DAFTAR PUSTAKA

Aazami, M.H., Tahmasbi, M., Ghaffari, M., Naserian, A.A., Valizadeh, R. And A.Ghaffari. 2013. Effects of saponin on rumen fermentation, nutrients digestibility, performance and plasma metabolites in sheep and goat kids. Journal Annual Review and Research in Biology. 3(4): 596-607.

Agustina, R. 2006. Penggunaan ramuan herbal sebagai feed additive untuk meningkatkan performans broiler. Pros. Lokakarya Nasional Inovasi Teknologi dalam Mendukung Usaha Ternak Unggas Berdaya Saing. 4 Agustus 2006 Semarang, Puslitbang Peternakan, Bogor. 47 – 52.

Alam, M., M.A. Manchulur, and M.N. Anwar. 2004. Isolation purification, characterization of cellulolytic enzym producer by the isolate streptomyces omiyaensis. Perkist Journal Biology Scientific. 7 (10):1647–1653.

Anwar, S., Rochana, A. dan H. Iman. 2016. Pengaruh tingkat penambahan *Complete Rumen Modifier* (CRM) dalam ransum berbasis jerami jagung terhadap produksi gas metan dan degradasi bahan kering di rumen (*In vitro*). Student E-Journal Fakultas Peternakan Universitas Padjajaran Bandung. 6 (1).

Arora, S. P. 1995. Pencernaan Mikroba pada Ruminansia. Cetakan kedua. Diterjemahkan oleh Retno Murwani. Yogyakarta : Gadjah Mada University Press.

Aryani, S. 2012. Isolasi dan karakterisasi ekstrak kasar enzim selulase dari kapang selulolitik *Mucor Sp.* Disertasi Universitas Airlangga, Banyuwangi.

Balamurugan. R.. S.P. Chittaranjan, A. M. Chandragunasekaran, and Ramakrishna. 2009. Molecular detection of the ruminal *bacterium Butyrivibrio fibrisolvens* in feces from rural residents of southern India. Microbial Ecology in Health and Disease. 21(1) : 38–43.

Berg, J.M., J.L. Tymoczko, and L. styer. 2012. Biochemistry. Seventh Edition. W.H Freeman and Company. USA.

Braun, U., and D. Jacquat. 2011.Ultrasonography of the retikulum in 30 healthy Saanen goats. Acta Veterinaria Scandinavica. 53 (19).

Brinckmann, J. A. 2017. *Nigella sativa*. The Journal of the American Botanical Council. 114 : 8 -16.

Brooker. J. D., L. O. Donovan,I. Skene, and Sellick. 1993. Mechanism of Tannin Resistence Detoxification in the Rumen. Animal Science Departemen. University of Adelaide. Australia.

Campbell, A. Neil, Reece, and B. Jane . 2008. Biologi Edisi Kedelapan Jilid I. Erlangga. Jakarta

Cannel, R. 1998. Natural Product Isolation. Humana Press. New Jersey.

Cheeke PR. 2000. Actual and potential applications of *Yucca schidigera* and *Quillaja saponaria* saponins in human and animal nutrition. Journal American Society of Animal Science.

Chesworth, J. 1992. Ruminant Nutrition. Departement of Animal Science College of Agriculture. Sultan Qaboos University. Oman.

Coleman, G.S. 1989. The distribution of carboxymethylcellulase between fractions taken from the rumens of sheep containing no protozoa or one of five different protozoal populations. Journal of Agricultural Science. 106 : 121-127.

Dehority, B. A. and P. A. Tirabasso. 2004. Effect of feeding frequency on bacterial and fungal concentration, pH, and other parameters in the rumen J. Anim. Sci. 79 : 2908 - 2912.

Diaz, A., M. Avendano and A. Escobar. 1993. Evaluation of *Sapindus saponaria* as a defaunating agent and its effects on different ruminal digestion parameters. Livest. Res. Rural Dev. 5:1–6.

Djarijah, A.S. 1996. Usaha Ternak Sapi. Kanisius. Yogyakarta.

FAO. 2012. Balanced feeding for improving livestock productivity – Increase in milk production and nutrient use efficiency and decrease in methane emission, by M.R. Garg. FAO Animal Production and Health Paper No. 173. Rome, Italy.

