

DAFTAR PUSTAKA

- Aka, R. dan N. Sandiah. 2014. Kecernaan bahan kering dan bahan organik campuran rumput mulato (*Brachiaria hybrid.* cv. mulato) dengan jenis legum berbeda menggunakan cairan rumen sapi. Jurnal Ilmu dan Teknologi Peternakan Tropis. 1(1): 16-22.
- Al-Bayati, F. A. and M. J. Mohammed. 2009. Isolation, identification, and purification of cinnamaldehyde from *Cinnamomum zeylanicum* bark oil. an antibacterial study. Pharmaceutical Biology. 47(1): 61-66.
- Ali S.M, A. A. Khan, I. Ahmed I, M. Musaddiq, K. S. Ahmed, H. Polasa, L. V. Rao, C. M. Habibullah, L. A. Sechi, and N. Ahmed. 2005. Antimicrobial activities of eugenol and cinnamaldehyde against the human gastric pathogen *Helicobacter pylori*. Annals of Clinical Microbiology and Antimicrobials. 4(20):1– 7.
- An, X. P., Y. Wang, R. F. Wang, X. R. Hao, Y. C. Hu, T. Guo, J. Zhang, W. W. Wang, X. Y. Shi, S. Han, and J. W. Qi. 2020. Effects of a blend cinnamaldehyde, eugenol and capsicum oleoresin (cec) on growth performance, nutrient digestibility, immune response and antioxidant status of growing ewes. Livestock Science. 234: 1-6.
- Antoniewicz, A. M., V. Vuuren, C. J. van der Koelen, and I. Kosmala. 1992. Intestinal digestibility of rumen undegraded protein of formaldehyde-treated feedstuffs measured by mobile bag and in vitro technique. Journal of Animal Science and Technology. 39(1):111-124.
- Astuti, M. 2007. Pengantar Ilmu Statistik untuk Peternakan dan Kesehatan Hewan. Binasti Publisher, Bogor.
- Baguna, F. L. dan F. Kaddas. 2021. Analisis rantai nilai dan kontribusi pendapatan terhadap pemanfaatan hhbk kayu manis di pulau Tidore. Jurnal Inovasi penelitian. 1(9): 1787- 1794.
- Benchaar, C, H. V. Petit, R. Berthiaume, D. R. Ouellet, J. Chiquette, and P. Y. Chouinard. 2007. Journal of Dairy Science. 90(2): 886-897.
- Benchaar, C. 2016. Diet supplementation with cinnamon oil, cinnamaldehyde, or monensin does not reduce enteric methane production of dairy cows. Animal. 10(3):418-425.
- Busanello, M., J. P. Velho, A. A. C. Tambara, D. R. M. Alessio, A. T. Neto, and I. M. P. H. Velho. 2016. In situ ruminal degradability of soybean meal and alternative protein feeds in Brazil – a meta-analysis. Asian Journal of Agricultural and Food Sciences. 4(1): 117-123.



- Busquet, M., S. Calsamiglia, A. Ferret and C. Kamel. 2006. Plant extract affects in vitro rumen microbial fermentation. *J. Dairy Sci.* 89:761-771.
- Busquet, M., S. Calsamiglia, A. Ferret, and C. Kamel. 2005. Effects of cinnamaldehyde and garlic oil in rumen microbial fermentation in dual flow continuous culture. *Journal of Dairy Science.* 88 (7): 2508-2516.
- Calsamiglia, S., M. Busquet, P. W. Cardozo, L. Castillejos, and A. Ferret. 2007. Invited review: essential oils as modifiers of rumen microbial fermentation. *Journal of Dairy Science.* 90(6): 2580-2595.
- Cardozo, P. W., S. Calsamiglia, A. Ferret, and C. Kamel. 2004. Effects of natural plant extractson ruminal protein degradation and fermentation profiles in continuous culture. *Journal of Animal Science.* 82 (11): 3230-3236.
