitzer, and G. S. Wilson. 2001. The measurement of pH – definition, standards and procedures. *Pure Appl Chem*. 74 (11): 2169 – 2200.
- Cheng, F.Y., F. W. Hsu, H. S. Chang, L. C. Lin, and R. Sakata. 2009. Effect of different acids on the extraction of pepsin-solubilised collagen containing melanin from silky fowl feet. *Food Chemistry* 113: 563–567.



- de Melo Oliveira, V., C. R. D. Assis, B. D. A. M. Costa, R. C. de Araujo Neri, F. T. D. Monte, H. M. S. da Costa Vasconcelos, and A. L. F. Porto. 2021. Physical, biochemical, densitometric and spectroscopic techniques for characterization collagen from alternative sources: a review based on the sustainable valorization of aquatic by-products. *Journal of Molecular Structure*. 1224: 1-28.
- Devita, L., M. Nurilmala, H. N. Lioe, and M. T. Suhartono. 2021. Chemical and antioxidant characteristics of skin-derived collagen obtained by acid-enzymatic hydrolysis of bigeye tuna (*Thunnus obesus*). *Marine Drugs*. 222: 1 – 19.
- Dhakal, D., P. Koomsap, A. Lamichhane, M. B. Sidiq, and A. K. Anal. 2018. Optimizatio of Collagen Extraction from Chicken Feet by Papain Hydrolysis and Synthesis of Chicken Feet Collagen Based Biopolymeric Fibres. *Food Biosciences*. 1 – 34.
- Febriansyah, R., A. Pratama, dan J. Gumilar. 2019. Pengaruh konsentrasi NaOH terhadap rendemen, kadar air, dan kadar abu gelatin ceker itik (*Anas platyrhynchos javanica*). *Jurnal Ilmu dan Teknologi Hasil Ternak*. 14 (1): 1 – 10.
- Gallo, N., M. L. Natali, A. Sannino, and L. Salvatore. 2020. An overview of the use of equine collagen as emerging material for biomedical applications. *Journal of Functional Biomaterials*. 11,79: 1 – 27.
- Gandhi, K., N. Sharma, P. B. Gautam, R. Sharma, B. Mann, and V. Pandey. 2022. polyacrylamide gel electrophoresis BT advanced analytical techniques in dairy chemistry. Springer.
- Gautam, S.S., S. K. Mishra, V. Dash, A. K. Goyal, and G. Rath. 2010. Comparative study of extraction, purification and estimation of bromelain from stem and fruit of pineapple plant. *Thai J Pharm Sci*. 34: 67 – 76.
- Gelse, K., E. Poschl, and T. Aigner. 2003. Collagens structure, function, and biosynthesis. *Advanced Drug Delivery Reviews*. 55: 1531 – 1546.
- Hartati, I. dan L. Kurniasari. 2010. Kajian produksi kolagen dari limbah sisik ikan secara ekstraksi enzimatis. *Majalah Ilmiah Momentum*. 6 (1): 33 – 35.
- Hashim, P., M. S. M. Ridzwan, and J. Bakar. 2014. Isolation and characterization of collagen from chicken feet. *International Scholarly and Scientific Research and Innovation*. 8 (3): 250 – 254.
- Heu, M. S., J. H. Lee, H. J. Kim, S. J. Jee, Y. J. Jeon, F. Shahidi, and J. S. Kim. 2010. Characterization of acid and pepsin-soluble collagen from flatfish skin. *Food Sci Biotechnol*. 18 (1): 27 – 33.
- Itchenco, S., A. P. Kempka, and R. C. Prestes. 2017. Profiles of enzymatic hydrolysis of different collagens and derivatives over time. *R. bras. Tecnol. Agroindustr*. 11.
- Ismanto, A., D. P. Lestyanto, M. I. Haris, dan Y. Erwanto. 2020. Komposisi kimia, karakteristik fisik, dan organoleptik sosis ayam dengan penambahan karagenan dan *transglutaminase*. *Sains Peternakan*. 18 (1): 73 – 80.



