

DAFTAR PUSTAKA

- 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. *Poultry science*. 98(9): 3850—3859.
- Abdullah, S.S., M. Jayanti, I. Jayanto, dan I. Antasionasti. 2021. Pelatihan produksi minuman serbuk jahe, kunyit, temulawak Majelis Ta'lim Irsyaadul Ibaad dan PKK Bailang upaya peningkatan produktivitas ekonomi dan imunitas. *VIVABIO: Jurnal Pengabdian Multidisiplin*. 3(3): 16—24.
- Aggarwal, B.B., and K.B. Harikumar. 2009. Potential therapeutic effects of curcumin, the anti-inflammatory agent, against neurodegenerative, cardiovascular, pulmonary, metabolic, autoimmune and neoplastic diseases. *The international journal of biochemistry & cell biology*. 41(1): 40—59.
- Akbar, B. 2010. Tumbuhan dengan Kandungan Senyawa Aktif yang Berpotensi sebagai Bahan Antifertilitas. Jakarta: Adabia Press.
- Akoso, B.T. 1998. Manual Kesehatan Unggas. Kanisius, Yogyakarta.
- Al-Garadi, M.A., R.A. Alhotan, E.O. Hussein, M.M. Qaid, G.M. Suliman, M.A. Al-Badwi, E.H. Fazea, and I.O. Olarinre. 2025. Effects of a natural phytogenic feed additive on broiler performance, carcass traits, and gut health under diets with optimal and reduced energy and amino acid density. *Poultry Science*. 104(10): 105014.
- Alipin, K., R. Safitri, and R. Kartasudjana. 2016. Suplementasi probiotik dan temulawak pada ayam pedaging terhadap populasi Salmonella sp. dan kolesterol darah. *Jurnal veteriner*. 17(4): 582—586.
- Amerah, A.M., R.G. Lentle, and V. Ravindran. 2007. Influence of feed form on gizzard morphology and particle size spectra of duodenal digesta in broiler chickens. *The Journal of Poultry Science*. 44(2): 175—181.
- Amerah, A.M., V. Ravindran, R.G. Lentle, and D.G. Thomas. 2007. Feed particle size: Implications on the digestion and performance of poultry. *World's Poultry Science Journal*. 63(3): 439—455.
- Andreopoulou, M., V. Tsiouris, and I. Georgopoulou. 2014. Effects of organic acids on the gut ecosystem and on the performance of broiler chickens. *Journal of the Hellenic veterinary medical society*. 65(4): 289—302.
- Andriani, R., Syahrudin, M. Sayuti, dan S.I. Gubali. 2022. Kandungan protein kasar, serat kasar, dan energi formulasi ransum burung puyuh petelur yang ditambahi tepung daun kelor (*Moringa oleifera lam.*). *Gorontalo Journal of Equatorial Animals*. 1(2): 93—98.

- Aqsa, A.D., K. Kiramang, dan M.N. Hidayat. 2016. Profil organ dalam ayam pedaging (*broiler*) yang diberi tepung daun sirih (*Piper betle* linn) sebagai imbuhan pakan. *Jurnal Ilmu dan Industri Peternakan*. 3(1): 148—159.
- Aristimunha, P.C., R.D. Mallheiros, P.R. Ferket, K.M. Cardinal, A.L.D.B. Moreira Filho, E.T. Santos, D.T. Cavalcante, and A.M.L. Ribeiro. 2020. Effect of dietary organic acids and humic substance supplementation on performance, immune response and gut morphology of broiler chickens. *Journal of Applied Poultry Research*. 29(1): 85—94.
- Arniyanti, M., F.S.A. Abdila, J.A. Sabil, V.Y. Saputri, L.M. Hasanah, and M. Su'udi. 2023. Pemanfaatan buah mengkudu (*Morinda citrifolia* L.) sebagai antidiabetes dan antihipertensi. *JCPS (Journal of Current Pharmaceutical Sciences)*. 6(2): 605—611.
- Astuti, P., dan H. Surlipta. 2020. Optimization of broiler production and immune response through giving meniran (*Phyllanthus niruri* L) and sambiloto (*Andrographis paniculata*) extracts after nd vaccination. *Bantara Journal of Animal Science*. 2(1): 23—30.
- Auza, F.A., D. Zulkarnain, A.M. Tasse, W. Kurniawan, R. Badaruddin, dan P.D. Isnaeni. 2023. Persentase bobot organ dalam ayam broiler yang diberi kombinasi ramuan herbal dan mineral zink sebagai aditif pakan. In *Prosiding Seminar Nasional Inovasi Dan Teknologi Peternakan 2022: Optimalisasi Integrated Farming System Berbasis Teknologi Peternakan Dalam Menunjang Pemenuhan Protein Hewani Di Era New Normal—Kendari*, 19 November 2022 (89).
- Auza, F.A., R. Badaruddin, P.D. Isnaeni, and A.B. Kimestri. 2023. Profil organ pencernaan, kualitas karkas dan potongan bagian karkas ayam *broiler* yang diberi tepung daun mengkudu (*Morinda Citrifolia* Linn) fermentasi sebagai imbuhan pakan. *Journal Galung Tropika*. 12(1): 71—81.
- Awad, E. A., I. Zulkifli, A. F. Soleimani, dan A. Aljuobori. 2017. Effects of feeding male and female broiler chickens on low protein diets fortified with different dietary glycine levels under the hot and humid tropical climate. *Italian Journal of Animal Science*. 16(3):453—461.
- Awad, W.A., K. Ghareeb, S. Abdel-Raheem, and J. Böhm. 2009. Effects of dietary inclusion of probiotic and synbiotic on growth performance, organ weights, and intestinal histomorphology of broiler chickens. *Poultry science*. 88(1): 49—56.
- Awad, W.A., K. Ghareeb, S. Nitsch, S. Pasteiner, S. Abdel-Raheem, and J. Böhm, J. 2008. Effects of dietary inclusion of prebiotic, probiotic and synbiotic on the intestinal glucose absorption of broiler chickens. *International Journal of Poultry Science*. 7(7): 688—691.

