

DAFTAR PUSTAKA

- Abdollahi MR, BJ. Hosking, D. Ning & V. Ravindran. 2016. Influence of palm Kernel meal inclusion and exogenous enzyme supplementation on growth performance, energy utilization, and nutrient digestibility in young broiler. Asian-Australasian Journal of Animal Science. 29(4): 539-48. <https://doi.org/10.5713/ajas.15.0224>
- Adrio JL, and AL. Demain. 2014. Microbial enzymes: Tools for biotechnological processes. Biomolecules, 4:117-139. <https://doi.org/10.3390/biom4010117>
- Aguzey HA, Z. Gao, HH. Wu, G. Cheng, Z. Wu, JH. Chen, and Z. Niu. 2020. Enzymatic treatment of palm kernel cake improves intestinal health, gut microbiota and immune system of broilers. Journal of Animal and Plant Sciences. 30 (3): 517-526. <https://doi.org/10.36899/japs.2020.3.0061>
- Alagawany M, ME. Abd El-Hack, MR. Farag, S. Sachan, K. Karthik, and K. Dhama. 2018. The use of probiotics as eco-friendly alternatives for antibiotics in poultry nutrition. Environmental Science and Pollution Research. 25: 10611– 10618. <https://doi.org/10.1007/s11356-018-1687-x>
- Allaart JG, AJAMv Asten, JCM Vernooij, and A. Grone. 2011. Effect of *Lactobacillus fermentum* on beta2 toxin production by *Clostridium perfringens*. Applied and Environmental Microbiology. 77(13): 4406-4411. <https://doi.org/10.1128/AEM.03002-10>
- Ali SA, P. Singh, SK. Tomar, AK. Mohanty, and P. Behare. 2020. Journal Proteomics. 213: 103600. <https://doi.org/10.1016/j.jprot.2019.103600>
- Ananda S, A. Hifizah, K. Kiramang, MA. Jamili, A. Mutmainna, dan Rismawati. 2023. Profil organ dalam broiler dengan penambahan probiotik effective microorganism-4 (EM-4) dalam air minum. Journal of Livestock and Animal Health, 6(1): 21-27. <https://doi.org/10.32530/jlah.v6i1.8>
- Andriyanto, AS. Satyaningtijas, R. Yufiadri, R. Wulandari, VM. Darwin dan SNA. Siburian. 2015. Performa dan pencernaan pakan ayam broiler yang diberi hormon testosteron dengan dosis bertingkat. Jurnal Acta Veterinaria Indonesiana. Vol. 3 (1): 29-37. <https://doi.org/10.29244/avi.3.1.29-37>
- Awad WA, K. Ghareeb, S. Abdel-Raheem, and J. Bohm. 2009. Effect of dietary inclusion of probiotic and synbiotic on growth performance, organ weights, and intestinal histomorphology of broiler chickens. Poultry Science. 88: 49-55
- Azman, NF, P. Abdeslahian, A. Kadier, H. Shukor, NKN. Al-Shorgani, AA. Hamid, and MS. Kalil. 2016. Utilization of palm kernel cake as a renewable feedstock for fermentative hydrogen production. Renew.Energy. 93: 700-708. <http://dx.doi.org/10.1016/j.renene.2016.03.046>
- Bao Y, Y. Zhang, Y. Zhang, Y. Liu, S. Wang, X. Dong, Y. Wang, and H. Zhang. 2010. Screening of potential probiotic properties of *Lactobacillus fermentum* isolated from traditional dairy products. Food Control, 21:695-701. <https://doi.org/10.1016/j.foodcont.2009.10.010>

- Beker A, RG Teeter, and AB. Yousuf. 2022. Maintenance energy requirement of broilers and the impact of ambient temperatures. *Journal of Agricultural Science*. 14(11): 30-42. <http://dx.doi.org/10.5539/jas.v14n11p30>
- Cahyono ED, U. Atmomarsono, dan E. Suprijatna. 2012. Pengaruh penggunaan tepung jahe (*Zingiber officinale*) dalam ransum terhadap saluran pencernaan dan hati pada ayam kampung umur 12 minggu. *Journal Animal Agriculture*. 1(1):65-74. <https://ejournal3.undip.ac.id/index.php/aaj/article/view/92>
- Chen X, Z. Tian, H. Zhou, G. Zhou, and H. Cheng. 2023. Enhanced enzymatic performance of β -mannanase immobilized on calcium alginate beads for the generation of mannan oligosaccharides. *Foods*. 12(16): 3089. <https://doi.org/10.3390/foods12163089>
- Chichlowski M, WJ. Croom, FW. Edens, BW. McBride, R. Qiu, CC. Chiang, LR. Daniel, GB. Havenstein, MD. and Koci. 2007. Microarchitecture and Spatial Relationship Between Bacteria and Ileal, Cecal, and Colonic Epithelium in Chicks Fed a Direct-Fed Microbial, PrimaLac, and Salinomycin. *Poultry Science*. 86(6): 1121–1132. <https://doi.org/10.1093/ps/86.6.1121>
- Chintya P. 2023. Pengaruh Kombinasi *Bacillus subtilis* dengan *Lactobacillus fermentum* sebagai Inokulum Dalam Meningkatkan Kualitas BIS Fermentasi Sebagai Bahan Pakan Unggas. Tesis. Padang: Fakultas Peternakan, Universitas Andalas
- Chizhayeva A, A. Amangeldi, Y. Oleinikova, and A. Alybaeva A. 2022. Lactic acid bacteria as probiotics in sustainable development of aquaculture. *Aquatic Living Resources*. 35(10): 1-17. <https://doi.org/10.1051/alr/2022011>
- Cionita T, JP. Siregar, WL. Shing, CW. Hee, DF. Fitriyana, J. Jaafar, R. Junid, AP. Irawan, AE Hadi, 2022. The Influence of Filler Loading and Alkaline Treatment on the Mechanical Properties of Palm Kernel Cake Filler Reinforced Epoxy Composites. *Polymers*. 14: 3063. <https://doi.org/10.3390/polym14153063>
- CiptaanG, A. Djulardi, dan K. Fajrona. 2023. Pemanfaatan bungkil inti sawit fermentasi dengan *Lactobacillus fermentum* dalam ransum terhadap performa broiler. Laporan Penelitian Dana PNBK Fakultas Peternakan Universitas Andalas. Kontrak no. 001a/UN.16.06.D/PT.a/SPP.RT/Faterna/2023
- Damayanti T. 2014. Ilmu Reproduksi Ternak. Cetakan pertama. Surabaya: Airlangga University Press
- Dawood A, and K. Ma. 2020. Applications of Microbial. *Frontiers in Bioengineering and Biotechnology*. 8: 598630. <https://doi.org/10.3389/fbioe.2020.598630>
- Dewanti, and Wong. 1995. Influence of culture condition on biofilm formation by *Escherchia coli* O157:H7. *J food Microbiol*. 26(2):147-164
- Direktorat Jenderal Perkebunan. 2019. Statistik Perkebunan Indonesia 2018-2020. Sekretariat Direktorat Jenderal Perkebunan. Jakarta: Direktorat Jenderal Perkebunan, Kementerian Pertanian

