

DAFTAR PUSTAKA

- Abd El-Hack, M. E., M. T. El-Saadony, M. E. Shafi, S. Y. A. Qattan, G. E. Batiha, A. F. Khafaga, A.-M. E. Abdel-Moneim, and M. Alagawany. 2020. Probiotics in poultry feed: A comprehensive review. *J. Anim. Physiol. Anim. Nutr. (Berl)*. 104: 1835-1850.
- Adil, S., M. T. Bandy, M. A. Wani, S. A. Hussain, S. Shah, I. D. Sheikh, M. Shafi, A. A. Khan, Z. A. Kashoo, R. A. Pattoo, and A. A. Swelum. 2024. Nano-protected form of rosemary essential oil has a positive influence on blood biochemistry parameters, haematological indices, immune-antioxidant status, intestinal microbiota and histomorphology of meat-type chickens. *Poult. Sci.* 103: 104309.
- Alvand, Z. M., M. Rahimi, and H. Rafati. 2023. Chitosan decorated essential oil nanoemulsions for enhanced antibacterial activity using a microfluidic device and response surface methodology. *Int. J. Biol. Macromol.* 239: 124257.
- Alyileili, S. R., K. A. El-Tarabily, I. E. H. Belal, W. H. Ibrahim, M. Sulaiman, and A. S. Hussein. 2020. Intestinal development and histomorphometry of Broiler Chickens Fed Trichoderma reesei Degraded Date Seed Diets. *Front. Vet. Sci.* 7: 349
- Amiri, N., M. Afsharmanesh, M. Salarmoini, A. Meimandipour, S. A. Hosseini, and H. Ebrahimnejad. 2020. Effects of nanoencapsulated cumin essential oil as an alternative to the antibiotic growth promoter in broiler diets. *J. Appl. Poult. Res.* 29: 875-885.
- Amrah, N. A., A. Mujnisa, and W. Pakiding. 2024. Effect of use of *Clitoria ternatea* extract on production performance and H/L ratio in broilers. In: p. 040017.
- Aviagen. 2012. Ross 308 Performance Objective. An Aviagen Brand. Huntsville, Alabama, US.
- Aviagen. Indian River Broiler Nutrition Specifications. 2022. An Aviagen Brand. Huntsville, Alabama, US.
- Aviagen. 2022. Indian River Performance Objective. An Aviagen Brand. Huntsville, Alabama, US.
- Aviagen. 2022. Ross 308 Performance Objective. An Aviagen Brand. Huntsville, Alabama, US.
- Cerchiara, T., A. Abruzzo, M. di Cagno, F. Bigucci, A. Bauer-Brandl, C. Parolin, B. Vitali, M. C. Gallucci, and B. Luppi. 2015. Chitosan based micro- and nanoparticles for colon-targeted delivery of vancomycin prepared by alternative processing methods. *Eur. J. Pharm. Biopharm.* 92: 112-119.

- Chayaratanasin, P., S. Adisakwattana, and T. Thilavech. 2021. Protective role of *Clitoria ternatea* L. flower extract on methylglyoxal-induced protein glycation and oxidative damage to DNA. BMC Complement. Med. Ther. 21: 80
- Choiri, Z., N. D. Dono, B. Ariyadi, C. Hanim, R. Martien, and Zuprizal. 2017. Effect of nano-encapsulation of noni (*Morinda citrifolia*) fruit extract on jejunal morphology and microbial populations in laying hens. Pak. J. Nutr. 17: 34-38.
- Citra, W., N. Sjafani, and Y. Sapsuha. 2024. The effect of butterfly pea flower extract on broilers raised in high-density environments (impact on performance, blood profile and gut microbes). Asian J. Dairy Food Res. 44(3): 491-497.
- Dono, N. D. 2012. Nutritional strategies to improve enteric health and growth performance of poultry in the post antibiotic era. Ph.D Thesis. Glasgow University. Glasgow.
- Duangnumsawang, Y., J. Zentek, and F. Goodarzi Boroojeni. 2021. Development and functional properties of intestinal mucus layer in poultry. Front. Immunol. 12: 745849.
- Ducatelle, R., E. Goossens, V. Eeckhaut, and F. Van Immerseel. 2023. Poultry gut health and beyond. Anim. Nutr. 13: 240-248.