- Jafari, H., A. Lista, M. M. Siekapen, P. G. Bohlouli, L. Nie, H. Alimoradi, and A. Shavandi. 2020. Fish collagen: extraction, characterization, and applications for biomaterials engineering. *Polymers* 12, 2230.
- Jap, C. A., A. C. Pertiwi., J. Andrew., dan Eric. 2023. Efikasi suplementasi kolagen dalam mencegah tanda penuaan. *Health Information Jurnal Penelitian*. 15: e842.
- Jaswir. I., A. Monsur, and H. M. Salleh. 2011. Nano-structural analysis of fish collagen extracts for new process development. *African Journal of Biotechnology*. 10(81):18847-18854.
- Karim, A. A. and R. Bhat. 2009. Fish gelatins: properties, challenges, and prospects as an alternative to mammalian gelatins. *Food Hydrocolloids*. 23: 563 – 576.
- Katili, A. 2009. Struktur dan fungsi protein kolagen. *Jurnal Pelangi Ilmu*. 2 (5): 19 – 29.
- Kim, S. H., H. S. Park, O. J. Lee, J. R. Chao, H. J. Park, J. M. Lee, H. W. Ju, B. M. Moon, Y. R. Park, J. E. Song, G. Khang, and C. H. Park. 2016. Fabrication of duck's feet collagen – silk hybrid biomaterial for tissue engineering. *International Journal of Biological Macromolecules*. 85: 442 – 450.
- Kittiphattanabawon. P., S. Benjakul, W. Visessanguan, T. Nagai, and M. Tanaka. 2005. Characterisation of acid-soluble collagen from skin and bone of bigeye snapper (*Priacanthus tayenus*). *Food Chem*. 89: 363-372.
- Kusa, S. R., A. S. Naiu, dan N. Yusuf. 2022. Karakteristik kolagen kulit tuna sirip kuning (*Thunnus albacares*) pada waktu hidro – ekstraksi berbeda dan potensinya dalam bentuk sediaan nanokolagen. *Media Teknologi Hasil Perikanan*. 10 (2): 107 – 116.
- Kristinsson, H. G. and B. A. Rasco. 2010. Fish protein hydrolysates: production, biochemical, and functional properties. *Critical Reviews in Food Science and Nutrition*. 40(1): 43 – 81.
- Kwatra, B. 2020. Collagen supplementation: therapy for skin disorders. *World Journal of Pharmaceutical Research*. 9 (5): 2404 – 2518.
- Lamparelli, E. P., V. Casagrande, S. Pressato, N. Maffulli, G. D. Porta, and D. Bellini. 2022. Synthesis and characterization of a novel composite scaffold based on hyaluronic acid and equine tipe I collagen. *Pharmaceutics*. 14: 1752.
- López, L. A., L. F. Jiménez, A. D. H. Fuentes, R. G. C. Montiel, and G. A. Álvarez. 2019. Hydrolysed collagen from sheepskins as a source of functional peptides with antioxidant activity. *IJMS* 20, 3931.
- Lindberg, D., K. A. Kristoffersen, S. G. Wubshet, L. M. G. Hunnes, M. Dalsnes, K. R. Dankel, V. Host and N. K. Afseth. 2021. Exploring effects of protease choice and protease combinations in enzymatic protein hydrolysis of poultry by-products. *Molecules* Vol. 26(5280): 1-19.
- Lin, Y. K. and D. C. Liu. 2006. Effects of pepsin digestion at different temperatures and times on properties of telopeptide-poor collagen from bird



- feet. *Food Chemistry*. 94 (4): 621 – 625.
- Liu, W., D. li, and S. D. Gao. 2009. Preparation and characterization of pepsin-solubilized type I collagen from the scales of snakehead (*Ophiocephalus argus*). *Journal of Food Biochemistry*. 33: 20 – 37.