Francis, G., Z. Kerem, H.P. Makkar and K. Becker. 2002. The biological action of saponins in animal system. British Journal of Nutrition. 88 : 587-605

Gijzen, H.J., H.J.Lubberding, M. Gerhardus, and G. Vogels. 1988. Contribution of rumen protozoa to fibre degradation and cellulase activity in vitro. FEMS Microbiology Ecology. 53 : 35-44.

Goetsch, A.L. and F.N. Owens. 1985. Effects of saponin on digestion and passage rates in cattle fed medium to low concentrate. J. Dairy Sci. 68: 2377- 2384.

Guo Y., X. Liu, Y. Lu, W.Y. Zhu, S.E. Denman, and C.S. Sweeney. 2008. Effect of tea saponin on methanogenesis, microbial community structure and expression of mcrA gene, in cultures of rumen microorganisms. Lett Appl Microbiol 47: 421-426.

Hawley, T.S. and R.G. Hawley. 2004. Flow Cytometry Protocols. Humana Press, Inc.

Hostettmann, K. and A. Marston. 1995. Saponins. Cambridge University Press. Cambridge

Hu, W.L.. X. Liu. Y.M. Wu, Y.Q Guo and J. Ye. 2006. Effects of tea saponins on *in vitro* ruminal fermentation and growth performance in growing Boer goat. Arch Anim Nutr 60:89–97.

Hutapea JR. 1994. Inventaris Tanaman Obat Indonesia. Ed ke-3. Jakarta: Badan Penelitian dan Pengembangan Kesehatan, Depkes RI.163-165.

Huyen, L.T., T.P. Herold, Markemann and A.V. Zarate. 2011. Resource use, cattle performance and output patterns on different farm types in a mountainous Province of Northern Vietnam. Journal Animal Production Science. 51: 650-661.

Jamarun, N., Elishasridas, R. Pazla and Fitriayani. 2017. *in vitro* nutrients digestibility of the combination *Thitonia diversifolia* and *Pennisetum purpureum.* Journal International Seminar on Tropical Animal Production. 122-127.

Jouany, J. P. 1991. Rumen Microbial Metabolism and Ruminant Digestion. Institut National De La Recherche Agronomique. Paris

Judoamidjojo, M., A. darwia, dan E.G. Sa'id. 1992. Teknologi Fermentasi Edisi 1. Rajawali Press. Jakarta.

Kamra, D. N. 2005. Rumen microbial ecosystem. current science. 89 (1).

Krause D, A.E. Denman and Mackie. 2003. Opportunities to improve fiber degradation in the rumen: microbiology, ecology, and genomics. FEMS Microbiol Rev. 27: 663–693.

Kumar, N., A. Kannan, R. Bhar, A. Gulati, A. Gaurav, and V.K. Sharma. 2016. Nutrient intake, digestibility and performance of Gaddi supplemented with tea seed or tea seed saponin ectract. Asian-Australasian Journal of Animal Sciences. 30(4) : 486-494.

Kurniawati, A dan U. Nafiatul. 2010. *Hibiscus schizopetalus* as saponin sourcem reduce protozoa number ad increase microbial proteim synthesis on *in vitro* sheep rumen fermentation. The 5th International Seminar on Tropical Animal Production. 177-182.

Lehninger, A. L., 1995. Dasar – Dasar Biokomia I, Erlangga, Jakarta.

Lu, C.D., N.A Jorgensen. 1987. Alfalfa saponins affect site and extent of nutrient digestion in ruminants. Journal Nutrition. 117: 919–927.

McDonald, P., R.A. Edwards, J.F.D Greenhalgh, and C.A Morgan. 2002. Animal Nutrition. Sixth ed. Pearson Education Limited. Harlow

Mehta, D. dan T. Satyanarayana. 2016. Bacterial and archaeal α-amylases: diversity and amelioration of the desirable 79 characteristics for industrial applications. Frontiers in Microbiology. 7: 1-21.

Nagari, Faradista. 2020. Pengaruh penggunaan jintan hitam (*Nigella sativa*) sebagai sumber saponin dalam pakan terhadap produksi metan dan

parameter fermentasi rumen secara *in vitro*. Skripsi Fakultas Peternakan Universitas Gadjah Mada. Yogyakarta

Nelson, D. L and C. Michael. 2008. Lehninger Principles of Biochemistry. Fifth Edition. W.H Freeman and Company. New York.

Nelson, D.L., and M. Cox. 2008. Lehninger Principles of Biochemistry,4th edition. WH Freeman and Company. New York.