- Elbaz, A. M., E. S. Ashmawy, S. A. M. Ali, D. M. Mourad, H. S. El-Samahy, F. B. Badri, and H. A. Thabet. 2023. Effectiveness of probiotics and clove essential oils in improving growth performance, immuno-antioxidant status, ileum morphometric, and microbial community structure for heat-stressed broilers. Sci. Rep. 13: 18846.
- Elolimy, A. A., M. M. Hashim, S. A. Elsafty, A. R. Y. Abdelhady, S. Ladirat, M. Shourrap, and M. Madkour. 2025. Effects of microencapsulated essential oils and seaweed meal on growth performance, digestive enzymes, intestinal morphology, liver functions, and plasma biomarkers in broiler chickens. J. Anim. Sci. 103. skaf092.
- Erensoy, K., and M. Sarica. 2023. Fast growing broiler production from genetically different pure lines in Turkey. 2. Broiler traits: growth, feed intake, feed efficiency, livability, body defects and some heterotic effects. Trop. Anim. Health Prod. 55: 61.
- Fascina, V., G. Pasquali, F. Carvalho, E. Muro, F. Vercese, M. Aoyagi, A. Pezzato, E. Gonzales, and J. Sartori. 2017. Effects of phytogenic additives and organic acids, alone or in combination, on the performance, intestinal quality and immune responses of broiler chickens. Rev. Bras. Ciência Avícola. 19: 497-508.
- Fatimah, I., H. Hidayat, B. H. Nugroho, and S. Husein. 2020. Ultrasound-assisted biosynthesis of silver and gold nanoparticles using *Clitoria ternatea* flower. South African J. Chem. Eng. 34: 97-106.

- Fonseca-García, I., F. Escalera-Valente, S. Martínez-González, C. A. Carmona-Gasca, D. A. Gutiérrez-Arenas, and F. Ramos. 2017. Effect of oregano oil dietary supplementation on production parameters, height of intestinal villi and the antioxidant capacity in the breast of broiler. *Austral J. Vet. Sci.* 49: 83-89.
- Forte, C., R. Branciar, D. Pacetti, D. Miraglia, D. Ranucci, G. Acuti, M. Balzano, N. G. Frega, and M. Tralbalza-Marinuuci. 2018. Dietary oregano (*Origanum vulgare* L.) aqueous extract improves oxidative stability and consumer acceptance of meat enriched with CLA and n-3 PUFA in broilers. *Poult. Sci.* 97: 1774-1785.
- Fries-Craft, K., R. J. Arsenault, and E. A. Bobeck. 2023. Basal diet composition contributes to differential performance, intestinal health, and immunological responses to a microalgae-based feed ingredient in broiler chickens. *Poult. Sci.* 102: 102235.
- Gamage, G. C. V., Y. Y. Lim, and W. S. Choo. 2021. Anthocyanins from *Clitoria ternatea* flower: biosynthesis, extraction, stability, antioxidant activity, and applications. *Front. Plant Sci.* 12: 792303
- Gao, J., H. Lin, X. J. Wang, Z. G. Song, and H. C. Jiao. 2010. Vitamin E supplementation alleviates the oxidative stress induced by dexamethasone treatment and improves meat quality in broiler chickens. *Poult. Sci.* 89: 318-327.
- Gilani, S. M. H., Z. Rashid, S. Galani, S. Ilyas, S. Sahar, Zahoor-ul-Hassan, K. Al-Ghanim, S. Zehra, A. Azhar, F. Al-Misned, Z. Ahmed, N. Al-Mulham, and S. Mahboob. 2021. Growth performance, intestinal histomorphology, gut microflora and ghrelin gene expression analysis of broiler by supplementing natural growth promoters: A nutrigenomics approach. *Saudi J. Biol. Sci.* 28: 3438-3447.
- Guagliano, G., L. Boeri, M. Merli, H. Yan, F. Briatico Vangosa, L. Visai, S. Visentin, P. Petrini, and L. Sardelli. 2025. The hidden piece in inflammatory bowel diseases: The significance of intestinal mucus in mediating the bacteria-cells crosstalk. *Mater. Today Bio.* 33: 101937.
- Haetinger, V. S., Y. K. Dalmoro, G. L. Godoy, M. B. Lang, O. F. de Souza, P. Aristimunha, and C. Stefanello. 2021. Optimizing cost, growth performance, and nutrient absorption with a bio-emulsifier based on lysophospholipids for broiler chickens. *Poult. Sci.* 100(4): 101025.