- Chapman, C. E., S. B. Ort, K. M. Aragona, R. G. Cabral, and P. S. Erickson. 2019. Effect of cinnamaldehyde on feed intake, rumen fermentation, and nutrient digestibility, in lactating dairy cows. *Journal of Animal Science.* 97(4): 1819-1827.
- Chaudhry, A. S., M. Mehedi, and H. Khan. 2012. Impacts of different spices on in vitro rumen dry matter disappearance, fermentation and methane of wheat or ryegrass hay based substrates. *Livestock Science.* 146:84-90.
- Cheeke. 2005. Applied Animal Nutrition. Feed and Feeding. 3rd edn. Pearson Prentice Hall, New Jersey.
- Chen, B.J., C. S. Fu., G. H. Li., X. N. Wang., H. X. Lou., D. M. Ren., and T. Shen. 2017. Cinnamaldehyde analogues as potential therapeutic agents. *Mini reviews in medicinal chemistry.* 17(1): 33-43.
- Chuzaemi, S., Mashudi, Marjuki, and A. N. Huda. 2014. Effect of wheat pollard (*Triticum aestivum*) and soybean meal (*Glycine max*) protected with condense tannin in the diet on feed intake and digestibility of lactation dairy cow. *Jurnal Ternak Tropika.* 15(1): 21-30.
- Cieslak, A., P. Zmora, A. Matkowski, I. Nawrot-Hadzik, E. Pers-Kamczyc, M. El-Sherbiny, M. Bryszak, and M. Szumacher-Strabe. 2016. Tannins from *Sanguisorba officinalis* affect *in vitro* rumen methane production and fermentation. *Journal of Animal Plant Science.* 26: 54-62.
- Djarot, P., Yulianita, N. F. Utami, A. M. Putra, Y. I. M. Putri, S. M. Muhardianty, T. A. Suciyani, and A. Syaepulrohman. 2023. Bioactivities and chemical compositionsof *Cinnamomum burmannii* bark extracts (Lauraceae). *Sustainability.* 15(1696): 1-15.



- Dunshea, F., V. Russo, I. Sawyer, and B. Leury. 2012. A starch-binding agent decreases the in vitro rate of fermentation of wheat. *Journal of Dairy Science*, 95(2):199.
- Egan, A. R. 2017. Animal nutrition and feed science. *Engineering*. 3(5): 586-587.
- Ernawati, A., L. Abdullah, I. G. Permana, and P. D. M. H. Karti. 2023. Forage production and nutrient content of different elephant grass varieties cultivated with *Indigofera zollingeriana* in an intercropping system. *Tropical Animal Science Journal*. 46(3): 321-329.
- Fajar, A., G. A. Ammar, M. Hamzah, R. Manurung, and M. Y. Abdurrahman. 2019. Effect of tree age on the yield, productivity, and chemical composition of essential oil from *Cinnamomum burmannii*. *Current Research on Biosciences and Biotechnology*. 1(1): 17-22.
- Fariani, A., A. N. T. Pratama, G. Muslim, and L. Warly. 2022. Digestibility quality of elephant grass (*Pennisetum purpureum*) and concentrate with the addition of urea molasses in vitro. *Jurnal Sain Peternakan Indonesia*. 17(4): 211-215.
- Gresse, R., F. Chaucheyras-Durand, M. A. Fleury, T. Van de Wiele, E. Forano, and S. Blanquet-Diot. 2017. Gut microbiota dysbiosis in postweaning piglets: understanding the keys to health. *Trend Microbiol*. 25(10): 851-873.
- Hadianto, I. 2020. Kajian penggunaan sinamatdehid kulit kayu manis (*Cinnamomum burmanni* Ness ex BI.) untuk proteksi protein pakan secara *in vitro*. Tesis. Fakultas Peternakan. Universitas Gadjah Mada. Yogyakarta.
- Hadianto, I., L. M. Yusiaty, Z. Bachruddin, B. Suhartanto, and C. Hanim. 2019. Effect of cinnamon bark meal (*Cinnamomum burmanni* Ness ex BI) addition as cinnamatdehid source on *in vitro* nutrient digestibility. *IOP Conference Series: Earth and Environmental Science*. 387: 1-4.