- Banamantuan, A.N. 2019. Strain dan karakteristik ayam broiler di Indonesia. Universitas Nusa Cendana. Kupang.
- Baurhoo, B., P.R. Ferket, and X. Zhao. 2009. Effects of diets containing different concentrations of mannanoligosaccharide or antibiotics on growth performance, intestinal development, cecal and litter microbial populations, and carcass parameters of broilers. *Poultry science*. 88(11): 2262—2272.
- Cappelaere, L., J.L.C. Grandmaison, N. Martin, and W. Lambert. 2021. Amino acid supplementation to reduce environmental impacts of broiler and pig production: a review. *Frontiers in Veterinary Science*. 8: 689259.
- Ceccopieri, C. and J.P. Madej. 2024. Chicken secondary lymphoid tissues—Structure and relevance in immunological research. *Animals*. 14(16): 2439.
- Ciftci, M., T. Guler, B. Dalkiliç, and O.N. Ertas. 2005. The effect of anise oil (*Pimpinella anisum* L.) on broiler performance. *International Journal of Poultry Science*. 4(11): 851—855.
- Cobb-Vantress, I. 2015. Broiler Performance and Nutrition Supplement. Cobb Vantress Inc, Arkansas.
- Djunaidi, I.H., E. Widodo, dan D.A. Apriana. 2018. Pengaruh penggunaan daun mint (*Mentha piperita* L.) bentuk tepung sebagai pakan tambahan terhadap kualitas karkas ayam pedaging. *Jurnal Nutrisi Ternak Tropis*. 1(1): 1—8.
- Dollar, R., J. Jiyanto, dan P. Anwar. 2023. pengaruh pemberian air buah mengkudu (*Morinda citrifolia* Linn) terhadap organ dalam ayam broiler. *Journal of Animal Center (JAC)*. 5(1): 26—35.
- Dozier, W.A., M.T. Kidd, and A. Corzo 2008. Dietary amino acid responses of broiler chickens. *Journal of Applied Poultry Research*. 17(1): 157—167.
- Emadi, M., and H. Kermanshahi. 2007. Effect of turmeric rhizome powder on the activity of some blood enzymes in broiler chickens. *International Journal of Poultry Science*. 6(1): 48—51.
- Erdaw, M.M., S. Wu, and P.A. Iji. 2017. Growth and physiological responses of broiler chickens to diets containing raw, full-fat soybean and supplemented with a high-impact microbial protease. *Asian-Australasian Journal of Animal Sciences*. 30(9): 1303.
- Fitroh, B.A., A. Hakim, and A.N. Respati. 2019. Substitusi jagung menggunakan 3 jenis kulit pisang yang berbeda dalam pakan terhadap histomorfologi vili usus itik hibrida. *Agrotechnology Innovation (Agrinova)*. 2(2).

- Food and Agriculture Organization (FAO) 2022. OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database).
- Gadde, U., W.H. Kim, S.T. Oh, and H.S. Lillehoj. 2017. Alternatives to antibiotics for maximizing growth performance and feed efficiency in poultry: a review. *Animal health research reviews*. 18(1): 26—45.
- Gorenz, B., M.L. Oelschlager, J.C. Jespersen, C. Cao, A.H. Smith, R.I. Mackie, and R.N. Dilger. 2024. Organ growth and fermentation profiles of broilers differing in body growth rate. *Poultry science*. 103(5): 103628.
- Hafsan, H.T.A., A. Natsir, and A. Ahmad. 2021. Performance, carcass and internal organs characterizes of broiler chickens with phytase.
- Hamedi, S., M. Rezaian, and T. Shomali. 2011. Histological changes of small intestinal mucosa of cocks due to sunflower meal single feeding. *American Journal of Animal and Veterinary Sciences*. 6: 171—175.
- Hashemi, S.R. and H. Davoodi. 2011. Herbal plants and their derivatives as growth and health promoters in animal nutrition. *Veterinary research communications*. 35(3): 169—180.
- Hashemipour, H., H. Kermanshahi, A. Golian, and T.J.P.S. Veldkamp. 2013. Effect of thymol and carvacrol feed supplementation on performance, antioxidant enzyme activities, fatty acid composition, digestive enzyme activities, and immune response in broiler chickens. *Poultry science*. 92(8): 2059—2069.
- Heinrich, M., J. Barnes, J. Prieto-Garcia, S. Gibbons, and E.M. Williamson. 2017. *Fundamentals of Pharmacognosy and Phytotherapy E-Book: Fundamentals of Pharmacognosy and Phytotherapy E-Book*. Elsevier Health Sciences.
- Hernandez, F., J. Madrid, V. Garcia, J. Orengo, and M.D. Megias. 2004. Influence of two plant extracts on broilers performance, digestibility, and digestive organ size. *Poultry science*. 83(2): 169—174.
- Hidayat, R., dan B. Yulianto. 2021. Efektivitas pakan konsentrat dalam meningkatkan pertumbuhan ayam broiler. *Jurnal Ilmu Ternak*. 19(1): 12—20.
- Hossain, M.S., Z. Urbi, A. Sule, and K.H. Rahman. 2014. *Andrographis paniculata (Burm. f.) Wall. ex Nees: a review of ethnobotany, phytochemistry, and pharmacology*. *The Scientific World Journal*. 2014(1): 274905.
- Hosseinzadeh, H., A.A. Alaw Qotbi, A. Seidavi, D. Norris, and D. Brown. 2014. Effects of different levels of coriander (*Coriandrum sativum*) seed powder and extract on serum biochemical parameters,