- Handito, D., E. Basuki, S. Saloko, L. G. Dwikasari, and E. Triani. 2022. Analisis komposisi bunga telang (*Clitoria ternatea*) sebagai antioksidan alami pada produk pangan. *Pros. Saintek.* 4: 64-70.

- Harykrishnan, S., M. Ganapathy, K. Abinaya, S. Meenakumari, M. Thirumavalavan, P. Anbu, and R. Pachiappan. 2025. An evaluation study on screening, partial purification, and characterization of proteins and antioxidant peptides from two varieties of *Clitoria ternatea*. *Int. J. Biol. Macromol.* 285: 138312.
- Havananda, T., and K. Luengwilai. 2019. Variation in floral antioxidant activities and phytochemical properties among butterfly pea (*Clitoria ternatea* L.) germplasm. *Genet. Resour. Crop Evol.* 66: 645-658.
- Hidayati, N. A., Z. Zuprizal, K. Kustantinah, 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.
- Homolak, J., J. De Busscher, M. Zambrano-Lucio, M. Joja, D. Virag, A. Babic Perhoc, A. Knezovic, J. Osmanovic Barilar, and M. Salkovic-Petrisic. 2023. Altered secretion, constitution, and functional properties of the gastrointestinal mucus in a rat model of sporadic alzheimer's disease. *ACS Chem. Neurosci.* 14: 2667-2682.
- Huang, Q., C. Wen, W. Yan, C. Sun, S. Gu, J. Zheng, and N. Yang. 2022. Comparative analysis of the characteristics of digestive organs in broiler chickens with different feed efficiencies. *Poult. Sci.* 101(12): 102184
- Jamil, N., M. N. Mohd Zairi, N. A. Mohd Nasim, and F. Pa'ee. 2018. Influences of environmental conditions to phytoconstituents in *Clitoria ternatea* (butterfly pea flower) – a review. *J. Sci. Technol.* 10: 208-228
- Jan, K.-C., and M. Gavahian. 2024. Cold plasma at various voltage, gas flow rate, and time assisted extraction of blue pea flower: Quantitative UPLC-ESI/MS/MS analysis of bioactive compounds, phenolics, and anthocyanin content. *Innov. Food Sci. Emerg. Technol.* 98: 103837.
- Jeyaraj, E. J., Y. Y. Lim, and W. S. Choo. 2022. Antioxidant, cytotoxic, and antibacterial activities of *Clitoria ternatea* flower extracts and anthocyanin-rich fraction. *Sci. Rep.* 12: 14890.
- Ji, Y., X. Liu, H. Lv, Y. Guo, and W. Nie. 2024. Effects of *Lonicerae flos* and Turmeric extracts on growth performance and intestinal health of yellow-feathered broilers. *Poult. Sci.* 103: 103488.
- Kah, M., A.-K. Weniger, and T. Hofmann. 2016. Impacts of (nano) formulations on the fate of an insecticide in soil and consequences for environmental exposure assessment. *Environ. Sci. Technol.* 50: 10960-10967.
- Kavoi, B., D. Gakuya, P. Mbugua, and S. Kiama. 2016. Effects of dietary *Moringa oleifera* leaf meal supplementation on chicken intestinal structure and growth performance. *J. Morphol. Sci.* 33: 186-192.

- Kovitvadh, A., L. Gasco, I. Zoccarato, and T. Rukkwamsuk. 2024. Effects of butterfly pea extracts on phagocytic activity of blood polymorphonuclear leukocytes and muscular lipid peroxidation in rabbits. *Animals*. 14(6): 958.
- Krithiga, N., A. Rajalakshmi, and A. Jayachitra. 2015. Green synthesis of silver nanoparticles using leaf extracts of *Clitoria ternatea* and *Solanum nigrum* and study of its antibacterial effect against common nosocomial pathogens . *J. Nanosci*. 2015: 1-8.
- Kumar, R., K. Mondal, P. K. Panda, A. Kaushik, R. Abolhassani, R. Ahuja, H.-G. Rubahn, and Y. K. Mishra. 2020. Core-shell nanostructures: perspectives towards drug delivery applications. *J. Mater. Chem. B*. 8: 8992-9027.
