

DAFTAR PUSTAKA

- 'Afifah, A. N., Zuprizal, and N. D. Dono. 2021. *In vitro* antibacterial activities of *Syzygium polyanthum* leaves extract-nanoparticle against *Salmonella typhimurium*, *Escherichia coli*, and *Lactobacillus acidophilus*. IOP Conf. Ser. Earth Environ. Sci. 782: p.022093.
- Abbott, D. W., I. M. Aasen, K. A. Beauchemin, F. Grondahl, R. Gruninger, M. Hayes, S. Huws, D. A. Kenny, S. J. Krizsan, S. F. Kirwan, V. Lind, U. Meyer, M. Ramin, K. Theodoridou, D. von Soosten, P. J. Walsh, S. Waters, and X. Xing. 2020. Seaweed and seaweed bioactives for mitigation of enteric methane: Challenges and opportunities. *Animals*. 10: p.2432.
- Abdallah, I. I. and W. J. Quax. 2017. A glimpse into the biosynthesis of terpenoids. *KnE Life Sci*. 3: 81-98.
- Abdelrheem, D. A., H. R. Abd El-Mageed, H. S. Mohamed, A. A. Rahman, K. N. Elsayed, and S. A. Ahmed. 2021. Bis-indole alkaloid caulerpin from a new source *Sargassum platycarpum*: isolation, characterization, *in vitro* anticancer activity, binding with nucleobases by DFT calculations and MD simulation. *J. Biomol. Struct. Dyn*. 39: 5137-5147.
- Abdel-Wareth, A. A., S. Kehraus, and K. H. Südekum. 2019. Peppermint and its respective active component in diets of broiler chickens: growth performance, viability, economics, meat physicochemical properties, and carcass characteristics. *Poult. Sci*. 98: 3850-3859.
- Abolfathi, M. E., S. A. Tabeidian, A. F. Shahraki, S. N. Tabatabaei, and M. Habibian. 2019. Effects of ethanol extract of elecampane (*Inula helenium* L.) rhizome on growth performance, diet digestibility, gut health, and antioxidant status in broiler chickens. *Livest. Sci*. 223: 68-75.
- Ahmed, N., H. F. Mohamed, C. Xu, X. Sun, and L. Huang. 2022. Novel antibacterial activity of *Sargassum fusiforme* extract against coral white band disease. *Electron. J. Biotechnol*. 57: 12-23.
- Akinyemi, F., and D. Adewole. 2022. Effects of brown seaweed products on growth performance, plasma biochemistry, immune response, and antioxidant capacity of broiler chickens challenged with heat stress. *Poult. Sci*. 101: p.102215.
- Alibi, S., D. Crespo, and J. Navas. 2021. Plant-derivatives small molecules with antibacterial activity. *Antibiotics*. 10: p.231.
- Aljawish, A., I. Chevalot, J. Jasniewski, J. Scher, and L. Muniglia. 2015. Enzymatic synthesis of chitosan derivatives and their potential applications. *J. Mol. Catal., B Enzym*. 112: 25-39.

- Almalik, A., I. Alradwan, M. A. Kalam, and A. Alshamsan. 2017. Effect of cryoprotection on particle size stability and preservation of chitosan nanoparticles with and without hyaluronate or alginate coating. *Saudi Pharm. J.* 25: 861-867.
- Altschul, S. F., W. Gish, W. Miller, E. W. Myers, and D. J. Lipman. 1990. Basic local alignment search tool. *J. Mol. Biol.* 215: 403-410.
- Andri, F., N. D. Dono, H. Sasongko, and Z. Zuprizal. 2021. Efficacy of nanophytobiotics to improve growth performance of broiler chickens: evidence from a meta-analysis. *Adv. Vet. Res.* 11: 195-202.
- Andri, F., N. D. Dono, H. Sasongko, and Z. Zuprizal. 2020. The effects of dietary seaweed inclusion on growth performance of broiler chickens: A systematic review and meta-analysis. *F1000Research.* 9: p.1087.
- Arguelles, E. D. L. R. 2021. Evaluation of antioxidant capacity, tyrosinase inhibition, and antibacterial activities of brown seaweed, *Sargassum ilicifolium* (Turner) C. Agardh 1820 for cosmeceutical application. *J. Fish. Environ.* 45: 64-77.
- Ashwin, K., A. K. Pattanaik, V. Paladan, A. Singh, J. K. Sahoo, T. Jose, S. E. Jadhav and N. Dutta. 2022. Fermentability of select polyphenol-rich substrates in the canine faecal inoculum and their interaction with a canine-origin probiotic: An *in vitro* appraisal. *J. Sci. Food Agric.* 102: 1586-1597.
- Atallah, S. T., E. M. El-Ktany, and E. M. Ragab. 2021. Evaluation of the economic impact of strain, housing systems and season on commercial broiler performance and profitability under Egyptian condition. *Alex. J. Vet. Sci.* 69: 39-48.
- Atmadja, W. S. and W. F. Prud'homme van Reine. 2014. Checklist of the Seaweed Species Biodiversity of Indonesia with Their Distribution and Classification: Green Algae (Chlorophyta) and Brown Algae (Phaeophyceae, Ochrophyta). Indonesian Institute of Sciences, Jakarta.
- Attia, Y. A., M. T. Rahman, M. J. Hossain, S. Basiouni, A. F. Khafaga, A. A. Shehata, and H. M. Hafez. 2022. Poultry production and sustainability in developing countries under the covid-19 crisis: Lessons learned. *Animals.* 12: p.644.
- Aviagen. 2007. ROSS 308 Broiler: Performance Objectives. Aviagen, Alabama.
- Aviagen. 2014. ROSS 308 Broiler: Performance Objectives. Aviagen, Alabama.
- Aviagen. 2018. ROSS Broiler Management Handbook. Aviagen, Alabama.
- Aviagen. 2019. ROSS 308/ROSS 308 FF Broiler: Performance Objectives. Aviagen, Alabama.

- Badran, A. M. M., H. A. Basuony, M. A. Elsayed, and A. M. E. Abdel-Moneim. 2020. Effect of dietary curcumin and curcumin nanoparticles supplementation on growth performance, immune response and antioxidant of broilers chickens. *Egypt Poult. Sci. J.* 40: 325-343.
- Baek, S. H., L. Cao, S. J. Jeong, H. R. Kim, T. J. Nam, and S. G. Lee. 2021. The comparison of total phenolics, total antioxidant, and anti-tyrosinase activities of Korean *Sargassum* species. *J. Food Qual.* 2021: p.6640789.
- Bangun, H., S. Tandiono, and A. Arianto. 2018. Preparation and evaluation of chitosan-tripolyphosphate nanoparticles suspension as an antibacterial agent. *J. Appl. Pharm. Sci.* 8: 147-156.
- Baskara, A. P., B. Ariyadi, N. D. Dono, R. Martien, and Z. Zuprizal. 2020. Effect of self-nanoemulsifying drug delivery system (SNEDDS) of cinnamon bark essential oil on broiler chicken performance. *Livest. Res. Rural. Dev.* 32: p.6.
- Bazana, M. T., C. F. Codevilla, and C. R. de Menezes. 2019. Nanoencapsulation of bioactive compounds: Challenges and Perspectives. *Curr. Opin. Food Sci.* 26: 47-56.
- Bel-Rhlid, R., N. Page-Zoerkler, R. Fumeaux, T. Ho-Dac, J. Y. Chuat, J. L. Sauvageat, and T. Raab. 2012. Hydrolysis of chicoric and caftaric acids with esterases and *Lactobacillus johnsonii* *in vitro* and in a gastrointestinal model. *J. Agric. Food Chem.* 60: 9236-9241.
- Bel-Rhlid, R., D. Thapa, K. Kraehenbuehl, C. E. Hansen, and L. Fischer. 2013. Biotransformation of caffeoyl quinic acids from green coffee extracts by *Lactobacillus johnsonii* NCC 533. *AMB Express.* 3: p.28.
- Bell, D. D. and W. D. Weaver. 2002. *Commercial Chicken Meat and Egg Production*, Fifth Edition. Kluwer Academic Publisher, Massachusetts.
- Berneira, L. M., I. I. de Santi, C. C. da Silva, D. Venzke, P. Colepicolo, R. D. A. Vaucher, M. A. Z. dos Antos, and C. M. de Pereira. 2021. Bioactivity and composition of lipophilic metabolites extracted from Antarctic macroalgae. *Braz. J. Microbiol.* 52: 1275-1285.
- Blunt, J. W., A. R. Carroll, B. R. Copp, R. A. Davis, R. A. Keyzers, and M. R. Prinsep. 2018. Marine natural products. *Nat. Prod. Rep.* 35: 8-53.
- Bokulich, N. A., S. Subramanian, J. J. Faith, D. Gevers, J. I. Gordon, R. Knight, D. A. Mills, and J. G. Caporaso. 2013. Quality-filtering vastly improves diversity estimates from Illumina amplicon sequencing. *Nat. Methods.* 10: 57-59.
- Cai, D., N. A. Harrison, D. N. Kling, C. F. Gonzalez, and G. L. Lorca. 2019. Blueberries as an additive to increase the survival of *Lactobacillus johnsonii* N6.2 to lyophilisation. *Benef. Microbes.* 10: 473-482.