- microbiota, and immunity in broiler chicks. *The Scientific World Journal*. 2014(1): 628979.
- Huda, A., N. Badriyah, and R.K. Dewi. 2016. Pengaruh penggunaan campuran tepung kunyit dan jahe sebagai feed aditif terhadap munculnya gejala penyakit chronic respiratory disease (crd) dan snot pada ayam pedaging. *Jurnal Ternak*. 7(1).
- Hutabarat, V., S.A. Sitepu, and M. Sinambela. 2019. Pengaruh inhalasi sederhana menggunakan aromaterapi daun mint (*Mentha piperita*) terhadap penurunan sesak nafas pada pasien tuberculosis paru di puskesmas. *Jurnal Penelitian Kebidanan & Kespro*. 2(1): 11—16.
- Jamroz, D., T. Wartelecki, M. Houszka, and C. Kamel. 2006. Influence of diet type on the inclusion of plant origin active substances on morphological and histochemical characteristics of the stomach and jejunum walls in chicken. *Journal of Animal Physiology and Animal Nutrition*. 90(5-6): 255—268.
- Jantan, I., A.S. Rohani, and I.B. Sumantri. 2021. Immunomodulatory effects and mechanisms of curcuma species and their bioactive compounds: A review. *Frontiers in pharmacology*. 12: 643119.
- Jia, L., X. Zhang, X. Li, M.W. Schilling, E.D. Peebles, A.S. Kiess, and L. Zhang. 2022. Internal organ and skeletal muscle development in commercial broilers with woody breast myopathy. *Poultry Science*. 101(9): 102012.
- Jumiati S., Nuraini, dan R. Aka. 2017. Bobot potong, karkas, giblet dan lemak abdominal ayam broiler yang temulawak (*Curcuma xanthorrhiza* Roxb) dalam pakan. *Jurnal Ilmu dan Teknologi Peternakan Tropis*. 4(3): 11—19.
- Kamruzzaman, H.M. and M.O. Hoq. 2016. A review on ethnomedicinal, phytochemical and pharmacological properties of *Phyllanthus niruri*. *Journal of Medicinal Plants Studies*. 4(6): 173—180.
- Karthika, K., N.S. Sunilkumar, B.A. Dixy, and H. Sebastian. 2019. Comparative studies on the morphometry and percent organ weights of digestive tract in commercial broiler and layer chicken. *The Pharma Innovation Journal*. 8(4): 994—997.
- Karthika, K., N.S. Sunilkumar, B.A. Dixy, H. Sebastian, and A.Sasidharan. 2019. Comparative studies on the per cent organ weights in commercial broiler and layer chicken. *Journal Veteriner of Animal Science*. 50(2): 133—137.
- Kaspers, B. The Bursa Of Fabricius And Its Essential Role In B-Cell Development And Antibody Production. *Merial Avian Science Review*. <https://www.vaxxitek.com/sites/vaxxitek.com/files/merial-avian-science-review-en.pdf> (Accessed February 21, 2019).