- Kurniawan, J., E. Tugiyanti, and E. Susanti. 2021. The effect of additive feeding as a substitute for antibiotics against feed consumption and body weight gain broiler chicken. *Angon J. Anim. Sci. Technol*. 3: 134-140.
- Lelis, C. A., A. P. A. de Carvalho, and C. A. C. Junior. 2021. A systematic review on nanoencapsulation natural antimicrobials in foods: In vitro versus in situ evaluation, mechanisms of action and implications on physical-chemical quality. *Int. J. Mol. Sci*. 22(21): 12055
- Li, C., W. Tang, S. Chen, J. He, X. Li, X. Zhu, H. Li, and Y. Peng. 2022. Phytochemical properties and in vitro biological activities of phenolic compounds from flower of *Clitoria ternatea* L. *Molecules*. 27(19): 6336
- Li, D., H. Cui, K. Hayat, X. Zhang, and C.-T. Ho. 2022. Superior environmental stability of gelatin/CMC complex coacervated microcapsules via chitosan electrostatic modification. *Food Hydrocoll*. 124: 107341.
- Li, Y., M. Li, Q. Zeng, S. Bai, Y. Liu, X. Ding, S. Li, K. Zhang, R. Zhang, and J. Wang. 2025. Maternal low-protein diets influence sex-specific growth performance, meat quality, and intestinal morphology of broiler offspring. *Poult. Sci*. 104: 105618.
- Liao, L., Jian Li, Jun Li, Y. Huang, and Y. Wu. 2021. Effects of Astragalus polysaccharides on intestinal morphology and intestinal immune cells of Muscovy ducklings infected with Muscovy duck reovirus. *Poult. Sci*. 100: 64-72.
- Linh, N. T., N. H. Qui, and A. Triatmojo. 2022. The effect of nano-encapsulated herbal essential oils on poultry's health. *Arch. Razi Inst*. 77: 2013-2021.

- Livingston, M. L., A. J. Cowieson, R. Crespo, V. Hoang, B. Nogal, M. Browning, and K. A. Livingston. 2020. Effect of broiler genetics, age, and gender on performance and blood chemistry. *Heliyon*. 6(7): e04400.
- Maesaroh, U. 2019. Pengaruh penambahan nano-enkapsulasi ekstrak daun sirsak (*Annona muricata* linn.) dalam air minum terhadap kesehatan saluran pencernaan dan kinerja pertumbuhan ayam broiler. Thesis. Universitas Gadjah Mada. Yogyakarta.
- Maesaroh, U., N. D. Dono, and Z. Zuprizal. 2022. Performance, microbial populations, and jejunal morphology of broilers supplemented with nano-encapsulated graviola leaf extract. *Trop. Anim. Sci. J.* 45: 64-72.
- Manyeula, F., N. A. Sebola, and M. Mabelebele. 2025. Productive, internal organ and intestinal histomorphological characteristics of broiler chickens in response to dietary rapeseed meal: A meta-analysis. *J. Anim. Physiol. Anim. Nutr. (Berl)*. 109: 211-222.
- Marpaung, A. M. 2020. Tinjauan manfaat bunga telang (*clitoria ternatea* l.) bagi kesehatan manusia. *J. Funct. Food Nutraceutical*. 1(2): 63-85.
- Maynard, C. J., C. W. Maynard, A. R. Jackson, M. T. Kidd, S. J. Rochell, and C. M. Owens. 2023. Characterization of growth patterns and carcass characteristics of male and female broilers from four commercial strains fed high or low density diets. *Poult. Sci.* 102(3): 102435.
- Mehmood, A., M. Ishaq, L. Zhao, S. Yaqoob, B. Safdar, M. Nadeem, M. Munir, and C. Wang. 2019. Impact of ultrasound and conventional extraction techniques on bioactive compounds and biological activities of blue butterfly pea flower (*Clitoria ternatea* L.). *Ultrason. Sonochem.* 51: 12–19.
- Meng, W. S., Q. Zou, Y. Xiao, W. Ma, J. Zhang, T. Wang, and D. Li. 2023. Growth performance and cecal microbiota of broiler chicks as affected by drinking water disinfection and/or herbal extract blend supplementation. *Poult. Sci.* 102: 102707.