- Hadianto, Ikhwan. 2020. Kajian penggunaan sinamatdehid kulit kayu manis (*Cinnamomum burmanni* ness ex. bi.) untuk proteksi protein pakan secara *in vitro*. Tesis. Program Studi Magister Ilmu Peternakan. Fakultas Peternakan. Universitas Gadjah Mada, Yogyakarta.
- Handayani, A., I. Q. Lailaty, A. Rosyidah, D. R. T. Sari, N. Yunarto, and D. Suherman. 2024. Indonesian cinnamon (*Cinnamomum burmanni* (Nees & T. Nees) Blume) as promising medical resources: a review. *Jurnal Sylva Iestari*. 12(3): 610-633.



- Hartadi S. S., S. Reksodihadiprodjo, dan A. D. Tillman. 1997. Tabel Komposisi Pakan Ternak untuk Indonesia, UGM Press. Yogyakatra.
- Harwanto, L. M. Yusiaty, dan R. Utomo. 2014. Pengaruh kayu manis (*Cinnamomum burmanni* Ness ex Bl.) sebagai sumber sinamatdehid terhadap parameter fermentasi dan aktivitas mikrobia rumen secara in vitro. Buletin Peternakan. 38(2): 71-77.
- Hasanah, M., Y. Nuryani, A. Djisbar, E. Mulyono, E. Wikardi, and A. Asman. 2003. Indonesian cassia (Indonesian cinnamon). In: Ravindran PN, Babu NK, Shylaja M (editors). Cinnamon and cassia: the genus of *Cinnamomum*. CRC Press LLC. p. 201–14.
- Idowu, M., G. Taiwo, T. Sidney, E. Treon, Y. Leal, D. Ologunagba, F. Echie, A. Pech-Cervantes, I. M. Ogunade. 2024. Effects of rumen-bypass protein supplement on growth performance, hepatic mitochondrial protein complexes, and hepatic immune gene expression of beef steers with divergent residual feed intake. Plos One. 19(7): 1-15.
- Ishak, A., M. Gunal, and A. A. AbuGhazaleh. 2015. Animal Feed Science Technology. 207: 31-40.
- Jouany, J. P. and D. P. Morgavi. 2007. Use of 'natural' products as alternative to antibiotic feed additives in ruminant production. Animal. 1(10): 1443-1446.
- Kamalak, A., O. Canbolat, Y. Gubruz, and O. Ozay. 2005. Protected protein and amino acids in ruminant nutrition. KSU. Journal of Science and Engineering. 8(2): 84-88.
- Khairani, N. 2024. Pengaruh penggunaan sinamatdehid tepung daun kayu manis (*Cinnamomum burmanni* ness ex bi.) untuk proteksi protein terhadap parameter fermentasi rumen secara *in vitro*. Skripsi. Fakultas Peternakan. Universitas Gadjah Mada. Yogyakarta.
- Krishnamoorthy B., T. J. Zachariah, J. Rema, and P.A. Mathew. 1999. Evaluation of selected Chinese cassia (*Cinnamomum cassia* Blume) accessions for chemical quality. Journal of Spices and Aromatic Crops. 8(2):193–195.
- Kumari, R. and K. Kumar. 2015. Roasting and formaldehyde method to make bypass protein for ruminants and its importance: A review. The Indian Journal of Animal Sciences. 85(3): 3-10.
- Kurniawati, A., Widodo, W. T. Artama, and L. M. Yusiaty. 2019. Addition of essential oil source, *Amomum compactum* Soland ex Maton, and its effect on ruminal feed fermentation *in-vitro*. Biotropia. 26(3): 172-180.



- Li, X., T. Shao., Q. Shi., and M. Hu. 2013. A diaryl Schiff base as a photoand pH-responsive bifunctional molecule. Royal Society of Chemistry Advances. 3(45): 22877-22881.
- Liefferinge, E. V., C. Forte, C. Degroote, A. Ovyn, N. V. Noten, S. mangelinckx, and J. Michiels. 2022. *In vitro* and *in vivo* antimicrobial activity of cinnamaldehyde and derivatives towards the intestinal bacteria of weaned piglet. Italian Journal of Animal Science. 21(1): 493-506.