- Caijiao, C., H. Leshan, Y. Mengke, S. Lei, Z. Miansong, S. Yaping, L. Changheng, B. Xinfeng, L. Xue, L. Xin, and J. Airong. 2021. Comparative studies on antioxidant, angiotensin-converting enzyme inhibitory and anticoagulant activities of the methanol extracts from two brown algae (*Sargassum horneri* and *Sargassum thunbergii*). *Russ. J. Mar. Biol.* 47: 380-387.
- Calik, A., N. K. Emami, M. B. White, M. C. Walsh, L. F. Romero, and R. A. Dalloul. 2022. Influence of dietary vitamin E and selenium supplementation on broilers subjected to heat stress, Part I: Growth performance, body composition and intestinal nutrient transporters. *Poult. Sci.* 101: p.101857.
- Caporaso, J. G., J. Kuczynski, J. Stombaugh, K. Bittinger, F. D. Bushman, E. K. Costello, N. Fierer, A. G. Peña, J. K. Goodrich, J. I. Gordon, G. A. Huttley, S. T. Kelley, D. Knights, J. E. Koenig, R. E. Ley, C. A. Lozupone, D. McDonald, B. D. Muegge, M. Pirrung, J. Reeder, J. R. Sevinsky, P. J. Turnbaugh, W. A. Walters, J. Widmann, T. Yatsunenko, J. Zaneveld and R. Knight. 2010. QIIME allows analysis of high-throughput community sequencing data. *Nat. Methods.* 7: 335-336.
- Carrillo-Domínguez, S., R. E. Rodríguez-Martínez, M. Díaz-Martínez, E. Magaña-Gallegos, and M. Cuchillo-Hilario. 2022. Potential application of pelagic *Sargassum* in animal feeding. *J. Appl. Phycol.* 35: 433-444.
- Chakraborty, K., A. Maneesh, and F. Makkar. 2017. Antioxidant activity of brown seaweeds. *J. Aquat. Food Prod. Tech.* 26: 406-419.
- Chandrasekaran, M., K. D. Kim, and S. C. Chun. 2020. Antibacterial activity of chitosan nanoparticles: A review. *Processes.* 8: p.1173.
- Chitari, S., P. E. Dias, and U. Barros. 2018. Report on the identification of alkaloids from *Sargassum tenerimum*. *Seaweed Res. Utiln.* 40: 1-6.
- Corona, G., M. M. Coman, Y. Guo, S. Hotchkiss, C. Gill, P. Yaqoob, J. P. Spencer, and I. Rowland. 2017. Effect of simulated gastrointestinal digestion and fermentation on polyphenolic content and bioactivity of brown seaweed phlorotannin-rich extracts. *Mol. Nut. Food Res.* 61: p.1700223.
- Cotas, J., A. Leandro, D. Pacheco, A. M. Gonçalves, and L. Pereira. 2020. A comprehensive review of the nutraceutical and therapeutic applications of red seaweeds (Rhodophyta). *Life.* 10: p.19.
- Danaei, M., M. Dehghankhold, S. Ataei, F. H. Davarani, R. Javanmard, A. Dokhani, S. Khorasani, and M. R. Mozafari. 2018. Impact of particle size and polydispersity index on the clinical applications of lipidic nanocarrier systems. *Pharmaceutics.* 10: p.57.
- Dang, T. T., M. C. Bowyer, I. A. V. Altena, and C. J. Scarlett. 2018. Comparison of chemical profile and antioxidant properties of the brown algae. *Int. J. Food Sci. Technol.* 53: 174-181.

- Darbandi, A., A. Asadi, M. M. Ari, E. Ohadi, M. Talebi, M. H. Zadeh, A. D. Emami, R. Ghanavati, and M. Kakanj. 2022. Bacteriocins: Properties and potential use as antimicrobials. *J. Clin. Lab. Anal.* 36: p.24093.
- Darfiah, K., and G. Latama. 2021. Antibacterial activity and identification of active compounds of seaweed extract *Sargassum* sp., *Halimeda opuntia* and *Halymenia* sp. from Lae-Lae Island of South Sulawesi. *Int. J. Agric. Environ. Biotechnol.* 6: 187-195.
- Dewinta, A. F., I. E. Susetya, and M. Suriani. 2020. Nutritional profile of *Sargassum* sp. from Pane Island, Tapanuli Tengah as a component of functional food. *J. Phys. Conf. Ser.* 1542: p.012040.
- Dharmayanti, N., J. Supriatna, A. Abinawanto, and Y. Yasman. 2019. Isolation and partial characterization of alginate extracted from *Sargassum polycystum* collected from three habitats in Banten, Indonesia. *Biodiversitas* 20: 1776-1785.
- Dhas, T. S., P. Sowmiya, V. G. Kumar, M. Ravi, K. Suthindhiran, J. F. Borgio, G. Narendrakumar, V. R. Kumard, V. Karthick, and C. M. V. Kumar. 2020. Antimicrobial effect of *Sargassum plagiophyllum* mediated gold nanoparticles on *Escherichia coli* and *Salmonella typhi*. *Biocatal. Agric. Biotechnol.* 26: p.101627.
- Di Santo, M. C., C. L. D'Antoni, A. P. D. Rubio, A. Alaimo, and O. E. Pérez. 2021. Chitosan-tripolyphosphate nanoparticles designed to encapsulate polyphenolic compounds for biomedical and pharmaceutical applications– A review. *Biomed. Pharmacother.* 142: p.111970.
- Ding, Z., M. Mo, K. Zhang, Y. Bi, and F. Kong. 2021. Preparation, characterization and biological activity of proanthocyanidin-chitosan nanoparticles. *Int. J. Biol. Macromol.* 188: 43-51.
- Ditjen PKH. 2022. Statistik Peternakan dan Kesehatan Hewan 2022. Direktorat Jenderal Peternakan dan Kesehatan Hewan, Kementerian Pertanian Republik Indonesia, Jakarta.
- Duarte, C. M., J. Wu, X. Xiao, A. Bruhn, and D. Krause-Jensen. 2017. Can seaweed farming play a role in climate change mitigation and adaptation?. *Front. Mar. Sci.* 4: p.100.
- Edgar, R. C., B. J. Haas, J. C. Clemente, C. Quince, and R. Knight. 2011. UCHIME improves sensitivity and speed of chimera detection. *Bioinformatics.* 27: 2194-2200.
- Edgar, R. C. 2013. UPARSE: highly accurate OTU sequences from microbial amplicon reads. *Nat. Methods.* 10: 996-998.