- Metzler-Zebeli, B. U., E. Magowan, M. Hollmann, M. E. E. Ball, A. Molnár, K. Witter, R. Ertl, R. J. Hawken, P. G. Lawlor, N. E. O'Connell, J. Aschenbach, and Q. Zebeli. 2018. Differences in intestinal size, structure, and function contributing to feed efficiency in broiler chickens reared at geographically distant locations. *Poult. Sci.* 97: 578-591.
- Mir, N. A., A. Rafiq, F. Kumar, V. Singh, and V. Shukla. 2017. Determinants of broiler chicken meat quality and factors affecting them: a review. *J. Food Sci. Technol.* 54: 2997-3009.

- de Moura, M. R., F. A. Aouada, and L. H. C. Mattoso. 2008. Preparation of chitosan nanoparticles using methacrylic acid. *J. Colloid Interface Sci.* 321: 477-483.
- Mujnisa, A., N. A. Amrah, and W. Pakiding. 2025. *Clitoria ternatea* extract as natural antibiotic growth promoter (AGP) on broiler concerning carcass quality and intestine morphometric. *Asian J. Dairy Food Res.*
- Nguyen, D. T. N. 2021. Relationship between the ratio of villous height: crypt depth and gut bacteria counts as well production parameters in broiler chickens. *J. Agric. Dev.* 20: 1-10.
- Ningsih, N., B. Ariyadi, N. D. Dono, S. Supadmo, and Zuprizal. 2019. The effect of nanoencapsulated *Phaleria macrocarpa* fruits extract in drinking water on jejunal histomorphology of broiler chickens. *Trop. Anim. Sci. J.* 42: 106-112.
- Oguis, G. K., E. K. Gilding, M. A. Jackson, and D. J. Craik. 2019. Butterfly pea (*Clitoria ternatea*), a cyclotide-bearing plant with applications in agriculture and medicine. *Front. Plant Sci.* 10: 645.
- Padmanabhan, V., S. S. Kumar, and P. Giridhar. 2024. Phytochemicals and UHPLC-QTOF-HRMS characterisation of bioactives of butterfly pea (*Clitoria ternatea* L.) seeds and their antioxidant potentials. *Food Chem.* 433: 137373.
- Padmanabhan, V., and G. Parvatam. 2025. Seed oils of *Clitoria ternatea* L. – Source of bioactives with in vitro anti-inflammatory and antioxidant potential with nutrient-rich defatted meal. *Food Humanit.* 4: 100597.
- Paredes-López, D. M., R. A. Robles-Huaynate, M. R. Soto-Vásquez, R. A. Perales-Camacho, S. M. Morales-Cauti, X. Beteta-Blas, and U. Aldava-Pardave. 2024. Modulation of gut microbiota, and morphometry, blood profiles and performance of broiler chickens supplemented with piper aduncum, morinda citrifolia, and artocarpus altilis leaves ethanolic extracts. *Front. Vet. Sci.* 11 :1286152.
- Pateiro, M., B. Gómez, P. E. S. Munekata, F. J. Barba, P. Putnik, D. B. Kovačević, and J. M. Lorenzo. 2021. Nanoencapsulation of promising bioactive compounds to improve their absorption, stability, functionality and the appearance of the final food products. *Molecules.* 26(6): 1547.
- Petrolli, T. G., L. F. T. Albino, H. S. Rostagno, P. C. Gomes, F. de C. Tavernari, and E. M. Balbino. 2012. Herbal extracts in diets for broilers. *Rev. Bras. Zootec.* 41: 1683-1690.
- Pettinato, M., B. Aliakbarian, A. A. Casazza, and P. Perego. 2017. Encapsulation of antioxidants from Spent coffee ground extracts by spray drying. *Chem. Eng. Trans.* 57: 1219-1224.

- Ponnusamy, S., W. E. Gnanaraj, J. M. @Antonisamy, V. Selvakumar, and J. Nelson. 2010. The effect of leaves extracts of *Clitoria ternatea* Linn against the fish pathogens. *Asian Pac. J. Trop. Med.* 3: 723-726.
- 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: 434-442.
- Rahman, S., T. Ahmed, A. Lahiry, A. Afrin, B. Dey, M. Paul, and S. C. Das. 2025. Ameliorative effects of different additives on growth, meat quality, and histological indices in heat-stressed broilers exposed to prolonged fasting. *Livest. Sci.* 298: 105750.
- Ravindran, V., and M. R. Abdollahi. 2021. Nutrition and digestive physiology of the broiler chick: state of the art and outlook. *Animals.* 11: 2795.
