

## DAFTAR PUSTAKA

- Aboagye, I. A., A. D. Iwasa, A. R. Castillo, K.A. Beauchemin., K.M. Koenin., and M. Oba. 2018. Effects of hydrolyzable tannin with or without condensed tannin on methane emissions, nitrogen use, and performance of beef cattle fed a high-forage diet. *Journal Animal Science*.
- Ahmed, A., Khan, M.J., Shahjalal, M. dan Islam, K.M.S. 2002. Effects of feeding urea and soybean meal treated rice straw on digestibility of feed nutrient and growth performance of bull calves. *Asian-Aus. J. Anim-Sci*, 15 : 522-527.
- Anantasook, N. M. Wanapat, A. Cherdthong, and P. Gunun. 2013. Changes of microbial population in the rumen of dairy steers as influenced by plant containing tannins and saponins and roughage to concentrate ratio. *Asian Australas. J. Anim. Sci*, 26 (11): 1583-1591.
- Angga, W. A., Y. Rizal, M. E. Mahata, A. Yuniza and R. Mayerni. 2018. Potential of waste tea leaves (*Camellia sinensis*) in west sumatra to be processed into poultry feed. *Pak. J. Nutr.*,17(6): 287-293.
- Animut, G., Puchala R., Goetsch A.L., Patra A. K., Sahlu T., Varel V.H., and Wells J. 2008. Methane emission by goats consuming different sources of condensed tannins. *Anim. Feed Sci. and Technol. WARTAZOA*, 25(3): 107-11.
- Anggraeny, Y. N., H. Soentanto, Hartutik dan Kusmartono.2015. Sinkronisasi suplai proteindan energidalam rumenuntuk meningkatkan efisiensi pakan berkualitas rendah. *WARTAZOA*, 25(3): 107-116.
- Apriyantono, A. Fardiaz D., Puspita N.L., Sendarnawati dan Budiyanto, S. 1989. Analisis Pangan. PAU Pangan dan Gizi. IPB Press.
- Arora, S. P. 1995. Pencernaan Mikrobial pada Ruminansia. Gadjah Mada University Press. Yogyakarta.
- Attwood, G. T., Klieve, A. V., Ouwerkerk, D. and Patel, B. K. C. 1998. Ammonia hyperproducing bacteria from New Zealand ruminants. *Applied and Environmental Microbiology*, 64: 1796-1804.
- Bata, M. 2008. Pengaruh molases pada amoniasi jerami padi menggunakan urea terhadap pencernaan bahan kering dan bahan organik *in vitro*. *Agripet*, 8 (2): 15-20.
- Beauchemin, K.A., Kreuzer, M., O'Mara, F., dan McAlister, T.A., 2008. Nutritional management for enteric methane abatement: a review. *Aust. J. Exp. Agric.* 48: 21– 27.
- Bhatta, R., Y. Uyeno, K. Tajima, A. Taneka, Y. Yabumoto, I. Nonaka, O. Enishi, and M. Kuriha. 2009. Difference in the nature tannins on in-vitro ruminal

- methane and volatil fatty acid production and on methanogenic archaea and protozoal populations. *J. Dairy Sci*, 92,5512-5522.
- Cabrera, C., R. Artacho dan R. Giménez. 2006. Green tea: beneficial effects. *journal of the american college of nutrition*, 25(2): 79–99
- Carulla, J. E., M. Kreuzer, A. Machmüller, dan H. D. Hess. 2005. Supplementation of *Acacia mearnsii* tannins decreases methanogenesis and urinary nitrogen in forage-fed sheep. *Austr. J. Agric. Res.*, 56: 961–970. doi: 10.1071/AR05022
- Cieslak, A., P. Zmora, E. Pers-Kamczyc, dan M. SzumacherStrabel. 2012. Effects of tannins source (*Vaccinium vitisidaea* L.) on rumen microbial fermentation in vivo. *Anim. Feed Sci. Technol*, 176:102–106. doi:10.1016/j.anifeedsci.2012.07.012
- Conway, E. J. dan E. O'Malley. 1942. Microdiffusion methods: ammonia and urea using buffered absorbents (revised methods for ranges greater than 10 µgN). *Biochemistry Journal*, 36: 655-66.
- Cotton, W. R. dan Pielke, R. A. *Human Impacts on Weather and Climate*. Cambridge: Cambridge University Press. Hal: 288.
- Damron, W. S. 2006. *Introduction to Animal Science*. Prentice Hall, Ohio.
- Daning, D. R. A. 2010. *Tanin limbah teh hitam (camellia sinensis) sebagai agen defaunasi untuk menurunkan produksi metan secara in vitro*. Skripsi. Fakultas Peternakan, Universitas Gadjah Mada. Yogyakarta.
- Daswir, I. K. 1993. Sistem usaha tani gambir di Sumatera Barat. *Media Komunikasi. Penelitian dan Pengembangan Tanaman Industri.*, 11: 68-74.
- Dehority, B.A. *Rumen microbiology*. Thrumpton, Nottingham: Nottingham University Press.
- Dijkstra, J. A. Bannink, A.M. van Vaouren, J.W. Spek, J. W. van Groenigen, and O. Oenema. 2013. Diet effects on urine composition of cattle and N<sub>2</sub>O emissions. *Animal.*, 7(2): 292–302. doi: 10.1017/S1751731113000578.
- Fernandes, T., Zambom, M. Z., Castagnara, D. D., Souza, L. C., Damasceno, D. O., Schmidt, E. L. 2015. Uswe od dried waste of cassava starch extraction for feeding lactating cows. *Anais da Academia Brasileira de Ciências, Rio de Janeiro*, 87(2), 1101-1111.
- Fieves V, Babayami O.J, dan Demeyer D. 2005. Estimation of direct and indirect gas production in syringes: A tool to estimate short chain fatty acid production that requires minimal laboratory facilities. *J.Anim Feed Sci and Technol.*, 123-124: 197-210.
- France J. dan Dijkstra J. 2005. Volatile fatty acid production. In: J. Dijkstra, J. Forbes, J.M. France (Ed) *Quantitative aspects of ruminant digestion and metabolism*. 2nd Ed. CAB International, Wallingford, UK, pp.