- Kasse, A.S., C.V. Lisnahan, dan O.R. Nahak. 2021. Pengaruh pemberian tepung kunyit yang dicampur dalam air minum terhadap pertambahan bobot badan, konsumsi pakan, dan konversi pakan ayam broiler. *JAS*. 6(4): 69—71.
- Khan, K., H. Al-Khalaifah, N. Ahmad, M.T. Khan, R. Alonaizan, R.U. Khan, S. Naz, A. Abudabos, and I.A. Alhidary. 2025. Dietary supplementation of cinnamon and turmeric powder enhances growth performance, nutrient digestibility, immune response, and renal function in broiler chickens. *Poultry Science*. 105556.
- Khan, M.Z.I., M. Masum, M.Z.I. Khan, A.R. Aziz, M. Nasrin, and M.N.H. Siddique. 2014. Histomorphology of the lymphoid tissues of broiler chickens in Kelantan, Malaysia (Histomorfologi Tisu Limfa Ayam Pedaging di Kelantan, Malaysia). *Sains Malaysiana*. 43(8): 1175—1179.
- Khan, R.U., S. Naz, Z. Nikousefat, V. Tufarelli, and V. Laudadio. 2012. *Thymus vulgaris*: alternative to antibiotics in poultry feed. *World's Poultry Science Journal*. 68(3): 401—408.
- Khenenou, T., M. Melizi, and H. Benzaoui. 2012. Morpho-histological study of the bursa of fabricius of broiler chickens during post-hatching age. *International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering*. 6: 12.
- Kierończyk, B., M. Rawski, J. Długosz, S. Świątkiewicz, and D. Józefiak. 2016. Avian crop function-A review. *Ann. Anim. Sci*. 16(3): 653—678.
- Klasing, K.C. 2007. Nutrition and the immune system. *British Poultry Science*. 48(5): 525—537.
- Kokoszyński, D., Z. Bernacki, M. Saleh, K. Stęczny, and M. Binkowska. 2017. Body conformation and internal organs characteristics of different commercial broiler lines. *Revista Brasileira de Ciência Avícola*. 19(01): 47—52.
- Kolo, S., C.V. Lisnahan, dan O.R. Nahak. 2020. Pengaruh suplementasi l-threonine dalam pakan terhadap kinerja organ dalam ayam broiler. *JAS*. 5(4): 64—66.
- Kukuh I.G.A.J.W., G.A.M.K. Dewi, dan M. Wirapartha. 2025. Pengaruh pemberian ekstrak ciplukan (*Physalis angulata* L.) melalui air minum terhadap organ dalam broiler. *Jurnal Peternakan Tropika*. 13(3): 72—84.
- Kuttappan, V.A., M. Manangi, M. Bekker, J. Chen, and M. Vazquez-Anon. 2021. Nutritional intervention strategies using dietary antioxidants and organic trace minerals to reduce the incidence of wooden breast and other carcass quality defects in broiler birds. *Frontiers in Physiology*. 12: 663409.

- Laudadio, V., L. Passantino, A. Perillo, G. Lopresti, A. Passantino, R. U. Khan, dan V. Tufarelli. 2012. Productive performance and histological features of intestinal mucosa of broiler chickens fed different dietary protein levels. *Poultry Science*. 91(1): 265—270.
- Lewis, S.M., A. Williams, and S.C. Eisenbarth. 2019. Structure and function of the immune system in the spleen. *Science immunology*. 4(33): 1—12.
- Li, Y., X. Lei, Z. Yin, W. Guo, S. Wu, and X. Yang. 2018. Transgenerational effects of paternal dietary Astragalus polysaccharides on spleen immunity of broilers. *International journal of biological macromolecules*. 115: 90—97.
- Lisnahan, C.V., W. Wihandoyo, Z. Zuprizal, dan S. Harimurti. 2019. Morfologi usus ayam kampung umur 20 minggu yang disuplementasi dl-metionin dan l-lisin HCl dalam pakan (Intestinal morphology of 20 week old free range chickens supplemented with dl-methionine and llysine HCl in feed). *Journal of Tropical Animal Science and Technology*. 1(1): 14—21.
- Long, S., Y. Xu, C. Wang, C. Li, D. Liu, and X. Piao. 2018. Effects of dietary supplementation with a combination of plant oils on performance, meat quality and fatty acid deposition of broilers. *Asian-Australasian Journal of Animal Sciences*. 31(11): 1773.
- Lubis, A.D., B. Darmawan, H. Ningrum, I.Y. Noormasari, and N. Nakagoshi, N. 2007. Evaluation of fermented cassava (*Manihot esculenta* Crantz) pulp as feed ingredient for broiler. *Tropics*. 17(1): 73—80.
- Mahardhika, B.P., M. Ridla, R. Mutia, and M. Naja. 2021. Response size of Digestive organs of Broiler that are fed containing Jack bean (*Canavalia ensiformis*) different levels of protein with protease enzyme supplementation. *Jurnal Ilmu-ilmu Peternakan*. 31(2): 133—139.
- Maneak, C.L., G.A.M.K. Dewi, and I.W. Wijana. 2019. Persentase dan panjang saluran pencernaan ayam broiler yang mendapat ransum mengandung kulit buah naga difermentasi. *Journal of Tropical Animal Science*. 7(3): 1231—1245.
- Marang, E.A.F., L.D. Mahfudz, T.A. Sarjana, dan S. Setyaningrum. 2019. Kualitas dan kadar amonia litter akibat penambahan sinbiotik dalam ransum ayam broiler. *Jurnal Peternakan Indonesia (Indonesian Journal of Animal Science)*. 21(3): 303—310.
- Martínez, Y., E. Altamirano, V. Ortega, P. Paz, and M. Valdivié. 2021. Effect of age on the immune and visceral organ weights and cecal traits in modern broilers. *Animals*. 11(3): 845.
- Miles, R.D., G.D. Butcher, P.R. Henry, and R.C. Littell. 2006. Effect of antibiotic growth promoters on broiler performance, intestinal growth

