

DAFTAR PUSTAKA

- Abreu, V., P. Abreu, F. Jaenisch, A. Coldebella dan D. Paiva. 2011. Effect of floor type (dirt or concrete) on litter quality, house environmental conditions, and performance of broilers. *Braz. J. Poult. Sci.* 13(2): 127-137.
- Adedokun, S. A., P. Jaynes, M. E. Abd El-Hack, R. L. Payne, dan T. J. Applegate. 2014. Standardized ileal amino acid digestibility of meat and bone meal and soybean meal in laying hens and broilers. *Poult. Sci* 93:420–428.
- Afsharmanesh, M. dan Pourreza, J. 2005. Effects of calcium, citric acid, ascorbic acid and vitamin D3 on the efficacy of microbial phytase in broiler starters fed wheat based diets. *Int. J. Poult. Sci.* 4: 418-424.
- Agustina, A. S. 2019. Pengaruh Penambahan Ion Logam Ca^{2+} Dan Na^{+} pada Prebiotik Dari Kulit Singkong Terhadap Kualitas Ayam Pedaging (Broiler). Thesis. Program Pascasarjana. Universitas Hasanuddin. Makassar.
- Akande, K. 2016. The potential of jack bean (*Canavalia ensiformis*) as a replacement for soybean (*Glycine max*) in broiler starter and finisher diets. *Am. J. Exp. Agric.* 11:1–8.
- Alcala, A., B. Osborne, B. Allen, A. Seaton-Terry, T. Kirkland, dan M. Whalen. 2022. Toll-like receptors in the mechanism of tributyltin-induced production of pro-inflammatory cytokines, IL-1 β and IL-6. *J. Toxicol.* 472: 1 – 10.
- Ali, Q., S. Ma, S. La, Z. Guo, B. Liu, Z. Gao, U. Farooq, Z. Wang, X. Zhu, Y. Cui, D. Li, dan Y. Shi. 2022. Microbial short-chain fatty acids: a bridge between dietary fibers and poultry gut health — A review. *Anim. Biosci.* 35:1461–1478.
- Amere Subbarao, S. 2021. Cancer vs. SARS-CoV-2 induced inflammation, overlapping functions, and pharmacological targeting. *Inflammopharmacology.* 29:343–366.
- Annur, C. M. 2023. Nilai Impor Kedelai Indonesia Naik Meski Volumennya Turun pada 2022. <https://databoks.katadata.co.id/datapublish/2023/06/13/nilai-impor-kedelai-indonesia-naik-meski-volumennya-turun-pada-2022>. Diakses pada 13 Desember 2023, 08.26 WIB.
- AOAC International. 2005. Official Methods of Analysis. Association of Official Analytical Chemists. 18th ed. Washington DC.
- Applegate, T. J., G. Schatzmayr, K. Prickett, C. Troche, dan Z. Jiang. 2009. Effect of aflatoxin culture on intestinal function and nutrient loss in laying hens. *Poult. Sci.* 88:1235–1241.
- Arise, A. K., S. A. Malomo, C. Ihuoma Cynthia, N. A. Aliyu, dan R. O. Arise. 2022. Influence of processing methods on the antinutrients, morphology and in-vitro protein digestibility of jack bean. *Food. Chem.* 1:100078.

- Ariyantoro, A.R., D. R. Affandi, A. Yulviatun, D. Ishartani dan A. Septiarani. 2021. Pasting properties of jack bean (*Canavalia ensiformis*) modified starch with heat moisture treatment. IOP Publishing. The 8th International Conference on Sustainable Agriculture and Environment. Surakarta.
- ASOHI. 2018. Asosiasi Obat Hewan Indonesia. Perkembangan Produksi Pakan Indonesia dan Prediksi Produksi 2019. https://www.asohi.org/index.php?option=com_phocadownload&view=categor&download=22:revisi-dirpakan&id=4:materi-seminar. Diakses pada 30 Oktober 2023, 14.00 WIB.
- Baker, D.H. 2009. Advances in protein-amino acid nutrition of poultry. J. Amino Acids. 37:29-41.
- Baratawidjaya, K. G. dan I. Rengganis. 2009. Imunologi Dasar. Ed. Ke-8. Fakultas Kedokteran Universitas Indonesia. Jakarta.
- Barua, M., M. R. Abdollahi, F. Zaefarian, T. J. Wester, C. K. Girish, dan V. Ravindran. 2020. Standardized ileal amino acid digestibility of protein sources for broiler chickens is influenced by the feed form. Poult. Sci 99:6925–6934.
- Betancur-Ancona, D., S. Gallegos-Tintoré, A. Delgado-Herrera, V. Pérez-Flores, A. Castellanos Ruelas, dan L. Chel-Guerrero. 2008. Some physicochemical and antinutritional properties of raw flours and protein isolates from *Mucuna pruriens* (velvet bean) and *Canavalia ensiformis* (jack bean). Food Sci. Technol. Int. 43:816–823.
- Birt, D. F., T. Boylston, S. Hendrich, J.L. Jane, J. Hollis, L. Li, dan K. Schalinske. 2013. Resistant starch: promise for improving human health. Adv. Nutr. 4(6): 587–601.
- BPS. 2022. Produksi daging ayam ras pedaging menurut provinsi (ton), 2019-2021. Badan Pusat Statistik. Direktorat jenderal Peternakan dan Kesehatan Hewan. Jakarta.
- Calenge F, Kaiser P, Vignal A, dan Beaumont C. 2010. Genetic control of Resistance to salmonellosis and Salmonella carrier-state in fowl: a review. Genet. Sel. Evol. 42: 1-11.
- Carbone G, A. Wilson, S. A. Diehl, J. Bunn, S. M. Cooper, dan M. Rincon. 2013. Interleukin-6 receptor blockade selectively reduces IL-21 production by CD4 T cells and IgG4 autoantibodies in rheumatoid arthritis. Int. J. Biol. Sci. 9: 279–288.
- Chen Q., H. Wang, Y. Liu, Y. Song, L. Lai, Q. Han, X. Cao, dan Q. Wang. 2012. Inducible microRNA-223 down-regulation promotes TLR-triggered IL-6 and IL-1 β production in macrophages by targeting STAT3. PLoS ONE 7: 42971.
- Chen, X., K. Naehrer, dan T. Applegate. 2016. Interactive effects of dietary protein concentration and aflatoxin B1 on performance, nutrient digestibility, and gut health in broiler chicks. Poult. Sci. 95:1312–1325.