- Direktoral Jenderal Perkebunan. 2021. Statistik Perkebunan Indonesia. Kelapa sawit 2018-2020. Gartina, D., Sukriya RL, penyunting. Jakarta: Direktorat Jenderal Perkebunan, Kementerian Pertanian
- Dwijayanti BE. E. Rahmi, U. Balqis, D. Marsyitha, D. Aliza dan M. Akmal. Histologi, 2021. histomorfometri dan histokimia usus ayam buras (*Gallus gallus domesticus*) selama periode sebelum dan sesudah menetas. Jurnal agripet. 21(2): 128-140. <https://doi.org/10.17969/agripet.v21i2.16012>
- Fadilah R. 2013. Beternak Ayam Broiler. Bogor: Agro Media Pustaka
- Fahik VF, CV. Lishnahan, dan GF. Bira. 2021. Pengaruh suplementasi *L-Arginin* dalam pakan terhadap organ pencernaan ayam broiler. Journal of Animal Science. 6(4): 56-59. <https://doi.org/10.32938/ja.v6i4.1427>
- Fahmi A. 2020. Pengaruh pemberian ransum berserat kasar tinggi dan ransum pemulihan terhadap panjang usus halus dan vili ayam kampung unggul BALITNAK (KUB). Skripsi. Padang: Universitas Andalas
- Fan SP, CH. Chia, Z. Fang, S. Zakaria, and KL. Chee. 2014. Deproteinized palm kernel cake-derived oligosaccharides: A preliminary study. AIP Conference Prociding1614. 2014:61-64. <http://dx.doi.org/10.1063/1.4895171>
- Fawzya YN, A. Latifa, dan N. Noriko. 2014. Pemanfaatan limbah pengolahan agar sebagai komponen medium produksi selulase dari mikroba. Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan. 9(1): 51–60
- Fitro R, D. Sudrajat, dan E. Dihansih. 2015. Performa ayam pedaging yang diberi ransum komersial mengandung tepung ampas kurma sebagai pengganti jagung. Jurnal Peternakan Nusantara. 1(1): 1-8. <https://doi.org/10.30997/jpnu.v1i1.131>
- Foley MH, ME. Walker, AK. Stewart, S. O’Flaherty, EC. Gentry, S. Patel, VV. Beaty, G. Allen, M. Pan, JB. Simpson, C. Perkins, ME. Vanhoy, MK. Dougherty, SK. McGill, AS. Gulati, PC. Dorrestein, ES. Baker, MR. Redlno, R. B arrangou, and CM. Therlot. 2023. Bile salt hydrolases shape the bile acid landscape and restrict *Clostridioides difficile* growth in the murine gut. Nature Microbiology. 8: 611-628. <https://doi.org/10.1038/s41564-023-01337-7>
- Garcia A, K. Navarro, E. Sanhueza, S. Pineda, E. Pastene, M. Quezada, Henriquez, A. Karlyshev, J. Villena, and C. González. 2017. Characterization of *Lactobacillus fermentum* UCO-979C a probiotic strain with a potent anti *Helicobacterpylori* activity. Electrononic Journal Biotechnology. 25: 75-83. <https://doi.org/10.1016/j.ejbt.2016.11.008>
- Gurovic MSV, FR. Viceconte, MA. Bidegain, and J. Dietrich. 2023. Regulation of lignocellulose degradation in microorganisms. Journal of Applied Microbiology. 134 (1): lxac002. <https://doi.org/10.1093/jambio/lxac002>
- Hakim AH, I. Zulkifli, AS. Farjam, EA. Awad, and SK. Ramiah. 2022. Impact of feeding fermented palm kernel cake and high dietary fat on nutrient digestibility, enzyme activity, intestinal morphology and intestinal nutrient transporters mRNA expression in broiler chickens under hot and humid Conditions. Anim als. 12(7): 882-896. <https://doi.org/10.3390/ani12070882>

- Halder D, and S. Mandal. 2018. Insight into the antagonism of *Lactobacillus fermentum* curd isolate against gram positive and gram negative pathogenic bacteria. Bioscience Biotechnology Research Communications. 11(3): 461-468. <http://dx.doi.org/10.21786/bbrc/11.3/15>
- Han X, LD. Bertzbach, and M. Veit. 2019. Mimicking the passage of avian influenza viruses through the gastrointestinal tract of chickens. Veterinary Microbiology. 239:108462. <https://doi.org/10.1016/j.vetmic.2019.108462>
- Hardiningsih R, R.NR. Napitupulu dan T. Yulinery. 2006. Isolasi dan uji resistensi beberapa isolat *Lactobacillus* pada pH rendah. Biodiversitas. 7(1) : 15-17
- Hartini P, H. Purwanto, I. Juliyarsi, and E. Purwati. 2019. Probiotic potential of lactic acid bacteria *Lactobacillus* bacteria *Lactobacillus fermentum* Nbr 158 85 isolation from tempoyak in Padang Pariaman district, West Sumatra (Indonesia) to acid conditions, bile salts and anti microbial activity. International Research Journal Pharmacy. 10(3):70-73. <https://doi.org/10.7897/2230-8407.100381>
- Harumdewi E, N. Suthama, and I. Mangisah I. 2018. Pengaruh pemberian pakan protein mikropartikel dan probiotik terhadap pencernaan lemak dan perlemakan daging pada ayam broiler. Jurnal Sain Peternakan Indonesia. 13 (3): 258-264. <https://doi.org/10.31186/jspi.id.13.3.258-264>
- He Y, J. Li, F. Wang, W. Na, and Z. Tan. 2023. Dynamic changes in the gut microbiota and metabolites during the growth of Hainan Wenchang chickens. Animals. 13:348. <https://doi.org/10.3390/ani13030348>
- Heizinger LR, AR. Pugh, JA. Wagner, and M. Otto. 2023. Evaluating the translational potential of bacteriocins as an alternative treatment for *Staphylococcus aureus* infections in animal and humans. Antibiotics (Basel). 12(8): 1256. <https://doi.org/10.3390/antibiotics12081256>
- Henriette CS, Zibeni and ME. Aumaitre Petitdemange, 1993. Protease and lipase production by a strain of *Setaria marcescens* (532 S). Journal of Industrial Microbiology and Biotechnology. 12(2) :129-135. <https://doi.org/10.1007/bf01569913>
- Herlina B, R. Novita, dan T. Karyono. 2015. Pengaruh jenis dan waktu pemberian ransum terhadap performans pertumbuhan dan produksi ayam broiler. Jurnal Sain Peternakan Indonesia. 10(2): 107-113. <https://ejournal.unib.ac.id/index.php/jspi/article/view/799>
- Herman RA, E. Ayepa, WX. Zhang, ZN. Li, X. Zhu, M. Ackah, SS. Yuan, S. You and J. Wang. 2024. Molecular modification and biotechnological applications of microbial aspartic proteases. Critical Reviews in Biotechnology. 44(3): 388-413. <https://doi.org/10.1080/07388551.2023.2171850>
- Hermansyah B, WP. Lokapirnasari, dan F. Fikri. 2019. Pengaruh substitusi tepung biji bunga matahari (*Helianthus annuus* L.) dalam pakan komersial dengan konsentrasi tertentu terhadap performa ayam pedaging. Jurnal Medik Veteriner. 2 (1) : 7-12. <https://doi.org/10.20473/jmv.vol2.iss1.2019.7-12>
- Hidayat, R., S. Arum, N. Erwin. 2016. Pemanfaatan limbah kulit pisang lilin