- Liefferinge, E. V., C. Forte, J. Degroote, A. Ovyn, N. V. Noten, S. Mangelinckx, and J. Michiels. 2022. Italian Journal of Animal Science. 21(1): 493-506.
- Lu, Z., Z. Xu, Z. Shen, Y. Tian, and H. Shen. 2019. Dietary energy level promotes rumen microbial protein synthesis by improving the energy productivity of ruminal microbiome. Frontier in Microbiology. 10(847): 1-14.
- Malmuthuge, N., G. Liang, and L. L. Guan. 2019. Regulation of rumen development in neonatal ruminants through microbial metagenomes and host transcriptomes. Genome Biology. 20(172): 1-16.
- Maranatha, G., S. Fattah, Y. U. L. Sobang, M. Yunus, and Y. L. Henuk. 2020. Digestibility of dry matter and organic matter and the *in vitro* rumen parameters of complete feed from fermented corn cobs and moringa (*Moringa oleifera*) leaves meal. IOP Conference Series: Earth and Environmental Science. 454: 1-7.
- Maynard, L. A., J. K. Loosli, H. F. Hintz, and R. G. Warner. 2005. Animal Nutrition. 7th ed. McGraw-Hill Book Company, New York.
- McDonald, P., R. A. Edwards, J. F. D. Greenhalgh, C. A. Morgan, L. A. Sinclair, and R. G. Wilkinson. 2011. Animal Nutrition. 7th edn. Pearson. Canada.
- McDonald, P., R. A. Edwards., J. F. D. Greenhalgh., and C. A. Morgan. 2002. Animal Nutrition (6th ed.). Pearson Education Limited. England.
- Michiels, J., J. Missot, A. H. Van, A. Ovyn, D. Fremaut, S. D. Smet, and N. Dierick. 2010. Effects of dose and formulation of carvacrol and thymol on bacteria and some functional traits of the gut in piglets after weaning. Archives of Animal Nutrition. 64(2): 136-154.
- Mohamed, R. and A. S. Chaudhry. 2008. Methods to study degradation of ruminant feeds. Nutrition Research Reviews. 21(1): 68-81.
- Mota, L. G., A. S. R. Fonseca, T. S.d. Andrade, G. Duff, R. L. Galati, and L. d. S. Cabral. 2024. Blend of cinnamaldehyde and diallyl disulfide associated or not to antibioticson ruminal fermentation, cortisol and blood metabolites of feedlotsteers fed no-forage diet. Scientia Agricola. 81: 1-11.



- Mukherjee, R., R. Chakraborty, and A. Dutta. Role of fermentation in improving nutritional quality of soybean meal-a review. Asian Australasian Journal of Animal Sciences. 29(11): 1523-1529.
- Nafisah, A. and Nahrowi. 2021. The potential of pollard and rice bran with fractionation process as raw materials for high fiber processes food. Food ScienTech Journal. 2021. 3(1): 62-75.
- Noziere, P., I. O. Marty, C. Loncke, and D. Sauvant. 2010. Carbohydrate quantitative digestion and absorption in ruminants: from feed starch and fibre to nutrients available for tissues. Animal. 4(7): 1057-1074.
- Nurmeiliasari, N. J. Rangkuti, H. D. Putranto, E. Yunita, J. Firison, and H. Kusnadi, 2023. The effects of papaya leaf extract and turmeric extract inclusion on total apparent digestibility of nutrients and methane gas production in bali cattle. Jurnal Sain Peternakan Indonesia. 18(3): 185-192.
- Nurrodifah, S. 2023. Pengaruh tepung kulit buah naga merah (*Selenicereus monacanthus*) sebagai sumber tannin terhadap kecernaan pakan secara *in vitro*. Skripsi. Fakultas Peternakan. Universitas Gadjah Mada, Yogyakarta.