- parameters, and quantitative morphology. *Poultry Science*. 85(3): 476—485.
- Mohamed, M.A. E.F. El-Daly, N.A. Abd El-Azeem, A.W. Youssef, and H.M.A. Hassan. 2014. Growth performance and histological changes in ileum and immune related organs of broilers fed organic acids or antibiotic growth promoter. *International Journal of Poultry Science*. 13(10): 602.
- Mohammadagheri, N., R. Najafi, and G. Najafi. 2016, September. Effects of dietary supplementation of organic acids and phytase on performance and intestinal histomorphology of broilers. In *Veterinary Research Forum*. 7(3): 189.
- Murawska, D., K. Kleczek, K. Wawro, and D. Michalik. 2011. Age-related changes in the percentage content of edible and non-edible components in broiler chickens. *Asian-Australasian Journal of Animal Sciences*. 24(4): 532—539.
- Mustika, A.A., K. Mohamad, L.N. Sutardi, S. Rabi'ah, U.I. Pangesti, dan S.M. Leluala. 2022. Performa broiler dengan pemberian jamu kombinasi jahe, kunyit, dan temulawak. *Acta VETERINARIA Indonesiana*. 10(3): 253—261.
- Nahm, K. H. 2002. Efficient feed nutrient utilization to reduce pollutants in poultry and swine manure. *Critical Reviews in Environmental Science and Technology*. 32(1):1—16.
- Namroud, N.F., M. Shivazad, and M. Zaghari. 2008. Effects of fortifying low crude protein diet with crystalline amino acids on performance, blood ammonia level, and excreta characteristics of broiler chicks. *Poultry science*. 87(11): 2250—2258.
- Nasrin, M., M.N.H. Siddiqi, M.A. Masum, and M.A. Wares. 2012. Gross and histological studies of digestive tract of broilers during postnatal growth and development. *Journal of the Bangladesh Agricultural University*. 10(1): 69—77.
- Nasrin, M., M.N.H. Siddiqi, M.A. Masum, and M.A. Wares. 2012. Gross and histological studies of digestive tract of broilers during postnatal growth and development. *Journal of the Bangladesh Agricultural University*. 10(1): 69—77.
- Nasrullah, Makmun, A. Ramadhany, L. Ermansyah, J. A. Munawar, A. Nurzamin, R. A. Nurrohmah, A. Zaironi, dan V. A. Kurniawan. 2022. *Statistik Peternakan dan Kesehatan Hewan*. Kementerian Pertanian RI. Bogor.
- National Research Council (NRC). 1994. *Nutrient Requirements of Poultry*. 9th Revised Edition. National Academy Press.
- Ningsih, K.W., N. Suthama, F. Wahyono, and L. Krismiyanto. 2019. Kinerja hati pada ayam broiler yang diberi ekstrak buah mengkudu (*Morinda*

- citrifolia* L.). In Prosiding SNPBS (Seminar Nasional Pendidikan Biologi dan Saintek). 155—159.
- Nkukwana, T.T., V. Muchenje, P.J. Masika, and B. Mushonga. 2015. Intestinal morphology, digestive organ size and digesta pH of broiler chickens fed diets supplemented with or without Moringa oleifera leaf meal. *South African Journal of Animal Science*. 45(4): 362—370.
- Nova, R., dan D. Abdullah. 2025. *Curcuma xanthorrhiza* roxb. dalam manajemen kesehatan pencernaan: integrasi perspektif biomedik, genomik, dan etnomedisin Indonesia. *Journal of Public Health Science*. 2(1): 118—125.
- Nugroho, D., dan R. Setiawan. 2022. Dampak fluktuasi harga pakan pada efisiensi produksi unggas. *Poultry Production Jurnal*. 14(1): 98—105.
- Nurhayati, N., B. Berliana, and N. Nelwida. 2020. Massa protein dan lemak daging dada pada ayam broiler yang mengkonsumsi ransum mengandung bawang hitam. *Sains Peternakan: Jurnal Penelitian Ilmu Peternakan*. 18(1): 15—22.
- Nursiam, I., M. Ridla, N. Nahrowi, W. Hermana, and A. Jayanegara. 2022. A meta-analysis of fiber ratio effects on growth performance, gastrointestinal traits, and nutrient digestibility of broiler chickens. *Journal of World's Poultry Research*. 12(2): 77—84.
- Olomu, J.M. and S.A. Offiong. 1980. The effects of different protein and energy levels and time of change from starter to finisher ration on the performance of broiler chickens in the tropics. *Poultry Science*. 59(4): 828—835.
- Oso, A.O., R.U. Suganthi, G.M. Reddy, P.K. Malik, G. Thirumalaisamy, V.B. Awachat, S. Selvaraju, A. Arangasamy, and R. Bhatta. 2019. Effect of dietary supplementation with phytogenic blend on growth performance, apparent ileal digestibility of nutrients, intestinal morphology, and cecal microflora of broiler chickens. *Poultry science*. 98(10): 4755—4766.
- Ouyang, K., M. Xu, Y. Jiang, and W. Wang. 2016. Effects of alfalfa flavonoids on broiler performance, meat quality, and gene expression. *Canadian Journal of animal science*. 96(3): 332—341.
- Partonowati, P., A. Ahwan, dan F. Qonitah. 2021. Uji aktivitas antibakteri ekstrak etanol daun adas (*Foeniculum Vulgare* Mill) terhadap bakteri *pseudomonas aeruginosa*. (Doctoral dissertation, Universitas Sahid Surakarta).
- Pearse, G. 2006. Normal structure, function and histology of the thymus. *Toxicologic pathology*. 34(5): 504—514.
- Perdinan, A., Y.N. Larasati, P. Lestari, dan S.A. Salsabila. 2025. Mikroflora saluran pencernaan, morfologi usus, dan pertambahan bobot badan ayam broiler yang diberi ransum dengan penambahan asam