- (*Musa paradisiaca*) sebagai pakan alternative ayam pedaging (*Gallus galus d omesticus*). Jurnal Peternakan Sriwijaya. 5(1): 1-9. <https://doi.org/10.14710/jil.14.1.11-17>
- Hill C, F. Guarner, GR. Reid, DJ. Merenstein, B. Pot, HJ. Flint, S. Salminen, and PC. Calder. 2014. Expert consensus document: The International Scienetific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. Nature Reviews Gastroenterology and Hepatology. <https://doi.org/10.1016/j.gene.2019.143971>
- Hove PR, NJ. Nealon, SHJ. Chan, SM. Boyer, HB. Haberecht, and EP. Ryan. 2023. Integrated profiling of gram positive and gram negative probiotic genomes, proteomes and metabolomes revealed small molecules with differential growth inhibition of antimicrobial resistant pathogens. Journal of Dietary Supplements. 20(5): 788-810. <https://doi.org/10.1080/19390211.2022.2120146>
- Ibrahim S. 2008. Hubungan ukuran-ukuran usus halus dengan berat badan broiler. Jurnal Agripet. 8(2): 42-46. <https://doi.org/10.17969/agripet.v8i2.615>
- Jazi V, AD. Foroozandeh, M. Toghyani, B. Dastar, R. Rezaie Koochaksaraie, and M. Toghyani. 2018. Effects of *Pediococcus acidilactici*, mannanoligosaccharide, butyric acid and their combination on growth performance and intestinal health in young broiler chickens challenged with *Salmonella typhimurium*. Poultry Science. 97(6): 2034–2043. <https://doi.org/10.3382/ps/pey035>
- Jull MA. 1982. Poultry Husbandry. Tata Mc – Graw Hill. Publishing Company Ltd. New Delhi
- Kana JR, FIH. Kuagno, TR. Ngouana, P. Pone, KH. Mube, and A. Tegua A. 2015. The effect of graded level of wheat bran and natron on growth performance of finisher broiler chickens. International Journal of Innovations and scientific Research. 18(1): 109-116. <http://www.ijisr.issr-journals.org/abstract.php?article=IJISR-15-100-01>
- Karlyshev A, J. Villena, C. Gonzales, L. Albarracin, and J. Barros J. 2015. Draft Genome Sequence of a probiotic strain, *Lactobacillus fermentum* UCO0979C. Genome Announce. <https://doi.org/10.1128/genomea.01439-15>
- Khairunnisak, dan S. Zubaidah. 2021. Pengaruh pemberian limbah lokal terhadap pertambahan bobot badan dan konsumsi ransum ayam buras umur 30 hari. Jurnal Ilmiah Peternakan. 9(1): 26-32. <http://www.journal.umuslim.ac.id/index.php/jip/article/view/978>
- Kim JA, J. Bayo, J. Cha, YJ. Choi, MY. Jung, and DH. Kim. 2019. Investigating the probiotics characteristics of four microbial strains with potential application in feed industry. PLoS ONE. 14(6): e02189222. <https://doi.org/10.1371/journal.pone.0218922>
- Koranteng AAA, KA. Gbogbo, BA. Mensah, T. Bouassi, RK. Agbehadzi, and K. Tona. 2023. Influence of palm kernel cake on the growth performance, gut health and hematochemical indices of slowgrowing broilers. Journal of Applied

- Animal Research. 51(1): 554-563. <https://doi.org/10.1080/09712119.2023.2242447>
- Khumar, N, and V. Pruthi. 2014, Potential applications of ferulic acid from natural sources. Biotechnology Report. 4: 86-93. <https://doi.org/10.1016/j.btre.2014.09.002>
- Kuo CH, CY. Huang, CJ. Shieh, and CD. Dong. 2022. Enzymes and biocatalysis. Catalysis. 12: 993. <https://doi.org/10.3390/catal12090993>
- Lee B, DH. Kim, J. Lee, MD. Cressman, YM. Choi, and K. Lee. 2023. Greater number and sizes of muscle bundles in the breast and leg muscle of broilers compared of layer chickens. Frontiers in Physiology. 14: 1285938. <https://doi.org/10.3389/fphys.2023.1285938>
- Lim HK, DR. Kim, KI. Lee, DW. Hwang, and IT. Hwang. Complete saccharification of cellulose through chemo-enzymatic hydrolysis. Biomass and Bioenergy. 94: 31-38. <https://doi.org/10.1016/j.biombioe.2016.08.016>
- Long SL, CGM. Gahan, and SA. Joyce. 2017. Interactions between gut bacteria and bile in health and disease. Molecular Aspects of Medicine. 56: 54-65. <https://doi.org/10.1016/j.mam.2017.06.002>
- Malik WA, and S. Javed. 2024. Enhancement of cellulase production by cellulolytic bacteria SB123 in submerged fermentation media and biochemical characterization of the enzyme. International Journal Biological acromolecules. 263 (Pt 2): 130415. <https://doi.org/10.1016/j.ijbiomac.2024.130415>
- Mansilla WD, JM. Rubio, FS. Quintero, S. Saraswathy, and AI. García-Ruiz. 2022. The effect of gradually decreasing the dietary energy content, at constant or increased lysine: energy ratio on broiler performance, carcass yield, and body composition. Poultry Science. 101(11): 102132. <https://doi.org/10.1016/j.psj.2022.102132>
- Maradon GG, R. Sutrisna, dan Erwanto. Pengaruh ransum dengan kadar serat kasar berbeda terhadap organ dalam ayam jantan tipe medium umur 8 minggu. Jurnal Peternakan Terpadu. 3(2): 6-11. <http://dx.doi.org/10.23960/jipt.v3i2.p%25p>
- Markowiak P, and K. Śliżewska. 2018. The role of probiotics, prebiotics and synbiotics in animal nutrition. Gut Pathogens. 10: 21-40. <https://doi.org/10.1186/s13099-018-0250-0>
- Martínez EA, JD. Babot, MJ. Lorenzo-Pisarello, MC. Apella, and AP. Chaia. 2016. Feed supplementation with avian *Propionibacterium acidipropionici* contributes to mucosa development in early stages of rearing broiler chickens. Beneficial Microbes. 7(5): 687–698. <https://doi.org/10.3920/bm2016.0077>
- Matouskova K, TG. Neltner, and MV Maffini. 2023. Out of balance: conflicts of interest persist in food chemicals determined to be generally recognized as safe. Enviromental Health. 22(1):59. <https://doi.org/10.1186/s12940-023-01004-8>
- Maulana, M.F. 2018. Pengaruh bentuk kandang *closed house* dan *semiclose house*