- Chen, Y., J. Lin, Y. Zhao, X. Ma, dan H. Yi. 2021. Toll-like receptor 3 (TLR3) regulation mechanisms and roles in antiviral innate immune responses. *J. Zhejiang Univ. Sci. B.* 22(8): 609–632.
- Chung, T.K. dan D.H. Baker. 1992. Ideal amino acid pattern for 10-kilogram pigs. *J. of Anim. Sci.* 70: 3102-3111.
- Clarke, E., dan J. Wiseman. 2007. Effects of extrusion conditions on trypsin inhibitor activity of full fat soybeans and subsequent effects on their nutritional value for young broilers. *Br. Poult. Sci.* 48:703–712
- Cousens, L. S., D. Gallwitz, dan B. M. Alberts. 1979. Different accessibilities in chromatin to histone acetylase. *J. Biol. Chem.* 254:1716–23.
- Davies, N. T. dan Nightingale R. 1975. The effect of pyrate on intestinal absorption and secretion of zinc and manganese in rats. *Br. J. Nutr.* 34(2): 243-258.
- de Benedetti, F., H. I. Brunner, N. Ruperto, A. Kenwright, S. Wright, I. Calvo, R. Cuttica, A. Ravelli, R. Schneider, dan P. Woo. 2012. Randomized trial of tocilizumab in systemic juvenile idiopathic arthritis. *N. Engl. J. Med.* 367: 2385–2395.
- de Coca-Sinova, A., D. G. Valencia, E. Jimenez-Moreno, R. Lazaro, and G. G. Mateos. 2008. Apparent ileal digestibility of energy, nitrogen, and amino acids of soybean meals of different origin in broilers. *Poult. Sci.* 87:2613–2623.
- de Meireles, L. C., K. Bertoldi, L. R. Cechinel, B. L. Schallenberger, V. K. da Silva, N. Schröder, dan I. R. Siqueira. 2016. Treadmill exercise induces selective changes in hippocampal histone acetylation during the aging process in rats. *Neurosci. Lett.* 634: 19-24.
- De, K. 2021. Trypsin Inhibitor, the hidden enemy in Soyabean Meal. https://en.engormix.com/poultry-industry/enzymes-poultry-nutrition/trypsin-inhibitor-hidden-enemy_a47547/. Diakses pada 13 Januari 2024, 10.50 WIB.
- Deehan, E. C., C. Yang, M. E. Perez-Muñoz, N. K. Nguyen, C. C. Cheng, L. Triador, Z. Zhang, J. A. Bakal, dan J. Walter. 2020. Precision Microbiome Modulation with Discrete Dietary Fiber Structures Directs Short-Chain Fatty Acid Production. *Cell Host Microbe.* 27:389-404.e6.
- del Porto F., M. Proietta, L. Tritapepe, F. Miraldi, A. Koverech, P. Cardelli, F. Tabacco, V. de Santis, A. Vecchione, A.P. Mitterhofer, I. Nofroni, R. Amodeo, M. Trappolini, dan G. Aliberti. 2010. Inflammation and immune response in acute aortic dissection. *Ann. Med.* 42(8): 622–629.
- Deng, F., 1, S. Tang, H. Zhao, R. Zhong, L. Liu, Q. Meng, H. Zhang, dan L. Chen. 2023. Combined effects of sodium butyrate and xylo-oligosaccharide on growth performance, anti-inflammatory and antioxidant capacity, intestinal morphology and microbiota of broilers at early stage. *Poult. Sci.* 102:102585.
- Dinarelo, C. A. 2007. Historical insights into cytokines. *Eur. J. Immunol.* 37.

Direktorat Jenderal Peternakan dan Kesehatan Hewan. 2021. Kementan: alokasi impor GPS sudah sesuai kalkulasi. <https://ditjenpkh.pertanian.go.id/berita/1295-kementan-alokasi-impor-gps-sudah-sesuai-kalkulasi>. Diakses pada 13 Desember 2023, 08.03 WIB.

Doss, A., Pugalenth, M., Vadivel, V. G., Subhashini, G., dan A. R. Subash. 2011. Effects of processing technique on thenutritional composition and antinutrients content of under-utilized food legume *Canavalia ensiformis* L.DC. *Int. Food Res. J.* 18(3), 965–970.

Egan, S. V., H. H. Yeoh, dan J. H. Bradbury. 1998. Simple picrate paper kit for determination of the cyanogenic potential of cassava flour. *J. Sci. Food Agric.* 76: 39 – 48.

Elhassan, M., A. A. Taha, L. Eissa, A. M. Ali, dan M. M. O. Elhassan. 2022. Histology of the small intestine of broiler chicks Biosecurity Status of Poultry Farms in Khartoum State, Sudan View project Histology of the small intestine of broiler chicks. *Univ. Bahri J. Vet. Sci.* 1(2):55-61.

Elia, M., dan J. H. Cummings. 2007. Physiological aspects of energy metabolism and gastrointestinal effects of carbohydrates. *Eur. J. Clin. Nutr.* 61:S40–S74.

Ellis, N. dan C. R. Belmar. 1985. La composicion quimica del grano de *Canavalia ensiformis* en valor nutritive y sus factores toxicos, pp. 16 – 29. Universidad Autonoma de Yucatan, Merida, Yucatan, Mexico.