- Oba, M. and K. K. Main. 2023. Symposium review: effects of carbohydrate digestion on feed intake and fuel supply. Journal of Dairy Science. 106(3): 2153-2160.
- Pazla, R., N. jamarun, M. Zain, and Arief. 2018. Microbial protein synthesis and *in vitro* fermentability of fermented oil palm fronds by *Phanerochaete chrysosporium* in combination with tithonia (*Tithonia diversifolia*) and elephant grass (*Pennisetum purpureum*). Pakisatan Journal of Nutrition. 17(10): 462-470.
- Perez, H. G., C. K. Stevenson, J. M. Lourenco, and T. R. Callaway. 2024. Understanding rumen microbiology: an overview. Encyclopedia. 4(1): 148-157.
- Phesatcha, B., K. Phesatcha, B. Viennaxay, N. T. thao, and M. Wanapat. 2021. Feed intake asnd nutrient digestibility, rumen fermentation profiles, milk yield and compositions of lactating dairy cows supplemented by *Flemingia macrophylla* pellet. Tropical Animal Science Journal. 44(3): 288-296.
- Pruckler, M., S. Siebenhamdl-Ehn, S. Apprich, S. Holtinger, C. Haas, E. Schmid, and W. Kneifel. 2014. Wheat bran-based biorefinery 1: composition of wheat bran and strategies of functionalization. LWT-Food Science and Technology. 56: 211-221.



- Purbowati, E., A. Setiadi, G. Sa'id, dan R. K. Achjadi. 2012. Sapi. Agriflo. Jakarta.
- Rahayu, R. I., A. Subrata., dan J. Achmadi. 2018. Fermentasi ruminal in vitro pada pakan berbasis jerami padi amoniasi dengan suplementasi tepung pisang dan molasses. Jurnal Peternakan Indonesia. 20 (3): 166 – 174.
- Ramaiyulis, M. Zain, R. W. S. Ningrat, and L. Warly. 2019. Protection of protein in cattle feed supplement from rumen microbial degradation with addition of gambier leaf residues. International Journal of Zoological Research. 15(1): 6-12.
- Reddy, G. V. N., K. J. Reddy, and D. Nagalakshmi. 2002. Effect of expander-extruder processed complete diet containing sugarcane bagasse on growth and nutrient utilization in ongole bull calves. Indian Journal of animal Science. 75(2): 406-409.
- Rosenfelder, P., M. Eklund, and R. Mosenthin. 2013. Nutritive value of wheat and wheat by-product in pig nutrition: a review. Animal Feed Science and Technology. 185: 107-125.
- Shen,J., L. Zheng, X. Chen, X. Han, Y. Cao, and J. Yao. 2020. Metagenomic analyses of microbial and carbohydrate-active enzymes in the rumen of dairy goats fed different rumen degradable starch. Frontier in Microbiology. 11(1003): 1-9.
- Shinkai, T., O. Enishi, M. Mitsumori, K. Higuchi, Y. Kobayashi, A. Takenaka, K. Nagashima, M. Mochizuki, and Y. Kobayashi. 2012. Mitigation of methane production from cattle by feeding cashew nut shell liquid. Journal of Dairy Science. 95(9): 5308-5316.
- Silva, M. F. D., V. S. Ramos, Z. M. C. D. Carvalho, and M. I. B. Tavares. 2024. Bibliographic review of the application of cinnamaldehyde as a drug in dentistry. Revista Poco. 17(2): 1-21.
- Singh, P. and K. Krishnaswamy. 2023. Non-gmo-high oleic soybean meal value addition and studying the functional and reconstitution behavior. International Journal of Food Properties. 26(): 708-728.
- Soltan, Y.A., A. S. Natel., R. C. Araujo., A. S. Morsy., and A. L. Abdalla. 2018. Progressive adaptation of sheep to a microencapsulated blend of essential oils: Ruminal fermentation, methane emission, nutrient digestibility, and microbial protein synthesis. Animal Feed Science and Technology. 237:8-18.