- Efenberger-Szmechtyk, M. A. Nowak, and A. Czyzowska. 2021. Plant extracts rich in polyphenols: Antibacterial agents and natural preservatives for meat and meat products. *Crit. Rev. Food Sci. Nut.* 61: 149-178.
- Egil, A. C., B. Ozdemir, B. Gok, S. Kecel-Gunduz, and Y. Budama-Kilinc. 2020. Synthesis, characterization, biological activities and molecular docking of *Epilobium parviflorum* aqueous extract loaded chitosan nanoparticles. *Int. J. Biol. Macromol.* 161: 947-957.
- El-Sharkawy, H., A., Tahoun, A. M. Rizk, T. Suzuki, W. Elmonir, E. Nassef, M. Shukry, M. O. Germoush, F. Farrag, M. Bin-Jumah, and A. M. Mahmoud. 2020. Evaluation of *Bifidobacteria* and *Lactobacillus* probiotics as alternative therapy for *Salmonella typhimurium* infection in broiler chickens. *Animals*. 10: p.1023.
- Elbaz, A. M., A. M. Ahmed, A. Abdel-Maqoud, A. M. Badran, and A. M. E. Abdel-Moneim. 2022. Potential ameliorative role of *Spirulina platensis* in powdered or extract forms against cyclic heat stress in broiler chickens. *Environ. Sci. Pollut. Res.* 29: 45578-45588.
- Ephrem, E., A. Najjar, C. Charcosset, and H. Greige-Gerges. 2019. Selection of nerolidol among a series of terpenic and phenolic compounds for its potent activity against *Lactobacillus fermentum* ATCC 9338. *Process Biochem.* 80: 146-156.
- Fahmy, H. M., Y. A. Khadrawy, T. M. Abd-El Daim, A. S. Elfeky, A. A. Abd Rabo, A. B. Mustafa, and I. T. Mostafa. 2020. Thymoquinone-encapsulated chitosan nanoparticles coated with polysorbate 80 as a novel treatment agent in a reserpine-induced depression animal model. *Physiol. Behav.* 222: p.112934.
- FAO (Food and Agriculture Organization). 2018. The global status of seaweed production, trade and utilization. *Globefish Research Programme*. FAO, Rome.
- Fatimah, S., H. Aliman, and N. Daud. 2019. Phytochemical screening of *Sargassum* sp. and *in vitro* seed germination test. *Indones. J. Sci. Technol.* 4: 48-54.
- Firdaus, M., H. Kartikaningsih, and U. Sulifah. 2019. *Sargassum* extract inhibits the growth of foodborne illness bacteria. *AIP Conf. Proc.* 2202: p.020083.
- García-Ruiz, A., B. Bartolomé, C. Cueva, P. J. Martín-Álvarez, and M. V. Moreno-Arribas. 2009. Inactivation of oenological lactic acid bacteria (*Lactobacillus hilgardii* and *Pediococcus pentosaceus*) by wine phenolic compounds. *J. Appl. Microbiol.* 107: 1042-1053.
- Goel, A. 2021. Heat stress management in poultry. *J. Anim. Physiol. Anim. Nutr.* 105: 1136-1145.

- Gouvêa, L. P., J. Assis, C. F. Gurgel, E. A. Serrão, T. C. Silveira, R. Santos, C. M. Duarte, L. M. C. Peres, V. F. Carvalho, M. Batista, E. Bastos, M. N. Sissini, and P. A. Horta. 2020. Golden carbon of Sargassum forests revealed as an opportunity for climate change mitigation. *Sci. Total Environ.* 729: p.138745.
- Guan, Z., and Q Feng. 2022. Chitosan and chitooligosaccharide: The promising non-plant-derived prebiotics with multiple biological activities. *Int. J. Mol. Sci.* 23: p.6761.
- Guiry, M. D. and G. M. Guiry. 2022. AlgaeBase. World-Wide Electronic Publication. National University of Ireland, Galway. <https://www.algaebase.org/>; diakses pada 1 Desember 2022.
- Haas, B. J., D. Gevers, A. M. Earl, M. Feldgarden, D. V. Ward, G. Giannoukos, D. Ciulla, D. Tabbaa, S. K. Highlander, E. Sodergren, B. Methé, T. Z. DeSantis, J. F. Petrosino, R. Knight, and B. W. Birren. 2011. Chimeric 16S rRNA sequence formation and detection in Sanger and 454-pyrosequenced PCR amplicons. *Genome Res.* 21: 494-504.
- Habibi, H., N. Ghahtan, and S. Morammazi. 2018. The effects of some herbal essential oils against *Salmonella* and *Escherichia coli* isolated from infected broiler flocks. *J. World's Poult. Res.* 8: 74-80.
- Hadidi, M., S. Pouramin, F. Adinepour, S. Haghani, and S. M. Jafari. 2020. Chitosan nanoparticles loaded with clove essential oil: Characterization, antioxidant and antibacterial activities. *Carbohydr. Polym.* 236: p.116075.
- Hajjalizadeh, F., H. Ghahri, and A. Talebi. 2017. Effects of supplemental chromium picolinate and chromium nanoparticles on performance and antibody titers of infectious bronchitis and avian influenza of broiler chickens under heat stress condition. *Vet. Res. Forum.* 8: 259-264.
- Hardiningtyas, S. D., F. A. Putri, and I. Setyaningsih. 2022. Antibacterial activity of ethanolic *Spirulina platensis* extract-water soluble chitosan nanoparticles. *IOP Conf. Ser. Earth Environ. Sci.* 1033: p.012053.
- Harnentis, H., Y. Marlida, Y. S. Nur, W. Wizna, M. A. Santi, N. Septiani, F. Adzitey, and N. Huda. 2020. Novel probiotic lactic acid bacteria isolated from indigenous fermented foods from West Sumatera, Indonesia. *Vet. World.* 13: 1922-1927.
- Hasselström, L., W. Visch, F. Gröndahl, G. M. Nylund, and H. Pavia. 2018. The impact of seaweed cultivation on ecosystem services-A case study from the west coast of Sweden. *Mar. Pollut. Bull.* 133: 53-64.
- He, T., Y. H. Zhu, J. Yu, B. Xia, X. Liu, G. Y. Yang, J. H. Su, L. Guo, M. L. Wang and J. F. Wang. 2019. *Lactobacillus johnsonii* L531 reduces pathogen load and helps maintain short-chain fatty acid levels in the intestines of pigs challenged with *Salmonella enterica* Infantis. *Vet. Microbiol.* 230: 187-194.