- Reis, M. P., R. M. Gous, L. Hauschild, and N. K. Sakomura. 2023. Evaluation of a mechanistic model that estimates feed intake, growth and body composition, nutrient requirements, and optimum economic response of broilers. *Animal.* 17: 101016.
- Rodsatian, N., O. Songserm, I. Peñarrubia, M. Serra, J. Crespo, A. Blanch, and Y. Ruangpanit. 2023. Effect of dietary supplementation of citrus flavonoids on performance, intestinal epithelium morphology, microbiota in excreta and oxidative stress of broiler chickens subjected to heat stress. *Eur. Poult. Sci.* 87: 1-13.
- El Sabry, M. I., and S. Yalcin. 2023. Factors influencing the development of gastrointestinal tract and nutrient transporters' function during the embryonic life of chickens - a review. *J. Anim. Physiol. Anim. Nutr. (Berl).* 107: 1419-1428.
- Sakr, S. A., A. F. Abouelnaga, A. I. Ateya, N. M. A. Hashem, N. M. Wahed, I. F. Rehan, A. Elnagar, F. Zigo, I. Siedoi, W. A. Kamel, and H. A. El-Emam. 2025. Growth performance, behavior, gene expression, carcass characteristics, stress indicators, and economical parameters of avian 48 broiler chickens raised under three different stocking density. *Front. Vet. Sci.* 12 :1517142.
- Sánchez de Medina, F., I. Romero-Calvo, C. Mascaraque, and O. Martínez-Augustín. 2014. Intestinal Inflammation and Mucosal Barrier Function. *Inflamm. Bowel Dis.* 20: 2394-2404.
- Satria, D., E. Sofyanti, P. Wulandari, Fajarini, S. D. Pakpahan, and S. A. Limbong. 2022. Antibacterial activity of medan butterfly pea (*Clitoria ternatea* L.) corolla extract against *Streptococcus mutans* ATCC®25175™ and *Staphylococcus aureus* ATCC®6538™. *Pharmacia.* 69: 195-202.

- Scott-Cook, H. M., S. C. Mansbridge, A. M. Mackenzie, D. G. Yovchev, and V. R. Pirgozliev. 2025. Enhancing diet specification to maximise feed efficiency and production characteristics of the Redbro slow growing broiler chicken. *Br. Poult. Sci.* 1-11.
- Shehata, A. A., S. Yalçın, J. D. Latorre, S. Basiouni, Y. A. Attia, A. Abd El-Wahab, C. Visscher, H. R. El-Seedi, C. Huber, H. M. Hafez, W. Eisenreich, and G. Tellez-Isaias. 2022. Probiotics, prebiotics, and phytogenic substances for optimizing gut health in poultry. *Microorganisms*. 10(2): 395.
- Silva, N. C., C. Chevigny, S. Domenek, G. Almeida, O. B. G. Assis, and M. Martelli-Tosi. 2025. Nanoencapsulation of active compounds in chitosan by ionic gelation: Physicochemical, active properties and application in packaging. *Food Chem.* 463:141129.
- Son, D. K., C. V. Lisnahan, and O. R. Nahak. 2020. The effect of dl-methionine supplementation on body weight gain, feed consumption and feed efficiency of broilers. *J. Trop. Anim. Sci. Technol.* 2: 37-44.
- Stamford, N. P. J. 2012. Stability, transdermal penetration, and cutaneous effects of ascorbic acid and its derivatives. *J. Cosmet. Dermatol.* 11: 310-317.
- Subianto, R. P., C. Khoswanto, and I. L. Kriswandini. 2023. Antibacterial potential of butterfly pea (*Clitoria ternatea*) towards aggregatibacter actinomycetemcomitans in vitro. *World J. Adv. Res. Rev.* 17: 868-876.
- Sugiharto, S., Y. Zulpa, I. Agusetyaningsih, E. Widiastuti, H. I. Wahyuni, T. Yudiarti, and T. A. Sartono. 2024. Physiological responses and intestinal conditions of broiler chickens treated with encapsulated *Acalypha australis* L. leaf extract and chitosan. *Vet. World.* 17(5): 994-1000.
- Sundari, Zuprizal, T. Yuwanta, and R. Martien. 2014. Effect of nanocapsule level on broiler performance and fat deposition. *Int. J. Poult. Sci.* 13: 31-35.