- humat. Jurnal Pengembangan Penyuluhan Pertanian. 22(1): 21—35.
- Pertiwi, D.D.R., R. Murwani, dan T. Yudiarti. 2017. Bobot relatif saluran pencernaan ayam broiler yang diberi tambahan air rebusan kunyit dalam air minum. Jurnal Peternakan Indonesia (Indonesian Journal of Animal Science). 19(2): 61—65.
- Platel, K., and K. Srinivasan. 2004. Digestive stimulant action of spices: a myth or reality?. Indian Journal of Medical Research. 119(5):167.
- Pradesa, B.A. 2025. Penggunaan side mode terhadap keseragaman (uniformity) average body weight ayam broiler di peternakan ayam dekem tengah sawah peterongan Jombang. Integrative Perspectives of Social and Science Journal. 1738—1758.
- Prasetyo, T., dan N. Lestari. 2019. Pengaruh pemberian pakan terhadap kesehatan metabolik ayam broiler. Jurnal Veteriner Indonesia. 14(4): 55—63.
- Pudiasutiningtyas, N., N. Mubin, L.I. Safitri, and H. Kusumayanti. 2015. Diversifikasi kunyit (*Curcuma domestica*) dan kencur (*Kaempferia galanga* L.) sebagai minuman herbal serbuk siap saji. Metana. 11(01).
- Pujianti, A., A. Jaelani, and N. Widaningsih, 2013. Penambahan tepung kunyit (*Curcuma domestica*) dalam ransum terhadap daya cerna protein dan bahan kering pada ayam pedaging. Ziraa'ah Majalah Ilmiah Pertanian. 36(1): 49—59.
- Purnata, I.D.A., I.K. Berata, dan I.M. Kardena. 2018. Studi perkembangan histologi jejunum ayam broiler yang diberikan suplemen asam butirat. Indonesia Medicus Veterinus. 7(5): 531—539.
- Putnam, P.A. 1991. Handbook of animal science. Elsevier.
- Putra, B., dan F. Santoso. 2023. Peningkatan mortalitas ayam broiler akibat tekanan biaya produksi. Indonesian Livestock Research Journal. 19(3): 245—252.
- Putri, S., dan R. Hadi. 2021. Kajian formulasi pakan konsentrat untuk ayam broiler. Jurnal Peternakan Tropis. 7(1): 75—82.
- Putri, S.E., F.M. Abdullah, R. Septiyaningsih, F. Aulia, dan T.P. Rahayu. 2025. Nutrisi seimbang untuk unggas: memahami pentingnya protein dan serat: balanced nutrition for poultry: understanding the importance of protein and fiber. Jurnal Ilmiah Ilmu-Ilmu Peternakan. 28(1): 1—11.
- Rahmatillah, Z., Khairunisak, Firdus, dan Allaily. 2024. Literatur review: potensi bahan lokal alami di Indonesia sebagai pakan ayam broiler. Jurnal Ilmiah Peternakan. 6(2): 52—62.

- Rajput, N., N. Muhammad, R. Yan, X. Zhong, and T. Wang. 2013. Effect of dietary supplementation of curcumin on growth performance, intestinal morphology and nutrients utilization of broiler chicks. *The Journal of Poultry Science*. 50(1): 44—52.
- Rani, R., H.M. Golbar, and S.M.A. Rauf. 2020. Gross anatomy and morphometry of selected visceral organs of broiler chicken at different age groups. *Asian Journal of Medical and Biological Research*. 6(3): 555—563.
- Ratnani, R.D., I. Hartati, and L. Kurniasari. 2012. Potensi produksi andrographolide dari sambiloto (*Andrographis paniculata* Nees) melalui proses ekstraksi hidrotropi. *Majalah Ilmiah Momentum*. 8(1).
- Ravi, S., A. Biswas, G. Kolluri, G. Pipaliya, C. Deo, J. Rokade, K. Goyari, and P. Parte. 2025. Effect of dietary supplementation of herbal immuno-modulator on growth performance, immune response and serum biochemical indices of broiler chickens. *Scientific Reports*. 15(1): 39771.
- Rido, M., A. S. Imanullah, N. Erni, dan N. Fatmarischa. 2025. Pengaruh proporsi pemberian pakan terhadap intake protein, laju pertumbuhan dan konversi ransum ayam broiler. *Jurnal Media Informatika*. 7(1): 62—68.
- Rijal, S., N. Humaidah, dan D. Suryanto. 2023. Pengaruh pemberian feed addittivetepung bawang dayak (*Eleutherine bulbosa*) melalui pakan terhadap histomorfologi usus halus broiler. *Jurnal Dinamika Rekasatwa*. 6(2).
- Rostagno, M.H. 2020. Effects of heat stress on the gut health of poultry. *Journal of Animal Science*. 98(4).
- Satimah, S., V.D. Yuniyanto, dan F. Wahyono. 2019. Bobot relatif dan panjang usus halus ayam broiler yang diberi ransum menggunakan cangkang telur mikropartikel dengan suplementasi probiotik *Lactobacillus sp.* *Jurnal Sain Peternakan Indonesia*. 14(4): 396—403. <https://doi.org/10.31186/jspi.id.14.4.396-403>.
- Sayrafi, R., N. Mirzakhani, and R. Mobaseri. 2017. Effects of turmeric (*Curcuma longa*) and vitamin E on histopathological lesions induced in bursa of Fabricius of broiler chicks by salinomycin. In *Veterinary Research Forum*. 8(3): 231.
- Sharifi-Rad, J., A. Sureda, G.C. Tenore, M. Daglia, M. Sharifi-Rad, M. Valussi, R. Tundis, M. Sharifi-Rad, M.R. Loizzo, A.O. Ademiluyi, and R. Sharifi-Rad. 2017. Biological activities of essential oils: From plant chemoecology to traditional healing systems. *Molecules*. 22(1): 70.
- Sholiha, K., N.D. Dono, and B. Ariyadi. 2023. Growth performance and intestinal health of broiler chickens supplemented with coriander oil nanoemulsion in drinking water. *Tropical Animal Science Journal*. 46(1): 55—62.