- Heinrich, M., Mah, J., and Amirkia, V. 2021. Alkaloids used as medicines: Structural phytochemistry meets biodiversity-An update and forward look. *Molecules*. 26: p.1836.
- Heras, B. d. I. and S. Hortelano. 2009. Molecular basis of the anti-inflammatory effects of terpenoids. *Inflamm Allergy Drug Targets*. 8: 28-39.
- Herawati, D., and P. Pudjiastuti. 2021. Effect of different solvents on the phytochemical compounds of *Sargassum* sp. from Yogyakarta and East Nusa Tenggara. *J. Phys. Conf. Ser.* 1783: p.012001.
- Hidayati, N. A., R. E. Indarto, E. Suryanto, and N. D. Dono. 2022. Intestinal health in broiler chickens treated with nanoencapsulation of *Terminalia catappa* leaf extract as an antibacterial agent. *Trop. Anim. Sci. J.* 45: 443-450.
- Hosseini, S. A., and A. Meimandipour. 2018. Feeding broilers with thyme essential oil loaded in chitosan nanoparticles: An efficient strategy for successful delivery. *Br. Poult. Sci.* 59: 669-678.
- Hosseini, S. F., L. Ramezanzade, and D. J. McClements. 2021. Recent advances in nanoencapsulation of hydrophobic marine bioactives: Bioavailability, safety, and sensory attributes of nano-fortified functional foods. *Trends Food Sci. Technol.* 109: 322-339.
- Husain, D. R. and R. Wardhani. 2021. Antibacterial activity of endosymbiotic bacterial compound from *Pheretima* sp. earthworms inhibit the growth of *Salmonella typhi* and *Staphylococcus aureus*: *in vitro* and *in silico* approach. *Iran. J. Microbiol.* 13: 537-543.
- Hutapea, E. D., I. E. Susetya, A. Fadhillah, E. Yusni, I. Wahyuwatri, E. A. Manik, J. E. Aritonang, H. B. Setyorini, and M. Suriani. 2022. Biomass and carbon storage of *Sargassum* sp. in Poncan Gadang Island, North Sumatera Province. *IOP Conf. Ser. Earth Environ. Sci.* 977: p.012122.
- Jeong, J. S., and I. H. Kim. 2014. Effect of *Bacillus subtilis* C-3102 spores as a probiotic feed supplement on growth performance, noxious gas emission, and intestinal microflora in broilers. *Poult. Sci.* 93: 3097-3103.
- Jesumani, V., H. Du, P. Pei, M. Aslam, and N. Huang. 2020. Comparative study on skin protection activity of polyphenol-rich extract and polysaccharide-rich extract from *Sargassum vachellianum*. *PLoS One*. 15: p.0227308.
- Johnson, M., S. A. Kanimozhi, T. R. J. J. Malar, T. Shibila, P. R. Freitas, S. R. Tintino, I. R. A. Menezes, J. G. M. da Costa, and H. D. M. Coutinho. 2019. The antioxidative effects of bioactive products from *Sargassum polycystum* C. Agardh and *Sargassum duplicatum* J. Agardh against inflammation and other pathological issues. *Complement. Ther. Med.* 46: 19-23.

- Kain, D., and S. Kumar. 2020. Synthesis and characterization of chitosan nanoparticles of *Achillea millefolium* L. and their activities. *F1000Research*. 9: p.1297.
- Kasanah, N. (ed.). 2019. *Sargassum: Karakteristik, Biogeografi, dan Potensi*. UGM Press, Yogyakarta.
- Khoerunnisa, F., M. Nurhayati, F. Dara, R. Rizki, M. Nasir, H. A. Aziz, H. Hendrawan, N. E. Poh, C. Kaewsaneha, and P. Opaprakasit. 2021. Physicochemical properties of TPP-crosslinked chitosan nanoparticles as potential antibacterial agents. *Fibers and Polym.* 22: 2954-2964.
- Kocak, N., M. Sahin, I. Akin, M. Kus, and M. Yilmaz. 2011. Microwave assisted synthesis of chitosan nanoparticles. *J. Macromol. Sci. A*. 48: 776-779.
- Koo, S. Y., I. K. Mok, C. H. Pan, and S. M. Kim. 2016. Preparation of fucoxanthin-loaded nanoparticles composed of casein and chitosan with improved fucoxanthin bioavailability. *J. Agric. Food Chem.* 64: 9428-9435.
- Kpomasse, C. C., O. M. Oso, K. O. Lawal, and O. E. Oke. 2023. Juvenile growth, thermotolerance and gut histomorphology of broiler chickens fed *Curcuma longa* under hot-humid environments. *Heliyon*. 9: p.13060.
- Kuai, L., F. Liu, Y. Ma, H. D. Goff, and F. Zhong. 2020. Regulation of nano-encapsulated tea polyphenol release from gelatin films with different Bloom values. *Food Hydrocoll.* 108: p.106045.
- Kucukoglu, V., H. Uzuner, H. Kenar, and A. Karadenizli. 2019. *In vitro* antibacterial activity of ciprofloxacin loaded chitosan microparticles and their effects on human lung epithelial cells. *Int. J. Pharm.* 569: p.118578.
- Kumar, A., T. Behl, and S. Chadha. 2020. Synthesis of physically crosslinked PVA/Chitosan loaded silver nanoparticles hydrogels with tunable mechanical properties and antibacterial effects. *Int. J. Biol. Macromol.* 149: 1262-1274.
- Kwon, J., K. Lee, H. Hwang, S. H. Kim, S. E. Park, P. Durai, K. Park, H. S. Kim, D. S. Jang, J. S. Choi, and H. C. Kwon. 2022. New monocyclic terpenoid lactones from a brown algae *Sargassum macrocarpum* as monoamine oxidase inhibitors. *Plants*. 11: p.1998.
- Leandro, A., L. Pereira, and A. M. Gonçalves. 2019. Diverse applications of marine macroalgae. *Mar. Drugs*. 18: p.17.
- Lee, C. W., Y. T. Ahn, R. Zhao, Y.S. Kim, S. M. Park, D. H. Jung, J. K. Kim, H. W. Kim, S. C. Kim, and W. G. An. 2021. Inhibitory effects of *Porphyra tenera* extract on oxidation and inflammatory responses. *J. Evid. Based Complementary Altern. Med.* 2021: p.6650037.

- Letlole, B. R., E. P. Damen, and C. Jansen van Rensburg. 2021. The effect of α -monolaurin and butyrate supplementation on broiler performance and gut health in the absence and presence of the antibiotic growth promoter zinc bacitracin. *Antibiotics*. 10: p.651.
- Li, R., Z. Song, J. Zhao, D. Huo, Z. Fan, D. X. Hou, and X. He. 2018. Dietary L-theanine alleviated lipopolysaccharide-induced immunological stress in yellow-feathered broilers. *Anim. Nut.* 4: 265-272.
- Liang, J., H. Yan, P. Puligundla, X. Gao, Y. Zhou, and X. Wan. 2017. Applications of chitosan nanoparticles to enhance absorption and bioavailability of tea polyphenols: A review. *Food Hydrocoll.* 69: 286-292.
- Liang, W., H. Li, H. Zhou, M. Wang, X. Zhao, X. Sun, C. Li, and X. Zhang. 2021. Effects of *Taraxacum* and *Astragalus* extracts combined with probiotic *Bacillus subtilis* and *Lactobacillus* on *Escherichia coli*-infected broiler chickens. *Poult. Sci.* 100: p.101007.
- Lim, S., A. H. Choi, M. Kwon, E. J. Joung, T. Shin, S. G. Lee, N. G. Kim, and H. R. Kim. 2019. Evaluation of antioxidant activities of various solvent extract from *Sargassum serratifolium* and its major antioxidant components. *Food Chem.* 278: 178-184.
- Liu, L., M. Heinrich, S. Myers, and S. A. Dworjany. 2012. Towards a better understanding of medicinal uses of the brown seaweed *Sargassum* in traditional Chinese medicine: A phytochemical and pharmacological review. *J. Ethnopharmacol.* 142: 591-619.
- Lomartire, S., and A. M. Gonçalves. 2022. An overview of potential seaweed-derived bioactive compounds for pharmaceutical applications. *Mar. Drugs*. 20: p.141.
- López-Hortas, L., C. Caleja, J. Pinela, J. Petrović, M. Soković, I. C. F. R. Ferreira, M. D. Torres, H. Domínguez, E. Pereira, and L. Barros. 2022. Comparative evaluation of physicochemical profile and bioactive properties of red edible seaweed *Chondrus crispus* subjected to different drying methods. *Food Chem.* 383: p.132450.
- Ma, Y. L., P. Sun, J. Feng, J. Yuan, Y. Wang, Y. F. Shang, X. L. Niu, S. H. Yang, and Z. J. Wei. 2021. Solvent effect on phenolics and antioxidant activity of Huangshan Gongju (*Dendranthema morifolium* (Ramat) Tzvel. cv. Gongju) extract. *Food Chem. Toxicol.* 147: p.111875.
- Maesaroh, U., and N. D. Dono. 2022. Performance, microbial populations, and jejunal morphology of broilers supplemented with nano-encapsulated graviola leaf extract. *Trop. Anim. Sci. J.* 45: 64-72.
- Maesaroh, U., R. Martien, N. D. Dono, and Zuprizal. 2019. Antibacterial activity and characterization of *Annona muricata* Linn leaf extract-nanoparticles against *Escherichia coli* FNCC-0091 and *Salmonella typhimurium* FNCC-0050. *IOP Conf. Ser. Earth Environ. Sci.* 387: p.012055.