Emmert, J. L. dan Baker, D.H. 1997. Use of the ideal protein concept for prediction formulation of amino acid levels in Broiler Diets. *Appl. Pro. Res.* 6: 462- 470.

FAO. 2020. The State of Food Security and Nutrition in theWorld 2020. Transforming food systems for affordable healthy diets. FAO. Rome, Italy.

Food and Agriculture Organization (FAO)/IAEA. 2000. Working document (lab manual), Quantification of tannins in tree foliage. Vienna. IAEA, 1-3.

García-Villalba, R., J. A. Giménez-Bastida, M. T. García-Conesa, F. A. Tomás-Barberán, J. Carlos Espín, dan M. Larrosa. 2012. Alternative method for gas chromatography-mass spectrometry analysis of short-chain fatty acids in faecal samples. *J. Sep. Sci.* 35:1906–1913.

Garcia, A., dan A. B. Batal. Metabolism And Nutrition: Changes in the Digestible Lysine and Sulfur Amino Acid Needs of Broiler Chicks during the First Three Weeks Posthatching. *Poult. Sci.* 84:1350–1355.

Gobel, R. A., L. S. Kalangi, dan M. A. v Manese. 2022. Analisis pendapatan peternak ayam broiler dengan open house system dan closed house system di Kabupaten Minahasa Utara. *Zootec.* 42(2) : 317-326.

Grastand, S., K. Itani, S. L. Benestad, O. Oines, B. Svihus, dan M. Kaldhusdal. 2020. Varying starch to fat ratios in pelleted diets:II. Effects on intestinal

- histomorphometry, *Clostridium perfringens* and short-chain fatty acids in *Eimeria*-challenged broiler chickens. *Br. Poult. Sci.* 62(1): 92 – 100.
- Guilloteau, P., L. Martin, V. Eeckhaut, R. Ducatelle, R. Zabielski, F. V. Immerseel. 2010. From the gut to the peripheral tissues: The multiple effects of butyrate. *Nutr. Res. Rev.* 23: 366–384.
- Guo, S., Y. Zhang, Q. Cheng, J. Xv, Y. Hou, X. Wu, E. Du, dan B. Ding. 2020. Partial substitution of fermented soybean meal for soybean meal influences the carcass traits and meat quality of broiler chickens. *Animals.* 10.
- Hall, H. N., H. V. M. O'Neill, D. Scholey, E. Burton, M. Dickinson, dan E. C. Fitches. 2018. Amino acid digestibility of larval meal (*Musca domestica*) for broiler chickens. *Poult. Sci.* 97:1290–1297.
- Hamed, S. A., A. Mohan, S. N. Krishnan, A. Wang, M. Drikk, N. L. Prince, I. A. Lewis, J. Shearer, Å. V. Keita, J. D. Söderholm, T. E. Shutt, dan D. M. McKay. 2023. Butyrate reduces adherent-invasive *E. coli*-evoked disruption of epithelial mitochondrial morphology and barrier function: involvement of free fatty acid receptor 3. *Gut. Microbes.* 15(2):2281011.
- Hang Q, D. Wu, H. Li, S. Mahfuz, dan X. Pia. 2020. The impact of wheat bran on the morphology and physiology of the gastrointestinal tract in broiler chickens. *Animals.* 10(10):1831.
- Hartadi, H. S., Kustantinah, R. E. Indarto, N. D. Dono, dan Zuprizal. 2008. *Nutrisi Ternak Dasar*. Fakultas Peternakan. Universitas Gadjah Mada. Yogyakarta.
- He, W., P. Li, dan G. Wu. 2021. Amino acid nutrition and metabolism in chickens. *Adv. Exp. Med. Biol.* 1285:109-131.
- Hedemann, M. S., dan K. E. Bach Knudsen. 2007. Resistant starch for weanin-pigs - Effect on concentration of short chain fatty acids in digesta and intestinal morphology. *Livest. Sci.* 108:175–177.
- Heger, J., Wiltafsky, M., dan Zelenka, J., 2016. Impact of different processing cessing of full-fat soybeans on broiler performance. *Czech J. Anim. Sci.* 61:57-66.
- Herawati, H. 2011. Potensi pengembangan produk pati tahan cerna sebagai pangan fungsional. *Jurnal Litbang Pertanian.* Vol. 30(1): 31 – 39.
- Hoover, R., dan F. W. Sosulski. 1991. Composition, structure, functionality, and chemical modification of legume starches: a review. *Can. J. Physiol. Pharmacol.* 69(1):79-92.
- Idriss, H. T . dan J. H. Naismith. 2000. TNF alpha and the TNF receptor superfamily: structure-function relationship(s). *Microsc. Res. Tech.* 50(3):184-95.