- Sieo, C.C., N. Abdullah, W.S. Tan, and Y.W. Ho. 2005. Influence of β -glucanase-producing *Lactobacillus* strains on intestinal characteristics and feed passage rate of broiler chickens. *Poultry Science*. 84(5): 734—741.
- Sinurat, A.P., T. Haryati, M. Purba, T. Pasaribu, Y. Irawan, R.H. Setyawan, F. Saputra, M. Ilyas, N. Miraya, and S. Sumiati. 2025. Evaluation of *Curcuma xanthorrhiza* Roxb. extract as a functional alternative to antibiotic growth promoters in broiler chicken nutrition. *Veterinary World*. 18(7): 1944.
- Sjofjan, O., D.N. Adli, M.H. Natsir, and A. Kusumaningtyaswati. 2020. Pengaruh kombinasi tepung kunyit (*Curcuma domestica* Val.) dan probiotik terhadap penampilan usus ayam pedaging. *Jurnal Nutrisi Ternak Tropis dan Ilmu Pakan*. 2(1).
- Sturkie P.D. 1976. *Avian Physiology*. Edisi ke-3. New York (US): Springer Verlag.
- Sulistiyanto, B., S. Kismiati, and C.S. Utama. 2019. Tampilan produksi dan efek imunomodulasi ayam broiler yang diberi ransum berbasis wheat pollard terolah. *Jurnal Veteriner*. 20(3): 352—359.
- Sunder, J., T. Sujatha, A. Raja, and A. Kundu. 2016. Immunomodulatory effect of *Morinda citrifolia* and *Andrographis paniculata* on expression of toll-like receptors in Nicobari fowl. *The Indian Journal of Animal Sciences*. 86(9): 1006—1008.
- Supartini, N. 2008. Efek feed suplemen (*viterna*) terhadap penampilan produksi ayam pedaging fase finisher. *Buana Sains*. 8(2): 131—140.
- Suryani, M., R. Kusuma, dan D. Wahyuni. 2023. Tren konsumsi daging ayam di Indonesia dan dampaknya terhadap peternakan unggas. *Jurnal Agribisnis Indonesia*. 11(3): 321—330.
- Svihus, B. 2011. The gizzard: function, influence of diet structure and effects on nutrient availability. *World's Poultry Science Journal*. 67(2): 207—224.
- Svihus, B. 2014. Function of the digestive system. *Journal of Applied Poultry Research*. 23(2): 306—314.
- Swarayana, I.M.I., I.W. Sudira, dan I.K. Berata. 2012. Perubahan histopatologi hati mencit (*Mus musculus*) yang diberikan ekstrak daun ashitaba (*Angelica keiskei*). *Buletin veteriner udayana*. 4(2): 119—125.
- Taghdisi, A. and S. Hejazi. 2019. The effect of *Zingiber officinale* on the spleen tissue and antibody titer of broiler chickens. *Journal of Morphological Sciences*. 36(01): 046—050.
- Temim, S., A. M. Chagneau, S. Guillaumin, J. Michel, R. Peresson, P. A. Geraert, dan S. Tesseraud. 1999. Effects of chronic heat exposure and protein intake on growth performance, nitrogen retention and