- Magoč, T. and S. L. Salzberg. 2011. FLASH: fast length adjustment of short reads to improve genome assemblies. *Bioinformatics*. 27: 2957-2963.
- Mahendran, S., S. Sankaralingam, S. M. Sethupathi, D. Kathiresan, M. Muthumani, L. Kousalya, S. Palpperumal, and B. Harinathan. 2022. Evaluation of antioxidant and cytotoxicity activities of polyphenol extracted from brown seaweed *Sargassum tenerrimum* biomass. *Biomass Convers. Biorefin.* 2022: p.02301.
- Marx, U. C., J. Roles, and B. Hankamer. 2021. *Sargassum* blooms in the Atlantic Ocean—From a burden to an asset. *Algal Res.* 54: p.102188.
- Masjid, N. A. S., and N. D. Dono. 2020. Effect of dietary nano-encapsulated mindi (*Melia azedarach* Linn.) leaf extract on growth performance and intestinal pH of broiler chickens. *IOP Conf. Ser. Earth Environ. Sci.* 478: p.012025.
- Matsuda, Y., T. Awakawa, T. Mori, and I. Abe. 2016. Unusual chemistries in fungal meroterpenoid biosynthesis. *Curr. Opin. Chem. Biol.* 31: 1-7.
- Medina-Torres, N., H. Espinosa-Andrews, S. Trombotto, T. Ayora-Talavera, J. Patrón-Vázquez, T. González-Flores, Á. Sánchez-Contreras, J. C. Cuevas-Bernardino, and N. Pacheco. 2019. Ultrasound-assisted extraction optimization of phenolic compounds from *Citrus latifolia* waste for chitosan bioactive nanoparticles development. *Molecules*. 24: p.3541.
- Meimandipour, A., A. Nouri Emamzadeh, and A. Soleimani. 2017. Effects of nanoencapsulated aloe vera, dill and nettle root extract as feed antibiotic substitutes in broiler chickens. *Arch. Anim. Breed.* 60: 1-7.
- Mekinić, I.G., D. Skroza, V. Šimat, I. Hamed, M. Čagalj, and Z. Popović Perković. 2019. Phenolic content of brown algae (pheophyceae) species: Extraction, identification, and quantification. *Biomolecules*. 9: p.244.
- Milinić, D. D., D. A. Popović, S. M. Lević, A. Ž. Kostić, Ž. L. Tešić, V. A. Nedović, and M. B. Pešić. 2019. Application of polyphenol-loaded nanoparticles in food industry. *Nanomaterials*. 9: p.1629.
- Mirhadi, E., M. Rezaee, and B. Malaekhe-Nikouei. 2018. Nano strategies for berberine delivery, a natural alkaloid of berberis. *Biomed. Pharmacother.* 104: 465-473.
- Mishra, B., and R. Jha. 2019. Oxidative stress in the poultry gut: Potential challenges and interventions. *Front. Vet. Sci.* 6: p.60.
- Misic, D., V. Tadic, M. Korzeniowska, J. Nisavic, K. Aksentijevic, J. Kuzmanovic, and I. Zizovic. 2020. Supercritical fluid extraction of celery and parsley fruit-chemical composition and antibacterial activity. *Molecules*. 25: p.3163.
- Mourya, V. K, and N. N. Inamdar. 2008. Chitosan-modifications and applications: Opportunities galore. *React. Funct. Polym.* 68: 1013-1051.

- Muflihah, Y. M., G. Gollavelli, and Y. C. Ling. 2021. Correlation study of antioxidant activity with phenolic and flavonoid compounds in 12 Indonesian indigenous herbs. *Antioxidants*. 10: p.1530.
- Nam, S., H. W. Jang, and T. Shibamoto. 2012. Antioxidant activities of extracts from teas prepared from medicinal plants, *Morus alba* L., *Camellia sinensis* L., and *Cudrania tricuspidata*, and their volatile components. *J. Agric. Food Chem.* 60: 9097-9105.
- Nazarudin, M. F., N. H. Alias, S. Balakrishnan, W. N. I. Wan Hasnan, N. A. I. Noor Mazli, M. I. Ahmad, I. S. M. Yasin, A. Isha, and M. Aliyu-Paiko. 2021. Chemical, nutrient and physicochemical properties of brown seaweed, *Sargassum polycystum* c. Agardh (Phaeophyceae) collected from Port Dickson, Peninsular Malaysia. *Molecules*. 26: p.5216.
- NCBI (National Center for Biotechnology Information). 2022a. PubChem Compound Summary for CID 9294, Ephedrine. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Ephedrine>.
- NCBI (National Center for Biotechnology Information). 2022b. PubChem Compound Summary for CID 1201543, Cuscohygrine. Diakses pada 3 Desember 2022 <https://pubchem.ncbi.nlm.nih.gov/compound/Cuscohygrine>.
- NCBI (National Center for Biotechnology Information). 2022c. PubChem Compound Summary for CID 5281035, Pyrvinium. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Pyrvinium>.
- NCBI (National Center for Biotechnology Information). 2022d. PubChem Compound Summary for CID 3156, Doxapram. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Doxapram>.
- NCBI (National Center for Biotechnology Information). 2022e. PubChem Compound Summary for CID 5326018, Caulerpin. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Caulerpin>.
- NCBI (National Center for Biotechnology Information). 2022f. PubChem Compound Summary for CID 5281328, (24E)-24-N-Propylidenecholesterol. Diakses pada 3 Desember 2022 dari https://pubchem.ncbi.nlm.nih.gov/compound/24E_-24-N-Propylidenecholesterol.
- NCBI (National Center for Biotechnology Information). 2022g. PubChem Compound Summary for CID 5281239, Fucoxanthin. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Fucoxanthin>.
- NCBI (National Center for Biotechnology Information). 2022h. PubChem Compound Summary for CID 10455044, Sargachromenol. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Sargachromenol>.

- NCBI (National Center for Biotechnology Information). 2022i. PubChem Compound Summary for CID 101145056, Sargaquinoic acid. Diakses pada 3 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Sargaquinoic-acid>.
- NCBI (National Center for Biotechnology Information). 2022j. PubChem Compound Summary for CID 7410, Acetophenone. Diakses pada 4 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Acetophenone>.
- NCBI (National Center for Biotechnology Information). 2022k. PubChem Compound Summary for CID 12473, Pyrrole-2-carboxylic acid. Diakses pada 4 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Pyrrole-2-carboxylic-acid>.
- NCBI (National Center for Biotechnology Information). 2022l. PubChem Compound Summary for CID 5018391, Sedanolid. Diakses pada 4 Desember 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Sedanolid>.
- Ningsih, N., B. Ariyadi, and Z. Zuprizal. 2021. Penggunaan nanoenkapsulasi ekstrak buah mahkota dewa (*Phaleria macrocarpa*) dalam air minum terhadap kinerja pertumbuhan ayam broiler. Jurnal Ilmu Peternakan Terapan. 4: 84-91.
- Ningsih, N., B. Ariyadi, N. D. Dono, S. Supadmo, and Z. Zuprizal. 2019. The effect of nanoencapsulated *Phaleria macrocarpa* fruits extract in drinking water on jejunal histomorphology of broiler chickens. Trop. J. Anim. Sci. 42: 106-112.
- Niu, L., Z. Li, W. Fan, X. Zhong, M. Peng, and Z. Liu. 2022. Nano-strategies for enhancing the bioavailability of tea polyphenols: Preparation, applications, and challenges. Foods. 11: p.387.
- Nofal, A., M. Azzazy, S. Ayyad, E. Abdelsalm, M. S. Abousekken, and O. Tammam. 2022. Evaluation of the brown alga, *Sargassum muticum* extract as an antimicrobial and feeding additives. Braz. J. Biol. 84: p.259721.
- Nouri, A. 2019. Chitosan nano-encapsulation improves the effects of mint, thyme, and cinnamon essential oils in broiler chickens. Br. Poult. Sci. 60: 530-538.
- Nurhadi, B., R. A. Saputra, and N. Sukri. 2020. The role of encapsulant materials on the stability of bioactive compounds of red ginger (*Zingiber officinale* Roscoe. var. Rubrum) extract powder during storage. Food Chem. 333: p.127490.
- Ode, I. 2013. Kandungan alginat rumput laut *Sargassum crassifolium* dari perairan Pantai Desa Hutumuri, Kecamatan Leitimur Selatan, Kota Ambon. Agrikan. J. Agro Fish. 6: 47-54.