- General Laboratory Procedure. 1996. Departement of Dairy Science. University of Wisconsin.
- Gemeda, B. S. dan A. Hassen. 2015. Effect of Tannin and Species Variation on In vitro Digestibility, Gas, and Methane Production of Tropical Browse Plants. *Asian Australas. J. Anim. Sci.*, 28(2): 188-199.
- Getachew, G., A. Dandekar, D.H. Putnam, E.J. Depeters, S. Goyal, and W. Pittroff. 2008. The influence of addition of gallic acid, tannic acid, or quebracho tannins to alfalfa hay on in vitro rumen fermentation and microbial protein synthesis. *Anim. Feed Sci. Technol.*, 140: 444–461. doi:10.1016/j.anifeedsci.2007.03.011.
- Grainger, C., T. Clarke, M.J. Auldist, K.A. Beauchemin, S.M. McGinn, G.C. Waghorn and R.J. Eckard. 2009. Potential use of *Acacia mearnsii* condensed tannins to reduce methane emissions and nitrogen excretion from grazing dairy cows. *Can. J. Anim. Sci.*, 89, 241-251.
- Gumbira-Sa'id, E., K. Syamsu., E. Mardiyati, et al. 2009. *Agroindustri dan Bisnis Gambir Indonesia*. IPB-Press, Bogor.
- Hagerman, A. E. 2002. *Tannin Chemistry*. Department of Chemistry and Biochemistry. Oxford: Miami University.
- Haq, M.S. dan Karyudi, 2013. Efforts to increase tea production (*Camellia sinensis* L. O. Kuntze) through application of technical culture. *War. PPTK.*, 24: 71-84.
- Hegarty, R. S. 1999. Mechanism for competitively reducing ruminal methanogenesis. *Aus.J. of Agric.Res.*, 50: 1299-1305.
- IPCC. 1995. *Greenhouse Gas Inventory Workbook*. UNEP-OECD-IEA-IPCC. Brackwell-UK.
- Istiqomah, L., Hardian, H., Febrisantosa, A., dan Putra, D., 2011. Waru leaf (*hibiscus tiliaceus*) as saponin source on in-vitro ruminal fermentation characteristic. *Journal of the Indonesian Tropical Animal Agriculture*, 36(1): 43-49. <https://doi.org/10.14710/jitaa.36.1.43-49>
- Jayanegara A, dan Sofyan A. 2008. Penentuan aktivitas biologis tanin secara in-vitro menggunakan hohenheim gas test dengan polietilen glikol sebagai determinan. *Med. Pet*, 31(1): 44-52.
- Jayanegara, A., N. Togtokhbayar, H.P.S. Makkar dan K. Becker. 2008. Tannins determined by various methods as predictors of methane production reduction potential of plants by an in vitro rumen fermentation system. *Anim. Feed Sci. Technol.*, 150(2009): 230–237.
- Jayanegara, A. 2012. *Polifenol Sebagai Aditif Alami Dalam Upaya Mitigasi Emisi Gas Metana Asal Ternak Ruminansia*. Fakultas Peternakan, IPB. Bogor.
- Johnson, K. A. dan Johnson, D. E. 1995. Methane emissions from cattle. *Journal of Animal Science*, 73:2483.