terhadap konsumsi pakan, penambahan bobot badan dan *feed conversion ratio* (FCR) pada ayam pedaging. Skripsi. Malang: Universitas Brawijaya

- Mazanko MS, IV. Popov, EV. Prazdnova, AG. Refeld, AB. Bren, GA. Christyakov, A. Algburi, RM. Weeks, AM. Ermakov, and ML. Chikidans. 2022. Beneficial effects of spore forming *Bacillus* probiotic bacteria isolated from poultry microbiota on broilers healths, growth performance, and immune system. *Frontiers in Veterinary Science*. 9: 877360. <https://doi.org/10.3389/fvets.2022.877360>
- Melia U, LO. Nafiu, dan R. Badaruddin. 2022. Performans produksi ayam broiler yang diberi probiotik berbeda. *Jurnal Ilmiah Peternakan Halu Oleo*. 4(1): 57-60. [10.56625/jipho.v4i1.23547](https://doi.org/10.56625/jipho.v4i1.23547)
- Messaoudi S, M. Manai, G. Kergourlay, H, Prévost, N. Connil, JM. Chobert, and X. Dousset. 2013. *Lactobacillus salivarius*: Bacteriocin and probiotic activity. *Food Microbiology*. 36(2): 296–304. <https://doi.org/10.1016/j.fm.2013.05.010>
- Mhone AL, A. Makumi, J. Odaba, L. Guantai, KMD. Gunathilake, S. Loignon, CW. Ngugi, JK. Akhwale, S. Moineau, and N. Svitek. 2022. *Salmonella enteritidis* bacteriophages isolated from Kenyan poultry farms demonstrate time-dependent stability in environments mimicking the chicken gastrointestinal tract. *Viruses*. 14(8): 1788. <https://doi.org/10.3390/v14081788>
- Mile RD, GD. Butcher, PR. Henry, and RC. Littell. 2006. Effect of antibiotic growth promoters on broiler performance, intestinal growth parameter, and quantitative morphology. *Journal Poultry Science* 85: 476-485. <https://doi.org/10.1093/ps/85.3.476>
- Mirawati, A. Djulardi and G. Ciptaan. 2018. Utilization of fermented palm kernel cake with *Sclerotium rolfsii* in broiler ration. *International Journal of Poultry Science* 17 (7): 342-347. <http://dx.doi.org/10.3923/ijps.2018.342.347>
- Mirawati, G. Ciptaan and Ferawati. 2019a. Improving the quality and nutrient content of palm kernel cake through fermentation with *Bacillus subtilis*. *Livestock Research for Rural Development*. 31(7):
- Mirawati, G. Ciptaan and Ferawati. 2019b. The effect of *Bacillus subtilis* inoculum doses and fermentation time on enzyme activity fermented palm kernel cake. *Journal of World Poultry Research*. 9(4): 211-216. <https://dx.doi.org/10.36380/jwpr.2019.26>
- Mirawati, G. Ciptaan and Ferawati. 2020. Broiler performance on a diet containing palm kernel meal fermented with *B. subtilis*. *Livestock Research for Rural Development*. Vol 32(2)
- Mirawati, G. Ciptaan, I. Martaguri, Ferawati, and A. Srifani A. 2022. Improving quality and nutrient content of palm kernel meal with *Lactobacillus fermentum*. *International Journal of Veterinary Science*. 12(4): 615-622. <https://doi.org/10.47278/journal.ijvs/2023.013>
- Mirawati, G. Ciptaan, I. Martaguri, and Ferawati. 2023. Improving quality and

- nutrient content of palm kernel meal with *Lactobacillus fermentum*. International Journal of Veterinary Science. 12(4): 615-622. <https://doi.org/10.47278/journal.ijvs/2023.013>
- Mirawati, G. Ciptaan, I. Martaguri, Ferawati, and A. Srifani. 2024. The Role of *Lactobacillus fermentum* in Increasing the quality and Nutritional value of Palm kernel cake. International Journal of Veterinary Science. 13(4): 484-489. <https://doi.org/10.47278/journal.ijvs/2023.121>
- Mirsalami SM, and M. Mirsalami. 2024. Effects of duo-strain probiotics on growth, digestion, and gut health in broiler chickens. Veterinary and Animal Science. 24:1-13. <https://doi.org/10.1016/j.vas.2024.100343>
- Morinaga K, H. Kusada, and H. Tamaki. 2022. Bile salt hydrolases with extended substrate specificity confer a high level of resistance to bile toxicity on *atopobiaceae* bacteria. International Journal of Molecular Sciences. 23(18): 10980. <https://doi.org/10.3390/ijms231810980>
- Morkawiak P, and K. Śliżewska 2017. Effects of probiotics, prebiotics and synbiotics on human health. Nutrients. 9(9): 1021. <https://doi.org/10.3390/nu9091021>
- Muharliien, VM, dan Nurgiatiningsih. 2015. Pemanfaatan limbah daun papaya dalam bentuk tepung dan jus untuk meningkatkan performans produksi ayam arab. Research Journal of life Science. 02 (01): 17-24. <https://doi.org/10.21776/ub.rjls.2015.002.02.3>
- Mulaw G, TS. Tessema, D. Muleta, and A. Tesyafe. 2019. In vitro evaluation of probiotic properties of lactic acid bacteria isolated from some traditionally fermented Ethiopian food products. International Journal of Microbiology. 2019:1-11. <https://doi.org/10.1155/2019/7179514>
- Munira S, LO. Nafiu, dan AM. Tasse. 2016. Performans ayam kampung super pada pakan yang disubstitusi dedak padi fermentasi dengan fermentor berbeda. Jurnal Ilmu dan Teknologi Peternakan Tropis.. 3(2) : 21- 29. <https://doi.org/10.33772/jitro.v3i2.1683>
- Murtiyaningsih H, dan M. Hazmi. 2017. Isolasi dan uji aktivitas enzim selulase pada bakteri selulolitik asal tanah sampah. Agritrop: Journal of Agricultural Science. 15(2), 293-308. <https://doi.org/10.32528/agr.v15i2.1185>
- Nair MS, MA. Amalaradjou, and K. Venkitaranayanan. 2017. Antivirulence properties of Probiotics in combanting microbial pathogenesis. Advances in Applied Microbiology. 98:1-29. <https://doi.org/10.1016/bs.aambs.2016.12.001>
- Naghmouchi K, Y. Belguesmia, F. Bendali, G. Spano, BS. Seal, and D. Drider. 2019. *Lactobacillus fermentum*: a bacterial species with potential for food pre preservation and biomedical applications. Critical Reviews in Food Science and Nutrition. 60:20 3387-3399. <https://doi.org/10.1080/10408398.2019.1688250>
- Nasarudin MAS, AS. Abd Razak, M. Termizi, NFA. Hairolnizam, F. Amalina, S. Sulaiman, MR. Ab Hamid, and N. Sanat. 2024. The utilisation and feasibility study of solid waste, palm kernel cake, and *Trichantera gigantea* (ketum