- Ihim, S. A., S. D. Abubakar, Z. Zian, T. Sasaki, M. Saffarioun, S. Maleknia, dan G. Azizi. 2022. Interleukin-18 cytokine in immunity, inflammation, and autoimmunity: Biological role in induction, regulation, and treatment. *Front. Immunol.* 13.
- J. D. Latshaw dan L. Zhao. 2011. Dietary protein effects on hen performance and nitrogen excretion. *Poult. Sci.* 90: 99-106.
- Jacob, J., dan Pescatore, T. 2013. *Avian Digestive System*. Animal Sciences. University of Kentucky College of Agriculture. Lexington, US.
- Jahanian, R., dan E. Rasouli. 2016. Effect of extrusion processing of soybean meal on ileal amino acid digestibility and growth performance of broiler chicks. *Poult. Sci.* 95:2871–2878.
- Jayanti, A. Marsiz, Sudarman, A. Mutia, dan Rita. 2017. Pemanfaatan Koro Pedang (*Canavalia ensiformis*) sebagai Substitusi Bungkil Kedelai dalam Ransum Ayam Pedaging. Repository IPB. <http://repository.ipb.ac.id/handle/123456789/88671>
- Jia, L. X., W. M. Zhang, H. J. Zhang, T. T. Li, Y. L. Wang, Y. W. Qin, H. Gu, dan J. Du. 2015. Mechanical stretch-induced endoplasmic reticulum stress, apoptosis and inflammation contribute to thoracic aortic aneurysm and dissection, *J. Pathol.* 236(3): 373–383.
- Johansson, M. E. 2014. Mucus layers in inflammatory bowel disease. *Inflamm. Bowel. Dis.* 20: 2124–2131.
- Kanetro, B., M. Riyanto, D. Pujimulyani, dan N. Huda. 2021. Improvement of Functional Properties of Jack Bean (*Canavalia ensiformis*) Flour by Germination and Its Relation to Amino Acids Profile. *Curr. Res. Nutr. Food Sci.* 9:812–822.
- Kasno, A. 2016. Prospek Aneka Kacang Potensial: Koro Pedang sebagai Pengganti Kedelai. Balai Penelitian Kacang dan Ubi. Malang.
- Kawasaki, T. dan T. Kawai. 2014. Toll-like receptor signaling pathways. *Front. Immunol.* 5(461): 1 – 8.
- Kermanshahi, H., M. R. Akbari, M. Maleki, dan M. Behgar. 2007. Effect of prolonged low level inclusion of aflatoxin B1 into diet on performance, nutrient digestibility, histopathology and blood enzymes of broiler chickens. *J. Anim. Vet. Adv.* 6:686–692.
- Ketaren, P. P. 2010. Kebutuhan gizi ternak unggas di Indonesia. *Wartazoa.* 2(4): 172 - 180.
- Kim, C.H. 2018. Immune regulation by microbiome metabolites. *J. Immunol.* 154(2): 220 – 229.

- Kirchmann, H. dan E. Witter. 1989. Ammonia volatilization during aerobic and anaerobic manure decomposition. *Plant. Soil.* 115: 35–41.
- Kleessen, B., G. Stoof, J. Proll, D. Schmiedl, J. Noack, dan M. Blaut. 1997. Feeding resistant starch affects fecal and cecal microflora and short-chain fatty acids in rats. *J. Anim. Sci.* 75:2453-2462.
- Kutay, H., dan H. R. Kutlu. 2022. Effects of Pre-Starter Feeds Prepared Using Different Sugar Sources on Performance, Carcass Parameters, Internal Organ Development, Intestinal Development and Microbial Load in Broilers. *Turk. J. Agri. Food Sci. and Technol.* 10:1571–1578.
- Lan, R., Z. Zhao, S. Li, dan L. An. 2020. Sodium butyrate as an effective feed additive to improve performance, liver function, and meat quality in broilers under hot climatic conditions. *Poult. Sci.* 99:5491–5500.
- Landon, S. dan H. Salman. 2012. The resistant starch report – food Australia Supplement. 12
- Leeson, S. dan J. D. Summers. 2005. *Commercial Poultry Nutrition*. 3rd ed. Nottingham University Press. England.
- Liao, X., Y. Shao, G. Sun, Y. Yang, L. Zhang, Y. Guo, X. Luo, dan L. Lu. 2020. The relationship among gut microbiota, short-chain fatty acids, and intestinal morphology of growing and healthy broilers. *Poult. Sci.* 99:5883–5895.
- Liener, I. E. 1994. Implications of antinutritional components in soybean foods. *Food Sci.* 34:31.
- Lin, M. Y., M. R. de Zoete, J. P. M. van Putten, dan K. Strijbis. 2015. Redirection of epithelial immune responses by short-chain fatty acids through inhibition of histone deacetylases. *Front. Immunol.* 6: 554.
- Liu H, Wang J, He T, Becker S, Zhang G, Li D, Ma X. 2018. Butyrate: a doubled-edged sword for health? *Adv. Nutr.* 9:21-9.
- Liu, L., Q. Li, Y. Yang, dan A. Guo. 2021. Biological Function of Short-Chain Fatty Acids and Its Regulation on Intestinal Health of Poultry. *Front. Vet Sci* 8.
- Liu, W.C., Y. Guo, Z. H. Zhao, R. Jha, dan B. Balasubramanian. 2020. Algae-derived polysaccharides promote growth performance by improving antioxidant capacity and intestinal barrier function in broiler chickens. *Front. Vet. Sci.* 7:601336.
- Livak, K.J., dan T.D. Schmittgen. 2001. Analysis of relative gene expression data using real-time quantitative PCR and the $2^{-\Delta\Delta CT}$ method. *Methods.* 25(4): 402-408.
- Lv, S., Li, D.F., Xing, J.J., Ma, Y.X., Huang, D.S., Li, J., 2006. Effects of extrusion of corn on growth performance, nutrient digestibility, and short-chain fatty acid profiles in the hindgut of weaned piglets. *Arch. Anim. Nutr.* 60:170–179.