- OECD-FAO. 2022. OECD-FAO Agricultural Outlook 2022-2031. OECD Publishing, Paris.
- Ong, T. H., E. Chitra, S. Ramamurthy, R. P. Siddalingam, K. H. Yuen, S. P. Ambu, and F. Davamani. 2017. Chitosan-propolis nanoparticle formulation demonstrates anti-bacterial activity against *Enterococcus faecalis* biofilms. PloS one. 12: p.0174888.
- Othman, L., A. Sleiman, and R. M. Abdel-Massih. 2019. Antimicrobial activity of polyphenols and alkaloids in Middle Eastern plants. Front. Microbiol. 10: p.911.
- Park, J. S., J. M. Han, D. Surendhiran, and B. S. Chun. 2022. Physicochemical and biofunctional properties of *Sargassum thunbergii* extracts obtained from subcritical water extraction and conventional solvent extraction. J. Supercrit. Fluids. 182: p.105535.
- Peraturan Menteri Pertanian Republik Indonesia No.14/Permentan/PK.350/5/2017 tentang Klasifikasi Obat Hewan. Kementerian Pertanian, Jakarta.
- Pinteus, S., M. F. Lemos, C. Alves, A. Neugebauer, J. Silva, O. P. Thomas, L. M. Botana, H. Gaspar, and R. Pedrosa. 2018. Marine invasive macroalgae: Turning a real threat into a major opportunity-The biotechnological potential of *Sargassum muticum* and *Asparagopsis armata*. Algal Res. 34: 217-234.
- Pirgozliev, V., S. C. Mansbridge, S. P. Rose, H. S. Lillehoj, and D. Bravo. 2019. Immune modulation, growth performance, and nutrient retention in broiler chickens fed a blend of phytogetic feed additives. Poult. Sci. 98: 3443-3449.
- Plaza, M., M. Amigo-Benavent, M. D. Del Castillo, E. Ibáñez, and M. Herrero. 2010. Facts about the formation of new antioxidants in natural samples after subcritical water extraction. Food Res. Int. 43: 2341-2348.
- Pliego-Cortés, H., I. Wijesekara, M. Lang, N. Bourgougnon, and G. Bedoux. 2020. Current knowledge and challenges in extraction, characterization and bioactivity of seaweed protein and seaweed-derived proteins. Adv. Bot. Res. 95: 289-326.
- Pramesti, R., W. A. Setyati, D. Pringgenies, and M. Zainuddin. 2019. Phenol content and antioxidative activity in the extract of multiple sargassum species. Annals. Biol. Sci. 7: 7-15.
- Prasedya, E. S., A. Frediansyah, N. W. R. Martyasari, B. K. Ilhami, A. S. Abidin, H. Padmi, Fahrurrozi, A. B. Juanssilfero, S. Widyastuti, and A. L. Sunarwidhi. 2021. Effect of particle size on phytochemical composition and antioxidant properties of *Sargassum cristaefolium* ethanol extract. Sci. Rep. 11: p.17876.

- Prihambodo, T. R., M. M. Sholikin, N. Qomariyah, A. Jayanegara, I. Batubara, D. B. Utomo, and N. Nahrowi. 2021. Effects of dietary flavonoids on performance, blood constituents, carcass composition and small intestinal morphology of broilers: A meta-analysis. *Anim. Biosci.* 34: p.434.
- Priyanka, K. R., R. Rajaram, and S. R. Sivakumar. 2022. A critical review on pharmacological properties of marine macroalgae. *Biomass Convers. Biorefin.* 2022: p.03134.
- Pusdatin. 2022. Outlook Komoditas Peternakan Daging Ayam Ras Pedaging. Pusat Data dan Sistem Informasi Pertanian, Sekretariat Jenderal Kementerian Pertanian, Jakarta.
- Puspita, M., N. A. R. Setyawidati, V. Stiger-Pouvreau, L. Vandanjon, I. Widowati, O. K. Radjasa, G. Bedoux, and N. Bourgougnon. 2020. Indonesian *Sargassum* species bioprospecting: Potential applications of bioactive compounds and challenge for sustainable development. *Adv. Bot. Res.* 95: 113-161.
- Quast, C., E. Pruesse, P. Yilmaz, J. Gerken, T. Schweer, P. Yarza, J. Peplies, and F. O. Glöckner. 2012. The SILVA ribosomal RNA gene database project: improved data processing and web-based tools. *Nucleic Acids Res.* 41: 590-596.
- Rajivgandhi, G. N., C. C. Kanisha, G. Ramachandran, N. Manoharan, R. A. Mothana, N. A. Siddiqui, A. J. Al-Rehaily, R. Ullah, and O. M. Almarfadi. 2021. Phytochemical screening and anti-oxidant activity of *Sargassum wightii* enhances the anti-bacterial activity against *Pseudomonas aeruginosa*. *Saudi J. Biol. Sci.* 28: 1763-1769.
- Rashwan, R. S., and Hammad, D. M. 2020. Toxic effect of *Spirulina platensis* and *Sargassum vulgar* as natural pesticides on survival and biological characteristics of cotton leaf worm *Spodoptera littoralis*. *Sci. Afr.* 8: p.00323.
- Ravi, H., and V. Baskaran. 2015. Biodegradable chitosan-glycolipid hybrid nanogels: A novel approach to encapsulate fucoxanthin for improved stability and bioavailability. *Food Hydrocoll.* 43: 717-725.
- Rigano, D., C. Formisano, E. Pagano, F. Senatore, S. Piacente, M. Masullo, R. Capasso, A. A. Izzo, and F. Borrelli. 2014. A new acetophenone derivative from flowers of *Helichrysum italicum* (Roth) Don ssp. *italicum*. *Fitoterapia.* 99: 198-203.
- Rosyada, A., W. B. Sunarharum, and E. Waziroh. 2019. Characterization of chitosan nanoparticles as an edible coating material. *IOP Conf. Ser. Earth Environ. Sci.* 230: p.012043.
- Rushdi, M. I., I. A. Abdel-Rahman, H. Saber, E. Z. Attia, W. M. Abdelraheem, H. A. Madkour, H. M. Hassan, A. H. Elmaidomy, and U. R. Abdelmohsen. 2020. Pharmacological and natural products diversity of the brown algae genus *sargassum*. *RSC Adv.* 10: 24951-24972.