- Kamal, M., 1994. *Nutrisi Ternak I*. Fakultas Peternakan, Universitas Gadjah Mada. Yogyakarta.
- Kraidees, M. S. 2005. Influence of urea treatment and soybean meal (urease) addition on the utilization of wheat straw by sheep. *Asian Aust. J. Anim. Sci.*, 18(7): 957 – 965.
- Kreuzer, M. dan C.R. Soliva. 2008. Nutrition: key to methane mitigation in ruminants. *Proc. Soc. Nutr. Physiol.*, 17: 168-171.
- Lelieveld, J., dan Crutzen, P.J., 1993. Methane emission into the atmosphere, an overview. p. 17-25 in van Amstel, A.R. (Ed.). *Methane and Nitrous Oxide, Methods in National Emission Inventories and Option for Control*. Proc. Intern. IPCC Workshop. Amsterdam.
- Makkar, H. P. S., M Blummel dan K. Becker. 1995. Formation of complexes between polyvinyl pyrrolidone and polyethylene glycol with tannins and their implication in gas production and true digestibility in in-vitro techniques. *J. Nutr.*, 73: 897-913.
- Makkar, H.P.S., 2003. Effects and fate of tannins in ruminant animals, adaptation to tannins, and strategies to overcome detrimental effects of feeding tannin-rich feeds. *Small Rum. Res.*, 49: 241–256.
- Martin, C, Doreau M, dan Morgavi DP. 2008. *Methane Mitigation in Ruminants: From Rumen Microbes To The Animal*. Inra, Ur 1213. Herbivores Research Unit. Research Centre of Clermont-Ferrand-Theix. F-63122. France (FR): St Genès Champanelle.
- Maynard, L.A., Loosli, J.K., Hintz, H.F. dan Warner, R.G., 1979. *Animal Nutrition – seven edition*. Mc Grow Hill Publishing. New York. 91-101: 158-166
- McAllister, T.A. dan Newbold, C.J. 2008. Redirecting rumen fermentation to reduce methanogenesis. *Aust. J. Exp. Agric.*, 48: 7–13.
- McDonald, P., Edwards, R.A. dan Greenhalg, J.P.D., 2002. *Animal Nutrition*. sixth Ed. Prentice hall. Gosport. London. 427-428.
- McLeod, M. N. 1974. Plant tannin: their role in forage quality. *Nutrition Abstract and Reviews.*, 44: 804-8115.
- Mcsweeny, C.S. B. Palmer, D.M. McNeill dan D.O Krause. 2001. Microbial interactions with tannins: nutritional consequences for ruminants. *Animal Feed Science and Technology*, 91: 83-93.
- Morgavi, D. P., J. P. Jouany, dan C. Martin. 2008. Changes in methane emission and rumen fermentation parameters induced by refaunation in sheep. *Aust. J. Exp. Agric.*, 48:69-72.
- Moss, A. R. 1993. *Methane: global warming and production by animals*. Chalcombe Publications, Kingston. United Kingdom. Hal: 105.