- Maesaroh, U., N. D. Dono, dan Zuprizal. 2022. Performance, microbial populations, and jejunal morphology of broilers supplemented with nano-encapsulated *Graviola* leaf extract. *Trop. Anim. Sci. J.* 45:64–72.
- Maharjan, P., D. A. Martinez, J. Weil, N. Suesuttajit, C. Umberson, G. Mullenix, K. M. Hilton, A. Beitia, dan C. N. Coon. 2021. Review: Physiological growth trend of current meat broilers and dietary protein and energy management approaches for sustainable broiler production. *Animals.* 15.
- Mahendra, R., Z. Azriani, dan R. Kahirati. 2021. Analisis permintaan dan penawaran daging ayam broiler di Sumatera Barat. *J. Agri Sains.* 5(2): 117-123.
- Mahowald, M. A., Rey, F. E., Seedorf, H., Turnbaugh, P. J., Fulton, R. S., dan Wollam, A. 2009. Characterizing a model of the human gut microbiota comprising members of its two dominant bacterial phyla. *Proceedings of the National Academy of Sciences of the United States of America*, 106, 5859.
- Marimuthu, M. dan P. Gurumoorthi. 2013. Physicochemical and functional properties of starches from Indian Jack bean (*Canavalia ensiformis*), an underutilized wild food legume. *J. Chem. Pharm. Res.* 5(1): 221-225.
- Marndi, R. 2012. Isolation and Characterization of Concanavalin A from the seeds of *Canavalia ensiformis*. Thesis Master of Science. Departement of Life Science. National Institute of Technology Rourkela. India.
- Mathius, I. W., dan A. P. Sinurat. 2001. Pemanfaatan bahan pakan inkonvensional untuk ternak. *Wartazoa.* 11(2): 20-31.
- Mátis, G., M. Mackei, B. Boomsma, H. Fébel, K. Nadolna, Ł. Szymański, J. E. Edwards, Z. Neogrády, dan K. Kozłowski. 2022. Dietary protected butyrate supplementation of broilers modulates intestinal tight junction proteins and stimulates endogenous production of short chain fatty acids in the caecum. *J. Anim.* 12.
- Meimandipour, A., A. Soleimanifarjam, K. Azhar, M. H. Bejo, M. Shuhaimi, L. Nateghi, dan A. M. Yazid. 2011. Age effects on short chain fatty acids concentrations and pH values in the gastrointestinal tract of broiler chickens. *Arch. Geflugelk.* 75(3): 164- 168.
- Mendez, A., R. E. Vargas, dan C. Michelangeli. 1996. Effects of Concanavalin A, fed as a constituent of jack bean (*Canavalia ensiformis* L.) seeds, on the humoral immune response and performance of broiler chickens. *Poult. Sci.* 77:282-289.
- Milczarek, A., M. Pachnik, M. Osek, dan R. Świnarska. 2022. Rearing Performance and Carcass Composition of Broiler Chickens Fed Rations Containing Guar Meal at Graded Levels. *Agriculture* 12:1385.
- Mirzaei, R., E. Dekhodaie, B. Bouzari, M. Rahimi, A. Gholestani, S. R. Hosseini-Fard, H. Keyvani, A. Teimoori, dan S. Karampoor. 2022. Dual role of

microbiota-derived short-chain fatty acids on host and pathogen. *Biomed. Pharmacother.* 145.

Mullenix, G. J., E. S. Greene, N. K. Emami, G. Tellez-Isaias, W. G. Bottje, G. F. Erf, M. T. Kidd, dan S. Dridi. 2021. *Spirulina platensis* inclusion reverses circulating pro-inflammatory (chemo)cytokine profiles in broilers fed low-protein diets. *Front. Vet. Sci.* 8.

Nakanishi, K. 2018. Unique action of interleukin-18 on t cells and other immune cells. *Front. Immunol.* 9:763.

Nalle, C. L., V. Ravindran, dan G. Ravindran. 2010. Nutritional value of faba beans (*Vicia faba* L.) for broilers: Apparent metabolisable energy, ileal amino acid digestibility and production performance. *Anim. Feed Sci. Technol.* 156:104–111.

Nalle, C. L., V. Ravindran, dan G. Ravindran. 2012. Nutritional value of white lupins (*Lupinus albus*) for broilers: Apparent metabolisable energy, apparent ileal amino acid digestibility and production performance. *Animals.* 6:579–585.

Nascimento Filho, M. A., R. T. Pereira, A. B. S. Oliveira, D. Suckeveris, A. M. Burin Junior, C. A. P. Soares, dan J. F. M. Menten. 2021. Nutritional value of *Tenebrio molitor* larvae meal for broiler chickens: metabolizable energy and standardized ileal amino acid digestibility. *J. Appl. Poult. Res.* 30.

Nasruddin. 2020. Komposisi Nutrisi Pakan Ayam Ras Pedaging masa akhir (*broiler finisher*) dari beberapa bahan pakan loka. *Dinamika Penelitian BIPA.* 21(38): 144-152.

Nastiti, A., A. Murdiati, dan Y. Marsono. 2017. The effect of autoclaved-cooled jack bean (*Canavalia ensiformis* (L.) DC.) high RS-4 starch on lowering glucose level and characteristics of digesta of stz-na induced type-2 diabetes mellitus rats. *Indones. Food Nutr. Prog.* Vol. 14, Issue 2.

Nhlane, L. T., C. M. Mnisi, V. Mlambo, dan M. J. Madibana. 2020. Nutrient digestibility, growth Performance, and blood indices of boschveld chickens fed seaweed-containing diets. *Animals.* 10(8): 1296.

Nikita. 2020. How much water should I consume to flush out toxins and detoxify the body?. <https://www.mediflam.com/blog/how-much-water-should-i-consume-to-flush-out-toxins-and-detoxify-the-body>. Diakses pada 14 Desember 2023, 16.00 WIB.

NRC. 1994. National Research Council; Nutrient Requirements of Poultry. 9th Rev. Ed. National Academy Press. Washington DC. USA.

Pastorelli, H., J. van Milgen, P. Lovatto, dan L. Montagne. 2012. Meta-analysis of feed intake and growth responses of growing pigs after a sanitary challenge. *Animals.* 6:952–961.