- Saeed, R. M., I. Dmour, and M. O. Taha. 2020. Stable chitosan-based nanoparticles using polyphosphoric acid or hexametaphosphate for tandem ionotropic/covalent crosslinking and subsequent investigation as novel vehicles for drug delivery. *Front. Bioeng.* 8: p.4.
- Safitri, I., W. Warsidah, M. S. J. Sofiana, A. A. Kushadiwijayanto, and T. N. Sumarni. 2021. Total phenolic content, antioxidant and antibacterial activities of *Sargassum polycystum* of ethanol extract from waters of Kabung Island. *Berkala Sainstek.* 9: 139-145.
- Şahin, S., N. T. B. M. Nasir, İ. Erken, Z. E. Çakmak, and T. Çakmak. 2019. Antioxidant composite films with chitosan and carotenoid extract from *chlorella vulgaris*: Optimization of ultrasonic-assisted extraction of carotenoids and surface characterization of chitosan films. *Mater. Res. Express.* 6: p.095404.
- Sahyon, H. A., and S. A. Al-Harbi. 2020. Antimicrobial, anticancer and antioxidant activities of nano-heart of *Phoenix dactylifera* tree extract loaded chitosan nanoparticles: *In vitro* and *in vivo* study. *Int. J. Biol. Macromol.* 160: 1230-1241.
- Salehi, B., J. Sharifi-Rad, A. M. Seca, D. C. Pinto, I. Michalak, A. Trincone, A. P. Mishra, M. Nigam, W. Zam, and N. Martins. 2019. Current trends on seaweeds: Looking at chemical composition, phytopharmacology, and cosmetic applications. *Molecules.* 24: p.4182.
- Salosso, Y. 2019. Nutrient and alginate content of macroalgae *Sargassum* sp. from Kupang Bay Waters, East Nusa Tenggara, Indonesia. *AACL Bioflux.* 12: 2130-2136.
- Sandrasari, D. A., M. Sabariman, and I. N. Azni. 2019. Determination of potential level of Indonesian rhizomes as an antioxidant based on phenolic compound and antioxidant activity. *IOP Conf. Ser. Earth Environ. Sci.* 383: p.012017.
- Saraswati, G. Giantina, P. E. Giriwono, D. N. Faridah, D. Iskandriati, and N. Andarwulan. 2020. Water and lipid-soluble component profile of *Sargassum cristaefolium* from different coastal areas in Indonesia with potential for developing functional ingredient. *J. Oleo Sci.* 69: 1517-1528.
- Saraswati, P. E. Giriwono, D. Iskandriati, C. P. Tan, and N. Andarwulan. 2019. *Sargassum* seaweed as a source of anti-inflammatory substances and the potential insight of the tropical species: A review. *Mar. Drugs.* 17: p.590.
- Scania, A. E., and A. R. Chasani. 2021. The anti-bacterial effect of phenolic compounds from three species of marine macroalgae. *Biodiversitas.* 22: 3412-3417.
- Seo, C., S. J. Jeong, H. J. Yun, H. J. Lee, J. W. Lee, H. W. An, N. Han, W. K. Jung, and S. G. Lee. 2022. Nutraceutical potential of polyphenol-rich *Sargassum* species grown off the Korean coast: A review. *Food Sci. Biotechnol.* 31: 971-984.

- Shad, H. S., M. Mazhari, O. Esmaeilipour, and H. Khosravinia. 2016. Effects of thymol and carvacrol on productive performance, antioxidant enzyme activity and certain blood metabolites in heat stressed broilers. *Iran. J. Appl. Anim. Sci.* 6: 195-202.
- Shafiei, M., H. Jafarizadeh-Malmiri, and M. Rezaei. 2019. Biological activities of chitosan and prepared chitosan-tripolyphosphate nanoparticles using ionic gelation method against various pathogenic bacteria and fungi strains. *Biologia.* 74: 1561-1568.
- Shetta, A., J. Kegere, and W. Mamdouh. 2019. Comparative study of encapsulated peppermint and green tea essential oils in chitosan nanoparticles: Encapsulation, thermal stability, *in-vitro* release, antioxidant and antibacterial activities. *Int. J. Biol. Macromol.* 126: 731-742.
- Shojadoost, B., M. Alizadeh, N. Boodhoo, J. Astill, S. H. Karimi, J. S. Doost, K. Taha-Abdelaziz, R. Kulkarni, and Sharif, S. 2022. Effects of treatment with *Lactobacilli* on necrotic enteritis in broiler chickens. *Probiotics Antimicrob.* 14: 1110-1129.
- Sobuj, M. K. A., M. Islam, M. Haque, M. Alam, and S. M. Rafiquzzaman. 2021. Evaluation of bioactive chemical composition, phenolic, and antioxidant profiling of different crude extracts of *Sargassum coriifolium* and *Hypnea pannosa* seaweeds. *J. Food Meas. Charact.* 15: 1653-1665.
- Soltanzadeh, M., S. H. Peighambari, B. Ghanbarzadeh, M. Mohammadi, and J. M. Lorenzo. 2021. Chitosan nanoparticles as a promising nanomaterial for encapsulation of pomegranate (*punica granatum* L.) peel extract as a natural source of antioxidants. *Nanomaterials.* 11: p.1439.
- Souza, C. R., W. P. Bezerra, and J. T. Souto. 2020. Marine alkaloids with anti-inflammatory activity: Current knowledge and future perspectives. *Mar. Drugs.* 18: p.147.
- Stoica, R., R. Şomoghi, and R. M. Ion. 2013. Preparation of chitosan-tripolyphosphate nanoparticles for the encapsulation of polyphenols extracted from rose hips. *Dig. J. Nanomater. Biostructures.* 8: 955-963.
- Sukweenadhi, J., F. Setiawan, O. Yunita, K. Kartini, and C. Avanti. 2020. Antioxidant activity screening of seven Indonesian herbal extract. *Biodiversitas.* 21: 2062-2067.
- Suleria, H. A., C. J. Barrow, and F. R. Dunshea. 2020. Screening and characterization of phenolic compounds and their antioxidant capacity in different fruit peels. *Foods.* 9: p.1206.
- Sumandiarsa, I. K., D. G. Bengen, J. Santoso, and H. I. Januar. 2020. Nutritional composition and alginate characteristics of *Sargassum polycystum* (C. Agardh, 1824) growth in Sebesi Island Coastal, Lampung-Indonesia. *IOP Conf. Ser. Earth Environ. Sci.* 584: p.012016.

- Sun, X., Y. Xu, L. Zhao, H. Yan, S. Wang, and D. Wang. 2018. The stability and bioaccessibility of fucoxanthin in spray-dried microcapsules based on various biopolymers. *RSC Adv.* 8: 35139-35149.
- Sun, Q., D. Liu, S. Guo, Y. Chen, and Y. Guo. 2015. Effects of dietary essential oil and enzyme supplementation on growth performance and gut health of broilers challenged by *Clostridium perfringens*. *Anim. Feed Sci. Technol.* 207: 234-244.
- Sunarwidhi, A. L., A. Hernawan, A. Frediansyah, S. Widyastuti, N. W. R. Martyasari, A. S. Abidin, H. Padmi, E. Handayani, N. W. P. Utami, F. A. Maulana, M. S. M. Ichfa, and E. S. Prasedya. 2022. Multivariate analysis revealed ultrasonic-assisted extraction improves anti-melanoma activity of non-flavonoid compounds in Indonesian brown algae ethanol extract. *Molecules.* 27: p.7509
- Sundari, Z., T. Yuwanta, and R. Martien. 2014. Effect of nanocapsule level on broiler performance and fat deposition. *Int. J. Poult. Sci.* 13: 31-35.
- Sungkharak, S., N. Supasit, S. Choopan, and S. Ungphaiboon. 2016. Antibacterial activity against acne involved bacteria of chitosan in a soluble state and as nanoparticles. *Chiang Mai J. Sci.* 43: 1149-1158.
- Susilo, B., A. Rohim, and M. L. Wahyu. 2022. Serial extraction technique of rich antibacterial compounds in *Sargassum cristaefolium* using different solvents and testing their activity. *Curr. Bioact. Compd.* 18: 18-25.
- Tang, D., J. Wu, H. Jiao, X. Wang, J. Zhao, and H. Lin. 2019. The development of antioxidant system in the intestinal tract of broiler chickens. *Poult. Sci.* 98: 664-678.
- Tapilatu, Y. 2022. Biodiversity of tropical seaweeds. In Sangeetha, J. and Thangadurai, D. (Eds.). *Seaweed Biotechnology: Biodiversity and Biotechnology of Seaweeds and Their Application*. Apple Academic Press, Florida, pp. 1-13.
- Tarassoli, Z., R. Najjar, and A. Amani. 2021. Formulation and optimization of lemon balm extract loaded azelaic acid-chitosan nanoparticles for antibacterial applications. *J. Drug Deliv. Sci. Technol.* 65: p.102687.
- Tzeyung, A. S., S. Md, S. K. Bhattamisra, T. Madheswaran, N. A. Alhakamy, H. M. Aldawsari, and A. K. Radhakrishnan. 2019. Fabrication, optimization, and evaluation of rotigotine-loaded chitosan nanoparticles for nose-to-brain delivery. *Pharmaceutics.* 11: p.26.
- Vasanthi, C., V. A. Rao, R. N. Babu, P. Sriram, and R. Karunakaran. 2020. *In-vitro* antioxidant activities of aqueous and alcoholic extracts of sargassum species—indian brown seaweed. *J. Food Process. Preserv.* 44: p.14877.