- Ayam) as animal feed for broiler. *Construction*. 4(2): 150-155. <https://doi.org/10.15282/construction.v4i2.10677>
- Nelson, N. 1944. A Photometric adaptation of the somogyi method for the determination of glucose. *Journal of Biological Chemistry*. 153(2): 375-380. [https://doi.org/10.1016/S0021-9258\(18\)71980-7](https://doi.org/10.1016/S0021-9258(18)71980-7)
- Neto SG, RL. Oliveira, FHSd. Lima, A. Medeiros, L. Bezerra, J. Viégas, NGdN. Júnior, and MDdF. Neto. 2015. Milk production, intake, digestion, blood parameters, and ingestive behavior of cows supplemented with by products from the biodiesel industry. *Tropical Animal Health and Production*. 47 :191-200. <http://dx.doi.org/10.1007/s11250-014-0706-2>
- Nurdiyanto R, R. Sutrisna, dan K. Nova. 2015. Pengaruh ransum dengan persentase serat kasar yang berbeda terhadap performa ayam jantan tipe medium umur 3-8 minggu. *Jurnal Ilmiah Peternakan Terpadu*. Vol 3 (2): 12-19. <http://dx.doi.org/10.23960/jipt.v3i2.p%25p>
- Nur F, A. Hafsan, dan Wahdiniar. 2015. Isolasi bakteri asam laktat berpotensi probiotik pada dangke makanan tradisional dari susu kerbau di Curio, Kabupaten Enrekang. *Jurnal Ilmiah Biologi: Biogenesis*. 3(1): 60-65. <https://doi.org/10.24252/bio.v3i1.568>
- Nurhayati, Berliana, dan Nelwida. 2020. Masa protein dan lemak daging dada pada ayam broiler yang mengkonsumsi ransum mengandung bawang hitam. *Jurnal Penelitian Ilmu Peternakan*. 18(1): 15-22. <https://doi.org/10.20961/sainspet.v18i1.32174>
- Nurvadila S, D. Kurnia, dan P. Anwar. 2021. Karakteristik performans ayam broiler yang dipelihara dengan pola kemitraan dan pola mandiri di Kecamatan Kuantan Tengah Kabupaten Kuantan Singingi. *Jurnal of Animal Center*. 3(2): 149-154. <https://doi.org/10.36378/jac.v3i2.1990>
- Oliveira RL, MM. Faria, R. Silva, LR. Bezerra, GGP. Carvalho, A. de Pinheiro, J. Simionato & AG. Leão. 2015. Fatty acid profile of milk and cheese from dairy cows supplemented a diet with palm kernel cake. *Molecules*. 20: 15434-15448. <https://doi.org/10.3390/molecules200815434>
- Ong WL, KL. Chan, A. Suwanto, Z. Li, KH. Ng, and K. Zhou. 2024. Hydrolysis of palm kernel meal fibre using a newly isolated *Bacillus subtilis* F6 with high mannanase activity. *Bioresources and Bioprocessing*. 11(1): 113. <https://doi.org/10.1186/s40643-024-00826-9>
- Pahan, I. 2021. Panduan Budidaya Kelapa Sawit untuk Perkebunan. Jakarta: Penebar Swadaya.
- Pandit A, Pandey U, Bhandari P, and Dahal R, 2024. Study of growth performance and carcass quality of different broiler breeds. *Trends in Agricultural Sciences*. 3(3): 296-300. <https://doi.org/10.17311/tas.2024.296.300>
- Panjaitan R, L. Nuraida, and RH. Dewanti-Hariyati R. 2018. Selection of lactic acid bacteria isolates from tempeh and tapes as probiotic candidates. *Journal of Food Technology and Industry*. 29:175-184. <https://doi.org/10.6066/jtip.2018.29.2.175>