- Liu D.C., Y. K. Lin, and M. T. Chen. 2001. Optimum condition of extracting collagen from chicken feet and its characteristics. *Asian-Australasian Journal of Animal Sciences*. 14(11): 1638-1644.
- Liu, D., G. Wei, T. Li, J. Hu, N. Lu, J. M. Regenstein, and P. Zhou. 2015. Effects of alkaline pretreatments and acid extraction condition on the acid-soluble collagen from grass carp (*Ctenopharyngodon idella*) skin. *Food Chemistry*. 172: 836 – 843.
- Masri, M. 2014. Isolasi dan pengukuran aktivitas enzim bromelin dari ekstrak kasar bonggol nanas (*Ananas comosus*) pada variasi suhu dan pH. *Biogenesis*. 2 (2): 119 – 125.
- Matinong, A., M. E. Chisti, Y. K. L. Pickering, and R. G. Haverkamp. 2022. Collagen extraction from animal skin. *Biology*. 11 (6): 905.
- Meyer, M., 2019. Processing of collagen based biomaterials and the resulting materials properties. *BioMed Eng Online* 18.
- Muthmainnah, A. dan K. Jalali. 2022. Produktivitas budidaya antara bebek peking (*Anas platyrhynchos*) dengan bebek hibrida (*Anas platyrhynchos domesticus*). *Jurnal Ilmiah Pendidikan Sains dan Terapan*. 2 (4): 258 – 271.
- Mohtar, N.F., C. Perera, and S. Y. Quek. 2010. Optimisation of gelatine extraction from hoki (*Macruronus novaezelandiae*) skins and measurement of gel strength and SDS-PAGE. *Food Chemistry* 122: 307–313.
- Nafi, A., N. Diniyah, and R. Permata. 2014. Production of savory salt as flavor enhancer from *Volvariella volvaceae* L. prodeded under different time of hydrolysis and spontaneous fermentation. *Inovasi Scientific Journal*. 14 (2): 125 – 132.
- Nagarajan, M., S. Benjakul, T. Prodpran, P. Songtipya, and H. Kishimura. 2012. Characteristic and functional properties of gelatin from splendid squid (*Loligo formosana*) skin as affected by extraction temperatures. *Food Hydrocolloids*. 29: 389 – 397.
- Nalinanon, S., Benjakul, S, and Kishimura, H. 2010. Collagens from the skin of arabesque greenling (*Pleurogrammus azonus*) solubilized with the aid of acetic acid and pepsin from albacore tuna (*Thunnus alalunga*) stomach. *J. Sci. Food Agric*. 90, 1492–1500.
- Nasyanka, A, L., J. Naimah, U. Firmani, P. Octavia, dan V. a. Azizah. 2024. Characteristics of collagen-based milkfish bone waste extracted with bromelain with cofactor Ca²⁺. *Jurnal Kefarmasian Indonesia*. 14 (1): 23 – 31.
- Naomi, R., Ridzuan, P. M, and H. Bahari. 2021. Current insights into collagen type I. *Polymers* 13, 2642.
- Nurhidayah., Masriany, dan M. Masri. 2012. Isolasi dan pengukuran aktivitas enzim bromelin dari ekstrak kasar batang nanas (*Ananas comosus*) berdasarkan variasi pH. *Jurnal Ilmiah Biologi*. 1 (2): 116 - 122



- Nurjanah., T. I. Baharuddin, dan T. Nurhayati. 2021. Ekstraksi kolagen kulit ikan tuna sirip kuning (*Thunnus albacares*) menggunakan enzim pepsin dan papain. JPHPI. 24 (2): 174 – 187.
- Ogawa, M., R. J. Portier, M. W. Moody, J. Bell, M. A. Schexnayder, and J. N. Losso. 2004. Biochemical properties of bone and scale collagens isolated from the subtropical fish black drum (*Pogonia cromis*) and sheepshead seabream (*Archosargus probatocephalus*). Food Chemistry. 88 (4): 495 – 501.