- Patterson, P.H. dan Adrizal. 2005. Management strategies to reduce air emissions: emphasis-dust and ammonia. J. Appl. Poult. Res. 14(3): 638-650.
- Peng L., Z. Li, dan R. S. Green. 2009. Butyrate enhances the intestinal barrier by facilitating tight junction assembly via activation of amp-activated protein kinase in caco-2 cell monolayers. J. Nutr. 139: 1619–1625.
- Perdinan, A. dan N. Larasati. 2019. Konsentrasi Short Chain Fatty Acids dan potential Hydrogen dalam Jejunum Ayam Broiler yang Disuplementasi Glukomanan Porang (*Amorphophallus onchophyllus*). Jurnal Pengembangan Penyuluhan Peternakan. 16(29) : 62
- Perez-Cano, F. J., M. Massot-Cladera, M. J. Rodriguez-Lagunas, dan M. Castell . 2014. Flavonoid affect host-microbiota crosstalk through TLR modulation. Antioxidants. 3(4): 649-670.
- Pérez-Reytor, D., C. Puebla, E. Karahanian, dan K. García. 2021. Use of short-chain fatty acids for the recovery of the intestinal epithelial barrier affected by bacterial toxins. Front. Physiol. 12.
- Piccinini, A. M. dan K. S. Midwood. 2014. Illustrating the interplay between the extracellular matrix and microRNAs. Int. J. Exp. Pathol. 95(3):158-80.
- Popkin, B. M., K. E. D'Anci, dan I. H. Rosenberg. 2010. Water, hydration, and health. Nutr. Rev. 68(8): 439 – 458.
- Portincasa, P., L. Bonfrate, M. Vacca, M. de Angelis, I. Farella, E. Lanza, M. Khalil, D. Q. H. Wang, M. Sperandio, dan A. di Ciaula. 2022. Gut Microbiota and Short Chain Fatty Acids: Implications in Glucose Homeostasis. Int. J. Mol. Sci. 23.
- Pusat Data dan Sistem Informasi Pertanian. 2020. Outlook Komoditas Pertanian Tanaman Pangan Kedelai. Sekretariat Jenderal Kementerian Pertanian. Jakarta.
- Puspitojati, E., R. Indrati, M. N. Cahyanto, dan Y. Marsono. 2019. Jack bean as tempe ingredients: The safety study and fate of protein against gastrointestinal enzymes.in IOP Conference Series: Earth and Environmental Science. Institute of Physics Publishing.
- Qin, S., K. Zhang, T. J. Applegate, X. Ding, S. Bai, Y. Luo, J. Wang, H. Peng, Z. Su, Y. Xuan, dan Q. Zeng. 2020. Dietary administration of resistant starch improved caecal barrier function by enhancing intestinal morphology and modulating microbiota composition in meat duck. Br. J. Nutr. 123:172–181.
- Rahmawati, A., A. Murdiati, Y. Marsono, dan S. Anggrahini. 2018. Changes of complex carbohydrates on white jack bean (*Canavalia ensiformis*) during autoclaving-cooling cycles. Curr. Res. Nutr. Food Sci. 6:470–480.
- Regassa, A. dan C. M. Nyachoti. 2018. Application of resistant starch in swine and poultry diets with particular reference to gut health and function. J. Anim. Nutr. 4:305–310.

- Research dan Market. 2019. Global Poultry (Broiler) Market with Focus on US, Brazil& Mexico: Insights, Trends and Forecast (2019–2023). Transboundary Disease News. Research and Markets, Dublin, Ireland.
- Ribeiro, R. S., M. Pinho, L. Falcão-Cunha, dan J. P. B. Freire. 2013. The use of chestnuts (*Castanea sativa* Mill.) as a source of resistant starch in the diet of the weaned piglet. *Anim. Feed Sci. Technol.* 182:111–120.
- Ritz, C. W., B. D. Fairchild, dan M. P. Lacy. 2004. Implications of ammonia production and emissions from commercial poultry facilities: a review. *J. Appl. Poult. Res.* 13:684-692.
- Rohaeni, E. S., T. Yuwanta, dan Zuprizal. 2003. Penampilan dan nitrogen ekskreta serta kolesterol darah pada ayam broiler yang mendapat pakan *all grain* dan *non all grain* pada level protein yang berbeda. *Buletin Peternakan.* 27(4): 151-160.
- Rosenthal, F. R. T., L. Espindola, dan S. M. G. De Oliveira. 1970. Jack-Bean Starch. 1. Properties of the Granules and of the Pastes. *J. Starch.* 22: 126 - 129.
- Rubin, L.L., C.W. Canal, A.L.M. Ribeiro, A. Kessler, Silva, L. Trevizan, T. Viola, M. Raber, T.A. Goncalves, dan R. Kras. 2007. Effects of methionine and arginine dietary levels on the immunity of broiler chickens submitted to immunological stimuli. *Brazilian Journal of Poultry Science.* 9(4):241 – 247.
- Saleh, N. E. 2020. Assessment of sesame meal as a soybean meal replacement in European sea bass (*Dicentrarchus labrax*) diets based on aspects of growth, amino acid profiles, haematology, intestinal and hepatic integrity and macroelement contents. *Fish Physiol. Biochem.* 46:861–879.
- Schiavone, A., M. de Marco, S. Martínez, S. Dabbou, M. Renna, J. Madrid, F. Hernandez, L. Rotolo P. Costa, F. Gai, and L. Gasco. 2017. Nutritional value of a partially defatted and a highly defatted black soldier fly larvae (*Hermetia illucens* L.) meal for broiler chickens: Apparent nutrient digestibility, apparent metabolizable energy and apparent ileal amino acid digestibility. *J. Anim Sci. Biotechnol.* 8.
- Shawkat, A. M., W. Shu-Biao, R. A. Swick, dan M. Choct. 2015. Dietary acylated starch improves performance and gut health in necroticenteritis challenged broilers. *Poult. Sci.* Vol. 94: 2434 – 2444.
- Siebert, W., T. Zuber, V. Sommerfeld, J. Krieg, D. Feuerstein, U. Kurrle, dan M. Rodehutscord. 2019. Prececal amino acid digestibility and phytate degradation in broiler chickens when using different oilseed meals, phytase and protease supplements in the feed. *Poult. Sci.* 98:5700–5713.
- Sims, J.E., dan D. E. Smith. 2010. The IL-1 family: regulators of immunity. *Nat. Rev. Immunol.* 10(2): 89–102.