- Pasaribu, T. 2018. Efforts to improve the quality of palm kernel cake through fermentation technology and enzyme addition for poultry. *Wartazoa*. 28(3): 119-128. <http://dx.doi.org/10.14334/wartazoa.v28i3.1820>
- Pellissery AJ, P G . Vinayamohan, M A R . Amalaradjou and K. Venkitanarayanan. 2020. Spoilage bacteria and meat quality. *Meat Quality Analysis*. 17: 307-334. <https://doi.org/10.1016/B978-0-12-819233-7.00017-3>
- Pereira JQ, AC. Ritter, S. Cibulski, and A. Brandelli. 2019. Functional genome annotation depicts probiotic properties of *Bacillus velezensis* FTC01. *Gene*, 713, 143971. <https://doi.org/10.1016/j.gene.2019.143971>
- Pratiwi ST, SPY. Paryati, ENL. Raja, dan P. Andana. 2022. Perbandingan efektivitas bakteriosin *Lactobacillus acidophilus* ATCC 4356 dengan nisin pada pertumbuhan *Salmonella typhi* ATCC 6539. *Media Kartika: Jurnal Kedokteran dan Kesehatan*. 5(2): 162-174. <http://medikakartika.unjani.ac.id/medikakartika/index.php/mk/article/view/261>
- Putri FA. 2024. Pengaruh pemberian bungkil inti sawit fermentasi dengan *L. fermentum* dalam ransum terhadap bobot hidup, persentase lemak abdomen, dan karkas broiler. *Skripsi*. Padang: Universitas Andalas
- Qurniawan A, IA Isnafia, dan A. Rudi. 2016. Performans produksi ayam pedaging pada lingkungan pemeliharaan dengan ketinggian yang berbeda di Sulawesi Selatan. *Jurnal Veteriner*, 17(4): 622-633. <https://ojs.unud.ac.id/index.php/jvet/article/view/26582>
- Rahmiati, and M. Mugi. 2017. Eksplorasi bakteri asam laktat kandidat probiotik dan potensinya dalam menghambat bakteri pathogen. *Journal of Islamic science and Technology*. 3(2): 141-150. <http://dx.doi.org/10.22373/ekw.v3i2.1870>
- Rasyaf M. 2004. Makanan Ayam Broiler. Jakarta: Penebar Swadaya
- Rasyaf M. 2013. Panduan beternak ayam pedaging. Jakarta: Penebar Swadaya
- Ravindran V, and MR. Abdollahi. 2021. Nutrition and Digestive Physiology of the Broiler Chick: State of the Art and Outlook. *Animals*. 11(10): 2795. <https://doi.org/10.3390/ani11102795>
- Reuben RC, and C. Torres. 2024. Bacteriocins: potential and prospects in health and agrifood systems. *Archives of Microbiology*. 2006(5):233. <https://doi.org/10.1007/s00203-024-03948-y>
- Rio ARD, JK. Keppler, RM. Boom, and AEM. Janssen. 2021. Protein acidification and hydrolysis by pepsin ensure efficient trypsin-catalyzed hydrolysis. *Food and Function*. 12(10): 4570-4581. <https://doi.org/10.1039/d1fo00413a>
- Riyanto, J. Nasution, and W. Saragih, 2020. Analisis potensi tanaman bangun-bangun (*Coleus amboinicus*) dan belimbing wuluh (*Averrhoa bilimbi*) sebagai bahan anti mikroba. *Biospecies*. 13(1): 37-45. <https://doi.org/10.22437/biospecies.v13i1.8095>
- Rori CA, FEF. Kandou, and AM. Tangapo. 2020. Aktivitas enzim ekstraseluler

- dari bakteri endofit tumbuhan mangrove *Avicennia marina*. Jurnal Bios Logos. 10(2): 48-55. <https://doi.org/10.35799/jbl.11.2.2020.28338>
- Rusli, MN. Hidayat, Rusny, A. Suarda, J. Syam, dan Astaty. 2019. Konsumsi ransum, pertambahan bobot badan dan konversi ransum ayam kampung superior yang diberikan ransum mengandung tepung pistia stratiotes. Jurnal Ilmu dan Industri Peternakan. 5(2): 66-76. <https://doi.org/10.24252/jiip.v5i2.11883>
- Sabo SdS, MA. Mendes, EdS. Araújo, LBdA. Muradian, EN. Makiyama, JG. LeBlanc, P. Borelli, RA. Fock, T. Knöb, and RPdS. Oliveira. 2020. Bioprospecting of probiotics with antimicrobial activities against *Salmonella Heidelberg* and that produce B-complex vitamins as potential supplements in poultry nutrition. Scientific Reports. 10: 7235. <https://doi.org/10.1038/s41598-020-64038-9>
- Sanhueza E, E. Paredes-osses, CL. González, and A. García. 2015. Effect of pH in the survival of *Lactobacillus salivarius* strain UCO_979C wild type and the pH acid acclimated variant. Electronic Journal of Biotechnology. 18: 343-346. <https://doi.org/10.1016/j.ejbt.2015.06.005>
- Saputri YSI, N. Suthama, dan B. Sukanto. 2019. Perkembangan duodenum dan pertambahan bobot badan pada ayam broiler yang diberi ransum dengan protein mikropartikel ditambah probiotik *Lactobacillus sp.* <https://repository.pertanian.go.id/handle/123456789/19887>
- Sardar D, S. Afsana, A. Habib, and MdT. Hossain. 2024. Dietary effects of multi-strain probiotics as an alternative to antibiotics on growth performance, carcass characteristics, blood profiling and meat quality of broilers. Veterinary Integrative Sciences. 22(2): e2025059. <https://doi.org/10.12982/VIS.2025.059>
- Sari, R. 2012. Karakterisasi bakteri probiotik yang berasal dari saluran pencernaan ayam pedaging. Skripsi. Makassar: Universitas Hasanuddin
- Satimah S, V. Yunianto, dan F. Wahyono. 2019. Bobot relatif dan panjang usus halus ayam broiler yang diberi ransum cangkang telur mikropartikel dengan suplementasi probiotik *Lactobacillus sp.* Jurnal Sains Peternakan Indonesia. 14(4): 396-403. <https://ejournal.unib.ac.id/index.php/jspi/article/view/6219>
- Scott, M.L., M.C. Nesheim, R.J. Young. 1982. Nutrition of the Chicken. 3rd Edition M.L. Scott and Associates. Ithaca, New York
- Seftiadi Y, Mirnawati, and Mirzah. 2020. The effect of the addition of palm kernel cake in making *Lactobacillus sp.* Inoculum on enzyme activity. Quest Journal of Research in Agriculture and Animal Science. 7(5): 1-5
- Sengupta, R. 2014. A comparative study of two *Lactobacillus fermentum* strains that show opposing effects on intestinal barrier integrity: a thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy, Massey University, Manawatu, New Zealand (Doctoral dissertation, Massey University)
- Setiawan H, LB. Utami, dan M. Zulfikar. 2018. Serbuk dan jambu biji