- Oslan, S. N. H., R. Shapawi, R. A. M. Mokhtar, W. N. Noordin, and N. Huda. 2022. Characterization of acid- and pepsin-soluble collagen extracted from the skin of purple-spotted bigeye snapper. Gels. 8, 665.
- Palpandi, C., P. Ramasamy, T. Rajinikanth, S. Vairamani, and A. Shanmugam. 2010. Extraction of collagen from mangrove archeogastropod *Nerita (dostia) crepidularia* Lamarck 1822. American-Eurasian Journal of Scientific Research. 5 (1): 23 – 30.
- Park, J., J. Choe, H. W. Kim, K. Hwang, D. Song, E. Yeo, H. Kim, Y. Choi, S. Lee, and C. Kim. 2013. Effect of various extraction methods on quality characteristic of duck feet gelatin. Korean food sci an. 33(2): 162 – 169.
- Pati, F., B. Adhikari, and S. Dhara. 2010. Isolation and characterization of fish scale collagen of higher thermal stability. Biresour Technol. 101 (10): 3737 – 3742.
- Pertiwi, M., Y. Atma, A. Z. Mustopa, dan R. Maisarah. 2018. Karakteristik fisik dan kimia gelatin dari tulang ikan patin dengah pre – treatment asam sitrat. Jurnal Aplikasi Teknologi Pangan. 7 (2): 83 – 91.
- Potaros, T., N. Raksakulthai, J. Rungrerdkreangkrai, and W. Worawattanamateekul. 2009. Characterization of collagen from nile tilapia (*Oreochromis niloticus*) skin isolated by two different methods. Kasetsart. 20 (6): 43: 584 – 593.
- Prajaputra, V., S. Maryam, N. Isnaini, S. Apriani, S. Maqfirah, A. S. Lestari, and W. S. Mulyana. 2025. Influence of extraction time on collagen yield and proximate composition from yellowfin tuna (*Thunnus albacares*) bones: insights from industrial waste valorization. Ecological Engineering Environmental Technology. 26(1): 1 – 7.
- Puspitasari, D. A. P., V. P. Bintaro, and B. E. Setiani. 2013. The soaking effect on different hydrochloride acid level and soaking time on pH, swelling percentage and collagen yield of chicken shank bone. J. Indonesian Trop Anim Agric. 38 (2): 98 – 102.
- Putri, D. T. P., V. W. Pangestika, H. Ilyas, M. Z. Abidin, N. A. Fitriyanto, and Y. Erwanto. 2024. Collagen properties of Indonesian local sheepskin isolated using acid and enzymatic methods. J Adv Vet Anim Res 11, 722.
- Rahmawati, R. dan S. Nurjanah. 2020. Pengaruh konsentrasi enzim papain terhadap mutu gelatin bubuk dari tulang dan cakar ayam. Jurnal Konversi. 9 (1): 40 – 52.



- Ridwan, M., R. Sari, R. D. Andika, A. A. Candra, dan G. G. Maradon. 2020. Usaha budidaya itik pedaging jenis hibrida dan peking. *Jurnal Peternakan Terapan*. 1 (1): 8 – 10.
- Rosida, D. F., A. D. Priyanto, and A. Y. Trisna. 2022. Effect of hydrolysis time and bromelain enzyme concentration on protein levels of apple snail (*Pila ampullacea*) hydrolyzate. *International Seminar of Research Month 2021. NST Proceedings*. Pages 341-346.
- Sari, R. I. P., Salman, dan E. Zaini. 2022. Isolasi dan karakterisasi serbuk enzim bromelin dari batang nanas (*Ananas comosus* (L.) Merr). *Medical Sains Jurnal Ilmiah Kefarmasian*. 7 (4): 751 – 758.
- Schmidt, M. M., R. C. P. Dornelles, R. O. Mello, E. H. Kubota, M. A. Mazutti, A. P. Kempka, and I. M. Demiate. 2016. Collagen extraction process. *International Food Research Journal*. 23 (3): 913 – 922.