- Suardin, N. Sandiah, dan R. Aka. 2014. Kecernaan bahan kering dan bahan organik campuran rumput mulato (*Brachiaria hybrid* cv. Mulato) dengan



- jenis legum berbeda menggunakan cairan rumen sapi. Jurnal Ilmu dan teknologi Peternakan Tropis. 1(1): 16-22.
- Tafzi, F. 2019. Bioactivity of cinnamon (*Cinnamommum* sp). Indonesian Food Science and Technology Journal. 3(1): 18-22.
- Tager, L. R. and K. M. Krause. 2010. Effects of cinnamaldehyde, eugenol, and capsicum on fermentation of a corn-based dairy rationin continuous culture. Canadian Journal of Animal Science. 90: 413-419.
- Tulung, Y. L. R., A. F. Pendong, dan B. Tulung. 2020. Evaluasi nilai biologis pakan lengkap berbasis tebon jagung dan rumput campuran terhadap kinerja produksi sapi peranakan ongole (po). Zootec. 40(1): 363-379.
- Tunkala, B. Z., K. DiGiancomo, P. S. A. Hess, F. R. Dunshea, and B. J. leury. 2023. *In vitro* protein protection of protein meals using bioprotect and tannin extract from red grape marc. Animal Research and One Health. 2: 2-15.
- Wang, S., K. Giller, M. Kreuzer, S.E. Ulbrich, U. Braun, and A. Schwarm. 2017. Contribution of ruminal fungi, archea, protozoa, and bacteria to methane suppression caused by oilseed supplemented diets. Frontier in Microbiology. 8(1864): 1-14.
- Wang, Y. J., J. X. Xiao, S. Li, J. J. Liu, G. M. Alugongo, Z. J. Cao, H. J. Yang, S. X. Wang, and K. C. Swanson. 2017. Protein metabolism and signal pathway regulation in rumen and mammary gland. Current Protein and Peptide Science. 18(6): 636-651.
- Wardono, H. P., A. Astuti, N. Ngadiyono, and A. Agus. 2024. Enhancing ruminant feed through *in vitro* assessment of sago hampas fermentation as an onggok substitute. Livestock Research for Rural Development. 36(3).
- Weibel, H and J. Hansen. 1989. Interaction of cinnamaldehyde (a sensitizer in fragrance) with protein. Contact Dermatitis. 20(3):161- 166.
- Wendakoon, C. N., and M. Sakaguchi. 1995. Inhibition of amino acid decarboxylase activity of *Enterobacter aerogenes* by active components in spices. Journal of Food Protect. 58(3):280-283.
- Widianingrum, D.C., S. I. O. Salasia., and C. T. Noviandi. 2019. Kecernaan dan karakteristik fermentasi rumen in vitro ransum ruminansia dengan suplementasi virgin coconut oil terproteksi. In Proceeding National Seminar on Animal Husbandry and Veterinary Technology. Jember: 168-76.



- Widyobroto, B. P., S. Padmowijoto, dan R. Utomo. 1998. Degradasi bahan organik dan protein secara *in sacco* enam konsentrat sumber protein. Buletin Peternakan (Edisi Khusus): 153-161.
- Wijaya, A. I., I. Ismartoyo, and A. Natsir. 2023. Analysis of rumen degradation characteristics of forage crude protein in goat. Online Journal of animal and Feed Research. 13(3): 217-223.
- Wulandari, R.E. Aldis, D. Ramadhan, Wulanningtyas, A. Astuti, Adiarto, L. M. Yusiaty, C. T. Noviandi, B. P. Widyobroto, and A. Agus. 2022. Degradability of rumen-protected soybean meal with different temperatures and heating times in bali cattles. Bulletin of Animal Science. 46(4): 211-215.
- Yang, W. Z., B. N. Ametaj, C. Benchaar, and K. A. Beauchemin. 2010. Dose response to cinnamaldehyde supplementation in growing beef heifer: ruminal and intestinal digestion. Journal of Animal Science. 88: 680-688.
- Yeoman, C. J. and B. A. White. 2014. Gastrointestinal tract microbiota and probiotics in production animals. Annual Review of Animal Bioscience. 2: 469-486.