- memperbaiki performans pertumbuhan dan morfologi duodenum ayam jawa super. *Indonesia Veterinary Journal*. 19(4): 554-567. <https://doi.org/10.19087/jveteriner.2018.19.4.554>
- Severin T, NMN. Bertine, NT. Ruben, TD Gilchrist, ENL. Wilfried, T. Evariste, TT. Romario, and KJ. Raphael. 2024. Effects of fermented palm kernel cake in humic acid and limestone solutions on the performance of broiler chickens. *Online Journal of Animal and Feed Research*. 14(1): 77-85. <https://dx.doi.org/10.51227/ojafr.2024.10>
- Sharma P, S. Sharma, G. Ramakrishna, H. Srivastava, and K. Gaikwad. 2022. A comprehensive review on leguminous galactomannans: structural analysis, functional properties, biosynthesis process and industrial applications. *Critical Reviews in Food Science and Nutrition*. 62(2): 443-465. <https://doi.org/10.1080/10408398.2020.1819196>
- Shimizu K, M. Iyo, M. Katto, T. Takada, K. Oana, H. Makini, Okada N, T. Kurakawa, and K. Oishi. 2023. Identification of genes essential for bile acid resistance in the probiotic *Lactocaseibacillus paracasei* strain Shiota. *Letters in Applied Microbiology*. 76(6):ovad062. <https://doi.org/10.1093/lambio/ovad062>
- Shohei MSH, MH. Miah, A. Al Faruq, ML. Rahman, and KHN. Islam. 2020. Development of small intestinal morphology on the basis of growth and absorption rate in broiler chicken (cobb 500) of Bangladesh. *Bangladesh Journal of Veterinary and Animal Sciences*. 7(1): 9-14. <https://doi.org/10.60015/bjvas%2Fv07i1a2>
- Shroyer NF, and SA. Kocoshis. 2011. Anatomy and Physiology of the Small and Large Intestines. In *Pediatric Gastrointestinal and Liver Disease*; Elsevier: pp. 324–336.e2. <https://doi.org/10.1016/B978-0-323-67293-1.00030-X>
- Skenderidis P, C. Mitsagga, D. Lampakis, K. Petrotos, and I. Giavasis. 2020. The effect of encapsulated powder of goji berry (*Lycium barbarum*) on growth and survival of probiotic bacteria isolated from some traditionally fermented Ethiopian food products. *Microorganisms*. 2019: 7179514. <https://doi.org/10.3390/microorganisms8010057>
- Singh A, S. Bajar, A. Devi, and D. Pant. An overview on the recent developments in fungal cellulase production and their industrial applications. *Bioresource Technology Report*. 14: 100652. <https://doi.org/10.1016/j.biteb.2021.100652>
- Song Y, W. Sun, Y. Fan, Y. Xue, D. Liu, C. Ma, W. Liu, W. Mosher, X. Luo, Z. Li, W. Ma, and T. Zhang. 2018. Galactomannan degrading enzymes from the mannan utilization gene cluster of alkaliphilic *Bacillus* sp. N16-5 and their synergy on galactomannan degradation. *Journal of Agricultural and Food Chemistry*. 66(42): 11055-11063. <https://doi.org/10.1021/acs.jafc.8b03878>
- Sousa SdC, GGd. Silva, FAdS. Moura, DR. Pereira, LP. Machado, LdS. Silva, FdS. Delgado, RM. Bezerra, and L. Dourado. 2023. Synbiotic supplements as antibiotic alternatives in broiler diets. *Semina: Ciencias Agrarias*. 44(5): 1859-1878. <http://dx.doi.org/10.5433/1679-0359.2023v44n5p1859>
- Sözcü A, A. İpek, M. Gündüz, and S. Gunnarsson. 2024. Comparison of growth

- performance, pasture usage, carcass yield and breast meat characteristics of two different slow growing broiler genotypes kept in the free range. *Animal Science and Reports*. 42(2): 155-172. <https://doi.org/10.2478/aspr-2023-0028>
- Srifani A, Mirnawati, Y. Marlida, Y. Rizal, And Nurmiati. 2024a. Isolation and characterization of cellulolytic lactic acid bacteria from soymilk waste as probiotic candidates for broiler. *International Journal of Veterinary Science*. 13(1): 108-114. <https://doi.org/10.47278/journal.ijvs/2023.067>
- Srifani A, Mirnawati, Marlida Y, Rizal Y, Nurmiati and Lee KW. 2024b. Identification of novel probiotic lactic acid bacteria from soymilk waste using the 16s rRNA gene for potential use in poultry. *Veterinary World*. 17(5): 1001-1011. www.doi.org/10.14202/vetworld.2024.1001-1011
- Srifani A, Mirnawati, Y. Marlida, Y. Rizal, and Nurmiati. 2024c. Effects of probiotics on growth performance and internal organ development of broiler fed with different levels of soy milk waste. (Unpublish)
- Steel RGD, dan J.H. Torrie. 1991. *Prinsip dan Prosedur Statistika*. Diterjemahkan oleh Bambang Sumantri. PT. Gramedia Pustaka Utama: Jakarta
- Sugiharto, T. Isroli, Yudiarti and E. Widiastuti. 2018. The effect of supplementation of multistrain probiotic preparation in combination with vitamins and minerals to the basal diet on the growth performance, carcass traits, and physiological response of broiler. *Veterinary World*. 11(2): 240-247. <https://doi.org/10.14202/vetworld.2018.240-247>
- Sulardi L. 2022. *Buku Ajar Budidaya Kelapa Sawit*. Cetakan I. PT Dewangga Energi Internasional
- Surya A, X. Liu, and MJ. Miller. Glutathione utilization in *Lactobacillus fermentum* CECT 5716. *Journal of Agricultural and Food Chemistry*. 66(48): 12651-12656. <https://doi.org/10.1021/acs.jafc.8b06136>
- Svihus B. 2014. Function of the digestive system. *Journal of Applied Poultry Research*. 23(2): 306-314. <https://doi.org/10.3382/japr.2014-00937>
- Tantu RY, N. Setiawan, dan D. Sulistiawati. 2022. Pengaruh penggunaan tepung daun beluntas (*Pluchea indica* Less) terhadap performa ayam arab (*Gallus turcicus*). *Jurnal Ilmiah AgriSains*. 23(3): 154-161. <https://doi.org/10.22487/jiagrisains.v23i3.2022.154-161>
- Teyssier JR, G. Brugaletta, F. Sirri, S. Dridi, and SJ. Rochell. A review of heat stress in chickens. Part II: insight into protein and energy utilization and feeding. *Frontiers in Physiology*. 13:943612. <https://doi.org/10.3389/fphys.2022.943612>
- Tokatli, M., G. Gulgor, S. B. Elmaci, N. A. Isleyen and F. Ozcelik. 2015. In vitro properties of potensil probiotik indogenous lactic acid bacteria. *Biomed Reseach International*. pp1-8
- Tombuku, AT, V. Rawung, M. Montong, dan Z. Poli. 2014. Pengaruh berbagai macam ransum komersial dengan menggunakan sistem kandang yang berbeda terhadap kualitas karkas ayam pedaging. *Jurnal ZooteK*. 34: 76-84. <https://doi.org/10.35792/zot.34.0.2014.4795>