- muscle development in broiler chickens. *Reprod Nutr Dev.* 39(1): 145—156.
- Tizard, I.R. 1988. *Pengantar Imunologi Veteriner*. Penerjemah Soehardjo H. Universitas Airlangga. Surabaya.
- Tugiyanti E. and E. Susanti. 2021. Profile the digestive organs of broiler chickens including crop weight, liver and intestine weight *International Journal of Veterinary Sciences and Animal Husbandry*, 6(3): 04—08. <https://doi.org/10.22271/veterinary.2021.v6.i3a.350>.
- Ukim, C.I., G.S. Ojewola, C.O. Obun, and E.N. Ndelekwute. 2012. Performance and carcass and organ weights of broiler chicks fed graded levels of Acha grains (*Digitaria exilis*). *Journal of Agriculture and Veterinary Science.* 1(2): 01—07.
- Usman, A.N.R. 2010. *Pertumbuhan Ayam Broiler (Melalui Sistem Pencernaannya) yang Diberi Pakan Nabati dan Komersial dengan Penambahan Dysapro*.
- Varianti, N.I., U. Atmomarsono, dan L.D. Mahfudz. 2017. Pengaruh pemberian pakan dengan sumber protein berbeda terhadap efisiensi penggunaan protein ayam lokal persilangan. *Jurnal Agripet.* 17(1): 53—59.
- Vertiprakhov, V.G., A.A. Grozina, and A.M. Dolgorukova. 2016. The activity of pancreatic enzymes on different stages of metabolism in broiler chicks. *Sel'skokhozyaistvennaya biologiya [Agricultural Biology]*. 4(51): 509—515.
- Wandono, Y.T., B. Brata, and H. Prakoso. 2013. Persentase organ dalam dan deposisi lemak broiler yang diberi pakan tambahan tepung kelopak bunga Rosella (*Hibiscus sabdariffa* Linn). *Jurnal Sain Peternakan Indonesia.* 8(1): 225905.
- Wang, M.Y., B.J. West, C.J. Jensen, D. Nowicki, C. Su, A.K. Palu, and G. Anderson. 2002. *Morinda citrifolia* (Noni): a literature review and recent advances in Noni research. *Acta Pharmacologica Sinica.* 23(12): 1127—1141.
- Warmasari N.W.M., D.K. Ernawati, A.W. Indrayani, N.W.S. Dewa, dan I.M. Jawi. 2020. Antibacterial activity from temulawak extract (*Curcuma Xanthorrhiza* Roxb) on growth inhibition of *Staphylococcus epidermidis* in vitro. *Jurnal Epidemiologi Kesehatan Komunitas.* 5(1): 1—7.
- Wassie, T., Z. Lu, X. Duan, C. Xie, K. Gebeyew, Z. Yumei, Y. Yin dan X. Wu. 2021. Dietary Enteromorpha polysaccharide enhances intestinal immune response, integrity, and caecal microbial activity of broiler chickens. *Frontiers in Nutrition.* 8: 783819.

- Wibowo, N.R., dan M.A. Wahyuningrum. 2017. Pengaruh pemberian tepung meniran/*Phyllanthus niruri* linn. pada ransum terhadap kadar hemoglobin dan hematokrit ayam broiler. *Jurnal Ilmiah Respati*. 8(2).
- Wickramasuriya, S.S., I. Park, K. Lee, Y. Lee, W.H. Kim, H. Nam, and H.S. Lillehoj. 2022. Role of physiology, immunity, microbiota, and infectious diseases in the gut health of poultry. *Vaccines*. 10(2): 172.
- Widodo, E. 2018. *Ilmu Nutrisi Unggas*. Universitas Brawijaya Press.
- Widodo, N., H. Khasanah, R. Yulianto, D.C. Widianingrum, dan H.P. Utami. 2025. Efektivitas kulit buah naga sebagai feed additive terhadap profil saluran pencernaan ayam broiler dengan cekaman panas. *Journal of Innovation Research and Knowledge*. 4(10): 7967—7976.
- Windisch, W., K. Schedle, C. Plitzner, dan A. Kroismayr. 2008. Use of phytogenic products as feed additives for swine and poultry. *Journal of animal science*. 86(14): E140—E148.
- Woyengo, T.A., K.B. Knudsen, and C.F. Børsting. 2023. Low-protein diets for broilers: current knowledge and potential strategies to improve performance and health, and to reduce environmental impact. *Animal Feed Science and Technology*. 297: 115574.
- Wu, G. 2013. Functional amino acids in nutrition and health. *Amino acids*. 45(3): 407—411.
- Wu, G., F.W. Bazer, Z. Dai, D. Li, J. Wang, and Z. Wu. 2014. Amino acid nutrition in animals: protein synthesis and beyond. *Annu. Rev. Anim. Biosci*. 2(1): 387—417.
- Yaman M.A. 2010. Ayam Kampung Unggul 6 Minggu Panen. Jakarta (ID): Penebar Swadaya.
- Yuliani, N.S., G.Y. Sakan, and N.P.F. Suryatni. 2022. The effect of herb and yeast addition on the organ profile and digestive tract of broiler chickens. *Buletin Veteriner Udayana*. 14(3): 255—262.
- Yuwanta, T. 2004. *Dasar Ternak Unggas*. Kanisius. Yogyakarta.
- Zainuddin, Z., D. Masyita, Fitriani, Sarayulis, M. Jalaluddin, E. Rahmi, and I. Nasution. 2016. Gambaran histologi kelenjar intestinal pada duodenum ayam kampung (*Gallus domesticus*), merpati (*Columba domesticus*) dan bebek (*Anser anser domesticus*). *Jurnal Medika Veterinaria*. 10(1): 9—11.
- Zeng, Z., S. Zhang, H. Wang, and X. Piao. 2015. Essential oil and aromatic plants as feed additives in non-ruminant nutrition: a review. *Journal of animal science and biotechnology*. 6(1): 7.