- Shaik, M. I., I. N. M. Nor, and N. M. Sarbon. 2023. Effect of extraction time on the extractability and physicochemical properties of pepsin-soluble collagen from the skin of silver catfish (*Pangasius* sp.). *Gels*. 9(300): 1 – 14.
- Shen, X. R., H. Kurihara, and K. Takahashi. 2007. Characterisation of molecular species of collagen in scallop mantle. *Food Chemistry*. 102: 1187 – 1191.
- Sholahuddin, M. A., N. Dyah, R. Lastuti, and M. Amin. 2024. Effect of differences bromelin enzyme concentration on protein hydrolysate from waste of tilapia viscera (*Oreochromis* sp.) on antioxidant activity. *Jurnal Biosains Pascasarjana*. 26 (1): 15 – 22.
- Shon, J., J. H. Eo, S. J. Hwang, J. B. Eun. 2011. Effect of processing conditions on functional properties of collagen powder from skate (*Raja kenoei*) skins. *Food Sci Biotechnol* 20, 99–106.
- Shyni, K., G. S. Hema, G. Ninan, S. Mathew, C. G. Joshy, and P. T. Lakshmanan. 2014. Isolation and characterization of gelatin from the skins of skipjack tuna (*Katsuwonus pelamis*), dog shark (*Scoliodon sorrakowah*), and rohu (*Labeo rohita*). *Food Hydrocolloids*. 39: 68 – 76.
- Silva, J. M., G. S. Diogo, A. L. P. Marques, T. H. Silva, and R. L. Reis. 2016. Marine collagen isolation and processing envisaging biomedical applications. *Biomaterial From Nature for Advanced Devices and Therapies*. John Wiley and Sons London, pp: 18 – 22.
- Silvipriya, K. S., K. K. Kumar, A. R. Bhat, B. D. Kumar, A. John, and P. lakshmanan. 2015. Collagen: animal sources and biomedical application. *Journal of Applied Pharmaceutical Science*. 5 (3): 123 – 127.
- Sjofjan, O., D. N. Adli, M. H. Natsir, Y. F. Nuningtyas, I. Bastomi, and F. R. Amalia. 2021. The effect of increasing levels of palm kernel meal containing α - β -mannanase replacing maize to growing-finishing hybrid duck on growth performance, nutrient digestibility, carcass trait, and VFA. *Journal of the Indonesian Tropical Animal Agriculture*. 46(1): 29 – 39.
- Stein, I. A., J. H. Svein, and G. H. E. Vincent. 2005. Enzymatic hydrolysis of atlantic cod (*Gadus morhua* L.) viscera. *Process Biochemistry*. 40: 1957 – 1966.



- Sukma., A. Mismawati, B. F. Pamungkas, S. Diachanty, dan I. Zuraida. 2022. Komposisi proksimat dan profil mineral tulang dan sisik ikan papuyu. *Media Teknologi Hasil Perikanan*. 10(3): 185 – 191.
- Suwarjoyowirayatno, S., C. Hidayat, T. D. Wahyuningsih, and R. Indrati. 2024. Characterization of acid-soluble collagen from peanut worm (*Siphonosoma australe*) and its inhibitory activity of cyclooxygenase-2. *J App Biol Biotech*.
- Tabarestani, H. S., Y. Maghsoudlou, A. Motamedzadega, S. A. R. Mahoonak, and H. Rostamzah. 2012. Study on some properties of acid-soluble collagens isolated from fish skin and bones of rainbow trout (*Onchorhynchus mykiss*). *International Food Research Journal*. 19 (1): 251 – 257.
- Tahir, M. M., J. Langkong, A. B. Tawali, dan N. A. Surahman. 2019. Kajian pengaruh jenis pengering dan konsentrasi maltodextrin terhadap produk minuman the secang effervescent. 2 (1): 51 – 61.
- Tangboriboon, N., R. Kuanuruksapong, and A. Sirivat. 2012. Preparation and properties of calcium oxide from eggshells via calcination. *Materials Science Poland*. 30 (4): 313 – 322.