- Vieco-Saiz, N., Y. Belguesmia, R. Raspoet, E. Auclair, F. Gancel, I. Kempf, and D. Drider. 2019. Benefits and inputs from lactic acid bacteria and their bacteriocins as alternatives to antibiotic growth promoters during food-animal production. *Front. Microbiol.* 10: p.57.
- Vuolo, M. M., V. S. Lima, and M. R. Junior. 2019. Phenolic compounds: Structure, classification, and antioxidant power. *Bioact. Compd.* 33-50.
- Wang, H., X. Ni, X. Qing, D. Zeng, M. Luo, L. Liu, G. Li, K. Pan, and B. Jing. 2017. Live probiotic *Lactobacillus johnsonii* BS15 promotes growth performance and lowers fat deposition by improving lipid metabolism, intestinal development, and gut microflora in broilers. *Front. Microbiol.* 8: p.1073.
- Wang, Q., G. M. Garrity, J. M. Tiedje, and J. R. Cole. 2007. Naive Bayesian classifier for rapid assignment of rRNA sequences into the new bacterial taxonomy. *Appl. Environ. Microbiol.* 73: 5261-5267.
- Ways, M., T. Mohammed, W. M. Lau, and V. V. Khutoryanskiy. 2018. Chitosan and its derivatives for application in mucoadhesive drug delivery systems. *Polymers.* 10: p.267.
- Woo, M. N., S. M. Jeon, H. J. Kim, M. K. Lee, S. K. Shin, Y. C. Shin, Y. B. Park, and M. S. Choi. 2010. Fucoxanthin supplementation improves plasma and hepatic lipid metabolism and blood glucose concentration in high-fat fed C57BL/6N mice. *Chem. Biol. Interact.* 186: 316-322.
- Wu, Y., H. Gao, Y. Wang, Z. Peng, Z. Guo, Y. Ma, R. Zhang, M. Zhang, Q. Wu, J. Xiao, and Q. Zhong. 2022. Effects of different extraction methods on contents, profiles, and antioxidant abilities of free and bound phenolics of *Sargassum polycystum* from the South China Sea. *J. Food Sci.* 87: 968-981.
- Yahya, R., A. M. Al-Rajhi, S. Z. Alzaid, M. A. Al Abboud, M. S. Almuhayawi, S. K. Al Jaouni, S. Selim, K. S. Ismail, and T. M. Abdelghany. 2022. Molecular docking and efficacy of *Aloe vera* gel based on chitosan nanoparticles against *Helicobacter pylori* and its antioxidant and anti-inflammatory activities. *Polymers.* 14: p.2994.
- Yan, Y., X. Li, C. Zhang, L. Lv, B. Gao, and M. Li. 2021. Research progress on antibacterial activities and mechanisms of natural alkaloids: A review. *Antibiotics.* 10: p.318.
- Yang, B., Y. Dong, F. Wang, and Y. Zhang. 2020. Nanoformulations to enhance the bioavailability and physiological functions of polyphenols. *Molecules.* 25: p.4613.
- Yudiati, E., S. Sedjati, A. Susanto, N. Azhar, and R. Alghazeer. 2021. Potency of chitosan and chitooligochitosan (COS) as prebiotics for *Streptococcus thermophilus* and *Lactobacillus bulgaricus* probiotics. *Jurnal Kelautan Tropis.* 24: 25-33.

- Yue, Y., C. Chen, K. Zhong, Y. Wu, and H. Gao. 2022. Purification, fermentation optimization, and antibacterial activity of pyrrole-2-carboxylic acid produced by an endophytic bacterium, *Bacillus cereus* ZBE, isolated from *Zanthoxylum bungeanum*. *Ind. Eng. Chem.* 61: 1267-1276.
- Yusuf, C. S. 2021. Product development of flakes cereal based on brown seaweed flour (*Sargassum* sp.): Prospect of food materials from Papua with low glycemic index. *J. Food. Sci.* 5: 61-72.
- Zamuz, S., P. E. Munekata, C. K. Dzuovor, W. Zhang, A. S. Sant'Ana, and J. M. Lorenzo. 2021. The role of phenolic compounds against *Listeria monocytogenes* in food. A review. *Trends Food Sci. Technol.* 110: 385-392.
- Zeb, A. 2020. Concept, mechanism, and applications of phenolic antioxidants in foods. *J. Food Biochem.* 44: p.13394.
- Zhang, J., K. Cai, R. Mishra, and R. Jha. 2020. *In ovo* supplementation of chitooligosaccharide and chlorella polysaccharide affects cecal microbial community, metabolic pathways, and fermentation metabolites in broiler chickens. *Poult. Sci.* 99: 4776-4785.
- Zhang, X. H., Z. Y. Sun, F. L. Cao, H. Ahmad, X. H. Yang, L. G. Zhao, and T. Wang. 2015. Effects of dietary supplementation with fermented ginkgo leaves on antioxidant capacity, intestinal morphology and microbial ecology in broiler chicks. *Br. Poult. Sci.* 56: 370-380.
- Zhang, Z., X. Li, S. Sang, D. J. McClements, L. Chen, J. Long, A. Jiao, Z. Jin, and C. Qiu. 2022. Polyphenols as plant-based nutraceuticals: Health effects, encapsulation, nano-delivery, and application. *Foods.* 11: p.2189.
- Zhao, H., H. Bai, F. Deng, R. Zhong, L. Liu, L. Chen, and H. Zhang. 2022. Chemically protected sodium butyrate improves growth performance and early development and function of small intestine in broilers as one effective substitute for antibiotics. *Antibiotics.* 11: p.132.
- Zhong, B., N. A. Robinson, R. D. Warner, C. J. Barrow, F. R. Dunshea, and H. A. Suleria. 2020. LC-ESI-QTOF-MS/MS characterization of seaweed phenolics and their antioxidant potential. *Mar. Drugs.* 18: p.331.
- Zuidhof, M. J., B. L. Schneider, V. L. Carney, D. R. Korver, and F. E. Robinson. 2014. Growth, efficiency, and yield of commercial broilers from 1957, 1978, and 2005. *Poult. Sci.* 93: 2970-2982.
- Zuprizal, Z., N. Ningsih, and T. A. Zulfian. 2020. The effect of nano-encapsulation *Phaleria macrocarpa* fruits extract in drinking water on the digestive tract and carcass characteristic of broiler chickens. *Buletin Peternakan.* 44: 1-5.