- Tulumoğlu S, HI Kaya dan O. Şimşek. 2014. Probiotic characteristic of *Lactobacillus fermentum* strain isolated from Tulum cheese. *Anaerob*, 30:120-125. <https://doi.org/10.1016/j.anaerobe.2014.09.015>
- Utama CS, Zuprizal, H. Chusnul, and Wihandoyo. 2018. Isolasi dan identifikasi Bakteri asam laktat selulolitik yang berasal dari Jus Kubis Terfermentasi. *Jurnal aplikasi teknologi pangan*, 7(1): 1-6. <https://doi.org/10.17728/jatp.2155>
- Vinderola CG dan JA. Reinheimer. 2003. Lactic acid starter and probiotic bacteria: a comparative “in vitro” study of probiotic characteristics and biological barrier resistance. *Food Research International*: 895-904
- Vinderola G, B. Capellini, F. Villareal, V. Suarez, A. Quiberoni, dan J. Reinheimer. 2008. Usefulness of a set of simple in vitro tests for the screening and identification of probiotic candidate strains for dairy use. *LWT-Food Science and Technology*. 41(9): 1678–1688. <https://doi.org/10.1016/j.lwt.2007.10.008>
- Wang J, and H. Ji. 2019. Influence of probiotics on dietary protein digestion and utilization in the gastrointestinal tract. *Current protein and Peptide Science*. 20(2): 125-131. <https://doi.org/10.2174/1389203719666180517100339>
- Woro ID, U. Atmomarsono dan R. Muryani. 2019. Pengaruh Pemeliharaan pada Kepadatan Kandang yang berbeda terhadap performa ayam broiler. *Jurnal Sain Peternakan Indonesia*. 14(4): 418-423. <https://doi.org/10.31186/jspi.id.14.4.418-423>
- Wulan S. 2024. Pengaruh pemberian bungkil inti sawit fermentasi dengan *Lactobacillus fermentum* dalam ransum terhadap performa dan *income over feed cost* broiler. Skripsi. Padang: Fakultas Peternakan Universitas Andalas
- Wulandari KY, VDYB. Ismadi, dan Tristiarti. 2013. Kecernaan serat kasar dan energi metabolis pada ayam kedu umur 24 minggu yang diberi ransum dengan berbagai level protein kasar dan serat kasar. *Animal Agriculture Journal*. 2(1): 9-17. <https://ejournal3.undip.ac.id/index.php/aaj/article/view/1834/0>
- Xing Z, H. Li, M. Li, R. Gao, C. Guo, and S. Mi. 2021. Disequilibrium in chicken gut microflora with *avian colibacillosis* is related to microenvironment damaged by antibiotics. *Science of Total Environment*. 762: 143058. <https://doi.org/10.1016/j.scitotenv.2020.143058>
- Yang Y, WJ. Khoo, Q. Zheng, HJ. Chung, and HG. Yuk. 2014. Growth Temperature alters *Salmonella enteritis* heat/acid resistance, membrane lipid composition and stress/virulence related gene expression. *International Journal of Food Microbiology*. 172:102-109. <https://doi.org/10.1016/j.ijfoodmicro.2013.12.006>
- Yang L, G. Shi, Y. Tao, C. Lai. X. Li, M. Zhou, and Q. Yong. 2021. The increase of incomplete degradation products of galactomannan production by synergetic hydrolysis β -mannanase and α -galactosidase. *Applied Biochemistry and Biotechnology*. 193(2): 405-416. <https://doi.org/10.1007/s12010-020-03430-7>
- Yang Y, J. Huang, D. Dornbusch, G. Grundmeier, K. Fahmy, A. Keller, and

- DL. Cheung. 2022. Effect of surface hydrophobicity on the adsorption of a pilus-derived adhesin-like peptide. *Langmuir*. 38(30): 9257-9265. <https://doi.org/10.1021/acs.langmuir.2c01016>
- Yaqoob MU, M. Yousaf, MI. Khan, and M. Wang. 2022. Effect of β -mannanase supplementation on growth performance, ileal digestibility, carcass traits, intestinal morphology, and meat quality in broilers fed low-ME diets. *Animals*. 12(9): 1126. <https://doi.org/10.3390/ani12091126>
- Yopi, A. Purnawan, A. Thontowi, H. Hermansyah, and A. Wijanarko. 2006. Preparasi mannan dan mannanase kasar dari bungkil inti sawit. *Jurnal Teknologi*. 4: 312-319
- Yuliana N. 2012. Kinetika pertumbuhan bakteri asam laktat isolat T5 yang berasal dari tempoyak. *Jurnal Teknologi & Industri Hasil Pertanian*. 13(2): 108-116. <https://jurnal.fp.unila.ac.id/index.php/JTHP/article/view/72/80>
- Yulista M. 2024. Pengaruh pemberian bungkil inti sawit dengan *Lactobacillus fermentum* dalam ransum terhadap retensi nitrogen, daya cerna serat kasar dan energi metabolisme broiler. Skripsi. Padang: Universitas Andalas
- Yuniastuti A. 2014. Buku monograf probiotik (dalam perspektif kesehatan). Unnes Press. Cetakan Pertama
- Zawistowska-Rojek A, Zareba T, and Tyski S (2022). Microbiological testing of probiotics preparations. *International Journal of Environmental Research and Public Health*, 19(9): 5701. <https://doi.org/10.3390/ijerph19095701>
- Zhang J, M. Liu, J. Xu, Y. Qi, N. Zhao, and M. Fan. 2019. First insight into the probiotic properties of ten *Streptococcus thermophilus* strains based on in vitro conditions. *Current Microbiology*. 77(3): 3433-352. <https://doi.org/10.1007/s00284-019-01840-3>
- Zhang XZ, and YHZ. Percival. 2013. Cellulase: Characteristics, sources, production, and applications. *Bioprocessing Technologies in Biorefinery for Sustainable Production of Fuels, Chemicals, and Polymers*. 8:131-146. <https://doi.org/10.1002/9781118642047.ch8>
- Zhen W, Y. Shao, X. Gong, Y. Wu, Y. Geng, Z. Wang, and Y. Guo. 2018. Effect of dietary *Bacillus coagulans* supplementation on growth performance and immune responses of broiler chickens challenged by *Salmonella enteritidis*. *Poultry Science*. 97(8): 2654–2666. <https://doi.org/10.3382/ps/pey119>
- Zhou Y, Y. Li, L. Zhang, Z. Wu, Y. Huang, H. Yan, J. Zhong, LJ. Wang, HM. Abdullah, and HH. Wang. 2020. Antibiotics administration routes and oral exposure to antibiotic resistant bacteria as key drivers for gut microbiota disruption and resistome in poultry. *Frontiers Microbiology*. 11:1319. <https://doi.org/10.3389/fmicb.2020.01319>