- Tu, R. S. and V. Breedveld. 2005. Microrheological detection of protein unfolding. *Physical Review E*. 72: 041914.
- Venetikidou, M., E. Lykartsis, T. Adamantidi, V. Prokopiou, A. Ofrydopoulou, S. Letsiou, and A. Tsoupras. 2025. Proteolytic enzyme activities of bromelain, ficin, and papain from fruit by-products and potential applications in sustainable and functional cosmetics for skincare. *Applied Sciences*. 15: 2637
- Wei, R., J. Chen, dan J. D. Huizinga. 2014. On the relationship between viscosity and surface tension. *Journal of Emerging Investigators*. 1-5.
- Wijaya, W. P., T. Gozali, dan M. R. Septiadji. 2021. Penambahan kolagen sisik dan tulang ikan gurami (*Osphronemus goramy*) pada minuman jus jambu biji (*Psidium guajava*). *Pasundan Food Technology Journal*. 8 (1): 12 – 19.
- Winarno. F. G. 2008. *Kimia pangan dan gizi*. Gramedia Pustaka Utama. Jakarta
- Wiyati, P. I. dan A. Tjitraresmi. 2018. Review: karakterisasi, aktivitas dan isolasi enzim bromelin dari tumbuhan nanas. *Farmaka*. 16 (2): 179 – 185.
- Wolf, P. 1983. A critical reappraisal of Waddell's technique for ultraviolet spectrophotometric protein estimation. *Principles And Techniques Of Analytical Biochemistry and Molecular Biology*. 6th Edition, Cambridge University Press, Massachusetts, Boston.
- Woo, J.-W., S. J. Yu, S. M. Cho, Y. B. Lee, and S. B. Kim. 2008. Extraction optimization and properties of collagen from yellowfin tuna (*Thunnus albacares*) dorsal skin. *Food Hydrocolloids*. 22: 879–887.
- Yanti, F., N. Dharmayanti, dan Suryanti. 2022. Aktivitas antioksidan kolagen dari kulit ikan patin (*Pangasius sp.*) dengan enzim bromelin kasar kulit nanas (*Ananas comosus L.*). *JPHPI*. 25: 88–96.



- Yousefi, M., F. Ariffin, and N. Huda. 2017. An alternative source of type i collagen based on by-product with higher thermal stability. *Food Hydrocolloids*. 63: 472 – 382.
- Zhou, P. and J. M. Regenstein. 2005. Effects of alkaline and acid pretreatments on alaska pollock skin gelatin extraction. *Journal of Food Science*. 70 (6): 392 – 396.
- Zain, F. A. M., N. Shahidan, A. W. Septama, H. Hashim, F. Adzitey, N. Julmohammad, and N. Huda. 2021. Physicochemical properties of duck feet gelatin powder extracted with acetic acid. *International Journal in Advanced Science Engineering Information Technology*. 11 (96): 2174 – 2179.
- Zang, Y., W. Liu, G. Li, B. Shi, Y. Miao, and X. Wu. 2007. Isolation and partial characterization of pepsin-soluble collagen from the skin of grass carp (*Ctenopharyngodon idella*). *Food Chemistry*. 102: 906 – 912.
- Zeng, Q. R., M. Zhang, B. P. Adhikari, and A. S. Mujumdar. 2013. Effect of drying processes on the functional properties of collagen peptides produced from chicken skin. *Drying Technology*. 31: 1653 – 1660.
- Zhang, F., A. Wang, Z. Li, S. He, and L. Shao. 2011. Preparation and characterisation of collagen from freshwater fish scales. *Food and Nutrition Sciences*. 2: 818 – 823.
- Zhang, X., S. Xu, L. Shen, and G. Li. 2020. Factors affecting thermal stability of collagen from the aspects of extraction, processing and modification. *Journal of Leather Science and Engineering*. 2: 1 – 19.