- Syahirah, N. F. L., M. U. Lutfi MY, A. A, M. Hafiz R, M. Zulhelmi OA, M. A. Adzhan O, and K. PY. 2018. A comparative analysis of *Clitoria ternatea* Linn. (butterfly pea) flower extract as natural liquid pH indicator and natural pH paper. *Dhaka Univ. J. Pharm. Sci.* 17:97–103.
- Tabatabaei, M., B. Ebrahimi, A. Rajaei, M. H. Movahednejad, H. Rastegari, E. Taghavi, M. Aghbashlo, V. K. Gupta, and S. S. Lam. 2022. Producing submicron chitosan-stabilized oil Pickering emulsion powder by an electrostatic collector-equipped spray dryer. *Carbohydr. Polym.* 294: 119791.
- Tamalluddin, F. 2012. Ayam Broiler, 22 Hari Panen Lebih Untung. Penebar Swadaya Grup. Jakarta. Indonesia.

- Thuekeaw, S., K. Angkanaporn, and C. Nuengjamnong. 2022. Microencapsulated basil oil (*Ocimum basilicum* Linn.) enhances growth performance, intestinal morphology, and antioxidant capacity of broiler chickens in the tropics. *Anim. Biosci.* 35: 752-762.
- Tonetti, F. R., A. Eguileor, and C. Llorente. 2024. Goblet cells: guardians of gut immunity and their role in gastrointestinal diseases. *eGastroenterology*. 2: 1-14.
- Torrey, S., M. Mohammadigheisar, M. N. d. Santos, D. Rothschild, L. C. Dawson, Z. Liu, E. G. Kiarie, A. M. Edwards, I. Mandell, N. Karrow, D. Tulpan, and T. M. Widowski. 2021. In pursuit of a better broiler: growth, efficiency, and mortality of 16 strains of broiler chickens. *Poult. Sci.* 100(3): 100955.
- Tumbal, E. L. S., and M. C. Simanjuntak. 2020. Pengaruh penambahan tepung daun kemangi (*Acimum* spp) dalam pakan terhadap performans ayam broiler. *J. Ilmu Peternak.* 1: 26-44.
- de Verdal, H., S. Mignon-Grasteau, C. Jeulin, E. Le Bihan-Duval, M. Leconte, S. Mallet, C. Martin, and A. Narcy. 2010. Digestive tract measurements and histological adaptation in broiler lines divergently selected for digestive efficiency. *Poult. Sci.* 89: 1955-1961.
- Wang, J., Y. Wu, T. Zhou, Y. Feng, and L. A. Li. 2025. Common factors and nutrients affecting intestinal villus height-A review. *Anim. Biosci.* 38: 1557-1569.
- Widowati, W., L. Darsono, J. Lucianus, E. Setiabudi, S. S. Obeng, S. Stefani, R. Wahyudianingsih, K. R. Tandibua, R. Gunawan, C. R. Wijayanti, A. Novianto, H. S. W. Kusuma, and Rizal. 2023. Butterfly pea flower (*Clitoria ternatea* L.) extract displayed antidiabetic effect through antioxidant, anti-inflammatory, lower hepatic GSK-3 β , and pancreatic glycogen on Diabetes Mellitus and dyslipidemia rat. *J. King Saud Univ. Sci.* 35(4): 102579.
- Xu, Q., M. Shen, Y. Han, and H. Diao. 2021. Effects of ellagic acid supplementation on jejunal morphology, digestive enzyme activities, antioxidant capacity, and microbiota in mice. *Front. Microbiol.* 12: 793576.
- Yu, Q., F. Yu, Q. Li, J. Zhang, Y. Peng, X. Wang, T. Li, N. Yin, G. Sun, H. Ouyang, Y. Chen, Y. Mine, R. Tsao, and H. Zhang. 2023. Anthocyanin-rich butterfly pea flower extract ameliorating low-grade inflammation in a high-fat-diet and lipopolysaccharide-induced mouse model. *J. Agric. Food Chem.* 71: 11941-11956.
- Yunilawati, R., Y. Yemirta, A. A. Cahyaningtyas, S. A. Aviandharie, N. Hidayati, and D. Rahmi. 2018. Optimasi proses spray drying pada enkapsulasi antosianin ubi ungu. *J. Kim. dan Kemasan.* 40:17–24.