- Smit, M. N., R. F. Ketelaar, L. He, and E. Beltranena. 2021. Ileal digestibility of energy and amino acids in three faba bean cultivars (*Vicia faba* L.) planted and harvested early or late in broiler chickens. *Poult. Sci.* 100.
- Solomon, S. G., V. T. Okomoda, dan O. Oguiche. 2018. Nutritional value of raw *Canavalia ensiformis* and its utilization as partial replacement for soybean meal in the diet of *Clarias gariepinus* (Burchell, 1822) fingerlings. *Food Sci. Nutr.* 6:207–213.
- Song, J., H. Peng, M. Lai, H. Kang, X. Chen, Y. Cheng, dan X. Su. 2023. Relationship between inflammatory-related cytokines with aortic dissection. *Int. Immunopharmacol.* 122: 110618
- Soomro, R. N., J. Yao, M. E. Abd El-Hack, M. A. Arain, I. H. R. Abbasi, M. Saeed, S. A. Soomro, M. A. E. Mohamed, R. Hu, Y. Qiao, X. Yang, M. Alagawany, V. Laudadio, K. Dhama, and V. Tufarelli. 2018. Significance of endogenous amino acid losses in the nutrition of some poultry species: a review. *J. Anim. Plant Sci.* 28:1547–1557.
- Sridhar, K. R. dan S. Seena. 2006. Nutritional and antinutritional significance of four unconventional legumes of the genus *Canavalia* - A comparative study. *Food Chem.* 99:267–288.
- Stanley, D., M. S. Geier, dan H. Chen. 2015. Comparison of fecal and cecal microbiotas reveals qualitative similarities but quantitative differences. *BMC Microbiol.* 15: 51.
- Subagio, A., Witono, Y., dan Windrati, S. W., 2002. Protein Albumin dan Globulin dari Beberapa Jenis Koro di Indonesia. Seminar Nasional Perhimpunan Ahli Teknologi Pangan Infonesia (PATPI) 30-31 Juli. Malang.
- Sun, S., X. Wang, X. Wu, Y. Zhao, F. Wang, X. Liu, Y. Song, Z. Wu, dan M. Liu. 2011. Toll-like receptor activation by helminths or helminth products to alleviate inflammatory bowel disease. *J. Parasites & Vectors.* 4(186): 2 – 8.
- Supriatna, D., Rienoviar, H.G. Pohan, E.H. Lubis, dan M. Isyanti. 2019. Profil Koagulasi Protein Tahu Campuran Kacang Koro Pedang (*Canavalia ensiformis*) dengan Kacang Kedelai. *Journal of Agro-Based Industry.* 36(2): 62 – 72.
- Sutrisno, V. D. Yunianto, dan N. Suthama. 2013. Kecernaan protein kasar dan pertumbuhan broiler yang diberi pakan *single step down* dengan penambahan *acidifier* asam sitrat. *J. Anim. Agri.* 2(3): 48 – 60.
- Syahniar, T.M., S. Nusantara¹, M. Andrian, dan E. Kustiawan. 2021. Edukasi Bahan Pakan Alternatif Dengan Prinsip Zero Waste Sebagai Upaya Kemandirian Pakan Pada Peternak Sapi Perah Di Desa Kemuning Lor-Jember. Seminar Nasional Terapan Riset Inovatif (SENTRINOV) Ke-7. Jil. 7(3–): 393 - 400.

- Takeuchi, O. dan S. Akira. 2010. Pattern recognition receptors and inflammation. *Cell*. 140(6):805-20.
- Tan, J., C. McKenzie, M. Potamitis, A. N. Thorburn, C. R. Mackay, dan L. Macia. 2014. The Role of Short-Chain Fatty Acids in Health and Disease. Pages 91–119 in *Advances in Immunology*. Academic Press Inc.
- Tanaka, T., M. Narazaki, dan T. Kishimoto. 2014. IL-6 in inflammation, immunity, and disease. *Cold Spring Harb. Perspect. Biol.* 6(10): 16295.
- Tangendjaja, B. 2007. Inovasi teknologi pakan menuju kemandirian usaha ternak unggas. *Wartazoa* 17:12–20.
- Thompson , W. L. dan L. J. Van Eldik. 2009. Inflammatory cytokines stimulate the chemokines CCL2/MCP-1 and CCL7/MCP-7 through NFκB and MAPK dependent pathways in rat astrocytes. *Brain. Res.* 1287: 47–57.
- Thompson, L.. dan Gabon, J., 1987. Effect of lectins on salivary and pancreatic-amylase activities and the rate of starch digestion. *J. Food Sci.* 52, 1050–1053.
- Tillman, A. D., S. Reksohadiprojo., Prawirokusuma, H. Hartadi, dan S. Lebdoesoekojo. 1991. *Ilmu Makanan Ternak Dasar*. Gadjah Mada University Press. Yogyakarta.
- Toppel, K., F. Kaufmann, H. Schön, M. Gauly, dan R. Andersson. 2019. Effect of pH-lowering litter amendment on animal-based welfare indicators and litter quality in a European commercial broiler husbandry. *Poult. Sci.* 98:1181–1189.
- Tremaroli, V. dan F. Bäckhed. 2012. Functional interactions between the gut microbiota and host metabolism. *Nature* 489:242–249.
- Trisiwi, H.F. 2004. Pengaruh level protein dengan koreksi asam amino esensial dalam pakan terhadap penampilan, produksi karkas dan nitrogen ekskreta ayam kampung. Tesis. Program Pascasarjana. Universitas Gadjah Mada. Yogyakarta.
- Tsutsui, H., dan K. Nakanishi. 2012. Immunotherapeutic applications of IL-18. *Immunotherapy*. 4(12):1883–94.
- Udedibie, A.B.I. dan C.R. Carlini. 1998. Questions and answers to edibility problem of the *Canavalia ensiformis* seeds -A review. *Anim. Feed Sci. Technol.* 74: 95 – 106.
- Ulupi, N., Muladno, C. Sumantri, dan I.W.T. Wibawan. Identifikasi keragaman gen toll-like receptor-4 ayam lokal dengan polymerase chain reaction- restriction frl lenght polymorphism. *Jurnal Veteriner*. 15(3): 345 – 352.
- Van Harn, J., M. A. Dijkslag, dan M. M. Van Krimpen. 2019. Effect of low protein diets supplemented with free amino acids on growth performance, slaughter

yield, litter quality, and footpad lesions of male broilers. *Poult. Sci.* 98:4868–4877.