- Moss, A. R., Jouany JP, dan Newbold J. 2000. Methane production by ruminants: its contribution to global warming. *Ann. Zootech.*, 49: 231-253.
- Moante, P. J., W. Chalupa, T. G. Jenkins, R. C. Boston. 2004. A model to describe ruminal metabolism and intestinal absorption of long chain fatty acids. *Anim. Feed Sci. Technol.*, 112: 79–105.
- Nazir, M. 2000. *Gambir : Budidaya, Pengolahan dan Prospek Diversifikasinya*. Yayasan Hutanku. Padang.
- Ningrat, R. W. S., M. Zain, Erpomen, dan H. Suryani. 2017. Effects of doses and different sources of tannins on in vitro ruminal methane, volatile fatty acids production and on bacteria and protozoa populations. *Asian J. Anim. Sci.*, 11(1): 47-53.
- Orskov, E.R. 1998. *The feeding of Ruminants. Principles and Practice*. Second Edition. Rowet Research Institute. Chalcombe Publications. Aberden.
- Patra, A. K., dan J. Saxena. 2011. Exploitation of dietary tannins to improve rumen metabolism and ruminant nutrition. *J. Sci. Food Agric.*, 91:24–37. doi:10.1002/jsfa.4152.
- Preston, T. R. dan R. A. Leng. 1987. *Matching Ruminant Production System with Available Resources in the Tropics*. Penambul Books. Armidale. Hal: 245.
- Rahadi, S. 2008. *Teknik Pembuatan Amoniasi Urea Jerami Padi Sebagai Pakan Ternak. Makalah Penerapan Iptek. Konawe Selatan. Sulawesi Tenggara*
- Ramaiyulis, Sajatmiko dan Y. Sari. 2013. Pertumbuhan Protozoa Dalam Cairan Rumen Sapi yang Disuplementasi Dengan Defaunator Sisa Pengolahan Daun Gambir secara in-vitro. *Pros. Semnas. Optimalisasi System Pertanian Terpadu dan Mandiri Menuju Ketahanan Pangan*. Politeknik Pertanian Negeri Payakumbuh. Payakumbuh.
- Roffler, R.E. dan L.D. Satter, 1975. Relationship between ruminal ammonia and nonprotein nitrogen utilization by ruminants. I. Development of a model for predicting nonprotein nitrogen utilization by cattle. *J. Dairy Sci.*, 58: 1880-1888.
- Sasongko, W.T., L.M. Yusiati, dan Z.Bachruddin. 2010. Optimalisasi pengikatan tanin daun nangka dengan protein Bovine serum albumin. *Buletin Peternakan*, 34,154-158.
- Sejian, V., Lal R, Lakritz J., dan Ezeji T . 2011. Measurement and prediction of enteric methane emission. *Int. J. Biomet*, 55: 1-16.
- Setiarto, R. H. B., 2013. Prospek dan potensi pemanfaatan lignoselulosa jerami padi menjadi kompos, silase dan biogas melalui fermentasi mikroba. *Jurnal selulosa*, 3(2): 51 – 66.
- Steel, R.G.D. dan Torrie, J. H. 1991. *Prinsip dan Prosedur Statistika Suatu Pendekatan Biometrik (Terjemahan: Bambang Sumantri)*. PT. Gramedia. Jakarta.

- Sutardi, T. 1980. Landasan Ilmu Nutrisi I. Fakultas Peternakan. IPB, Bogor.
- Syamsu, J.A., 2006. Kajian Penggunaan Starter Mikroba Dalam Fermentasi Jerami Padi Sebagai Sumber Pakan Pada Peternakan Rakyat di Sulawesi Tenggara. Dalam Seminar Nasional Bioteknologi. Puslit Bioteknologi LIPI: Bogor
- Tilley, J.M.A. dan R.A. Terry. 1963. A two stage technique for in the in vitro digestion of forage crops. J. Grassland Soc, 18: 104.
- Towaha, J. B. 2013. Kandungan Senyawa Kimia pada Daun Teh (*Camellia sinensis*). Warta Penelitian dan Pengembangan Tanaman Industri, 9(3).
- Uhi, H.T., A. Parakkasi, dan B. Haryanto. 2006. Pengaruh suplementasi katalitik terhadap karakteristik dan populasi mikroba rumen domba. Media peternakan, 29(1): 20-26.
- Utomo, R. 2004. Pengaruh penggunaan jerami padi fermentasi sebagai bahan dasar pembuatan pakan komplit pada kinerja domba. Buletin Peternakan, 29(4): 162-171.
- Vlaming, J.B. 2008. Quantifying variation in estimated methane emission from ruminants using the sf6 tracer technique. A Thesis of Doctor of Philosophy in Animal Science. Massey University. New Zealand.
- Waldron M.R., A.M. Saxton, F.N. Schrick, J.D. Quigley, J.L. Klotz. R.N. Heitmann. 2002. Volatile fatty acid metabolism by epithelial cells isolated from different areas of the ewe rumen. J Anim Sci, 80: 270-278.
- Winarti, S. 2010. Makanan Fungsional. Surabaya: Graha Ilmu.
- Yagi, K., dan Minami, K., 1990. Effect of organic matter application of methane emission from some japanese paddy fields. Soil Sci. Plant Nutr. 36:599-610.
- Yanuartono, H. Purnamaningsih, S. Indarjulianto dan A. Nururrozi. 2017. Potensi jerami sebagai pakan ternak ruminansia. Jurnal Ilmu-Ilmu Peternakan, 27 (1): 40 – 62.
- Zain, M., T. Sutardi, Suryahadi, dan N. Ramli. 2008. Effect of defaunation and supplementation methionine hydroxy analogue and branched chain amino acid in growing sheep diet based on palm press fiber ammoniated. Pak. J. Nutr, 7(6): 813-816.
- Zhang, H. L., Y. Chen, X. L. Xu dan Y. X. Yang. 2013. Effects of branched-chain amino acids on in vitro ruminal fermentation of wheat straw. Asian-Aust. J. Anim. Sci, 26(4): 523-528.
- Zhen, Y.S., Z.M. Chen, S.J. Cheng dan M.L. Chen. 2002. Tea Bioactivity and Therapeutic Potential. Taylor and Francis, London.