Vaquero, A., R. Sternglanz, dan D. Reinberg. 2007. NAD⁺-dependent deacetylation of H4 lysine 16 by class III HDACs. *Oncogene*. 26:5505.

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* 17:53–59.

Verma, J., T. S. Johri, dan B. K. Swain. 2007. Effect of aflatoxin, ochratoxin and their combination on protein and energy utilisation in white leghorn laying hens. *J. Sci. Food Agric.* 87: 760–764.

Vieira, E. L., A. J. Leonel, dan A. P. Sad. 2012. Oral administration of sodium butyrate attenuates inflammation and mucosal lesion in experimental acute ulcerative colitis. *J. Nutr. Biochem.* 23: 430-436.

Wang, T.C. dan M.F. Fuller. 1989. The optimum dietary amino acid patterns for growing pigs. 1. Experiments by amino acid deletion. *British J. of Nutr.* 62:77–89.

Widodo, N., Wihandoyo, dan Supadmo. 2009. Pengaruh level formalin dan frekuensi penambahan litter terhadap karakteristik litter ayam broiler. *Buletin Peternakan*. 33 (3) : 170-177.

William S.W. 2020. Aspek fisiologik Short Chain Fatty Acid (SCFA). *Med. Scope J.* 2(1): 26 – 35.

Wu, G. 2014. Dietary requirements of synthesizable amino acids by animals: A paradigm shift in protein nutrition. *J Anim Sci Biotechnol* 5.

Wu, Z., J. Liu, J. Chen, S. A. Pirzado, Y. Li, H. Cai, dan G. Liu. 2020. Effects of fermentation on standardized ileal digestibility of amino acids and apparent metabolizable energy in rapeseed meal fed to broiler chickens. *Animals* 10:1–13.

Xiao, C., L. Zhang, B. Zhang, L. Kong, X. Pan, T. Goossens, dan Z. Song. 2023. Dietary sodium butyrate improves female broiler breeder performance and offspring immune function by enhancing maternal intestinal barrier and microbiota. *Poult. Sci.* 102:102658.

Xie, Z., G. Shen, Y. Wang, dan C. Wu. 2019. Curcumin supplementation regulates lipid metabolism in broiler chickens. *Poult. Sci* 98:422–429.

Xu, Y., Y. M. Lin, C. R. Stark, P. R. Ferket, C. M. Williams, dan J. Brake. 2017. Effects of dietary coarsely ground corn and 3 bedding floor types on broiler live performance, litter characteristics, gizzard and proventriculus weight, and nutrient digestibility. *Poult. Sci.* 96:2110–2119.

- Yang, W., T. Yu, X. Huang, A. J. Bilotta, L. Xu, Y. Lu, J. Sun, F. Pan, J. Zhou, W. Zhang, S. Yao, C. L. Maynard, N. Singh, S. M. Dann, Z. Liu, dan Y. Cong. 2020. Intestinal microbiota-derived short-chain fatty acids regulation of immune cell IL-22 production and gut immunity. *Nat. Commun.* 11.
- Yang, Y., P. A. Iji, A. Kocher, L. L. Mikkelsen, dan M. Choctt. 2007. Effects of mannanoligosaccharide on growth performance, the development of gut microflora, and gut function of broiler chickens raised on new litter. *J. App. Poult. Res.* 16:280–288.
- Yuwananta, T. 2004. *Dasar Ternak Unggas*. Kanisius. Yogyakarta.
- Zainuddin, Dian, M., Fitriani, Firda, M., Sri, W., Roslizawaty, dan Mulyadi, A. 2015. Gambaran Histologi Kelenjar Ayam Kampung, Bebek, Dan Merpati. *Jurnal Medika Venterinaria*. 9(1): 68-70
- Zavarize, K.C., J.R. Sartori, E. Gonzales, dan A.C. Pezzato. 2012. Morphological Changes of the Intestinal Mucosa of Broilers and Layers as Affected by Fasting Before Sample Collection. *Braz. J. of Poult. Sci.* 14(21): 21 – 25.
- Zhang, L., J. Zhou, Z. Jing, Y. Xiao, Y. Sun, Y. Wu, dan H. Sun. 2018. Glucocorticoids regulate the vascular remodeling of aortic dissection via the p38 MAPK-HSP27 pathway mediated by soluble TNF-RII. *EBioMedicine*. 27: 247–257.
- Zhang, Y., Y. Liu, J. Li, T. Xing, Y. Jiang, L. Zhang, dan F. Gao. 2020. Dietary corn resistant starch regulates intestinal morphology and barrier functions by activating the Notch signaling pathway of broilers. *Asian-Australas J. Anim. Sci.* 33:2008–2020.
- Zhao, H., H. Bai, F. Deng, R. Zhong, L. Liu, L. Chen, dan 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: 132.
- Zheng, X., S. Li, dan H. Yang. 2021. Roles of toll-like receptor 3 in human tumors. *Front. Immunol.* 12: 1-9.
- Zhou, Q., C. L. Dalgard, C. Wynder, dan M. L. Doughty. 2011. Histone deacetylase inhibitors SAHA and sodium butyrate block G1-to-S cell cycle progression in neurosphere formation by adult subventricular cells. *BMC. Neurosci.* 12:50.
- Zhu, J., K. C. L. Cheng, dan K. W. Y. Yuen. 2018. Histone H3K9 and H4 acetylations and transcription facilitate the initial CENP-AHCP-3 deposition and De Novo centromere establishment in *Caenorhabditis elegans* Artificial Chromosomes. *Epigenetics Chromatin*. 11:16.