Nigam, P. S. 2013. Microbial enzymes with special characteristics for biotechnological applications. Biomolecules. 3(3): 597-611.

Padmaa, M. 2010. *Nigella Sativa*-Linn. Acomprehensive. Indian Journal Of Nat. Prod. And Res. 1(4) : 409 – 429.

Parakasi, A. 1999. Ilmu Nutrisi dan Makanan Ternak Ruminan. Indonesia University Press, Jakarta.

Patra, A. K., D. N. Kamra, and N. Agarwal. 2006. Effect of plant extracts on in vitro methanogenesis, enzyme activities and fermentation offeed in rumen liquor of buffalo. Animal Feed Science and Technology. 128(3-4): 276-291.

Pérez, A., Pecio, L., Kowalczyk, M., Kontek, R., Gajek, G., Stopinsek, I., Stochmal, A., and O. Wiesław. 2017. Cytotoxic triterpenoids isolated from sweet chestnut heartwood (*Castanea sativa*) and their health benefits implication. Journal Food and Chemical Toxicology.

Purbowati, E. Riyanto, W.S. Dilaga, C. Lestari, dan R. Adiwinarti. 2014. Karakteristik cairan rumen, jenis dan jumlah mikroba dalam rumen sapi jawa dan peranakan ongole. Buletin Peternakan. 38 (1) : 21 – 26.

Razie, F., A. Iswandi, A. Sutandi, L. Gunarto dan Sugiyanta. 2011. Aktivitas enzim selulase mikroba yang diisolasi dari jerami padi di persawahan pasang surut di kalimantan selatan. Jurnal Tanah Lingkungan. 13 (2) : 43-48.

Rukmana. 2005. Budidaya Rumput Unggul Hijauan Makanan Ternak. Kanisius. Yogyakarta

Rumiyati. 2008. Pengaruh imbangan jerami kacang tanah dengan rumput raja dalam ransum terhadap performan sapi peranakan *friesian holstein* jantan. Jurnal penelitian Ilmu Peternakan. Fakultas Pertanian Universitas Sebelas Maret Surakarta. 9: 62-68

Salami, S. A., B. Valenti, M. Bella, M. N. O'Grady, G. Luciano, J. P. Kerry, E. Jones, A. Priolo, and C. J. Newbold. 2018. Characterisation ofthe ruminal fermentation and microbiome in lambs supplemented with hydrolysable and condensed tannins. 94(5):1-13.

Sandi, S., S. Desiarni dan Asmak. 2018. Manajemen pakan ternak sapi potong di peternakan rakyat di Desa Sejaro Sakti Kecamatan

Indralaya Kabupaten Ogan Ilir. Jurnal peternakan sriwijaya. 7(1): 21-29.

Selinger, L.B., C.W Forsberg and K. Cheng. 1996. The rumen: a unique source of enzymes for enchancing livestock production. Anaerobe (2): 263-284.

Shahib, N. 2005, Biologi Molekular Medik I. Unpad Press. Bandung.

Smith A.L., 1997. Oxford Dictionary of Biochemistry and Molecular Biology, Oxford University Press.

Suhartati, F. 2005. Proteksi protein daun lamtoro (*Leucaena leucocephala*) menggunakan tanin, saponin, minyak dan pengaruhnya terhadap ruminal *undegradable dietary protein* dan sintesis protein mikroba rumen. Jurnal Animal Production. 7 (1) : 52-58.

Suharti, S., D.A Astuti dan E. Wina. 2009. Kecernaan nutrien dan performa produksi sapi potong peranakan ongole (PO) yang diberi tepung lerak (*Sapindus rarak*) dalam ransum. JITV. 14 (3) : 200-207.

Susanti, R. dan Fibriana, F. 2017. Teknologi Enzim. AndiPublisher. Yogyakarta

Susanti, S. dan E. Marhaeniyanto. 2007. Kecernaan, retensi nitrogen dan hubungannya dengan produksi susu pada sapi peranakan *Friesian Holstein* (FH) yang diberi pakan pollard dan bekatul. Jurnal Protein. 15 (2) : 141 – 147.

Thalib, A. 2004. Uji efektivitas saponin buah *Sapindus rarak* sebagai inhibitor metanogenesis secara *in vitro* pada sistem pencernaan rumen. Jurnal Ilmu Ternak dan Veteriner. 9 (3) : 164-171.

Van Soest, P.J. 1994. Nutritional Ecology of the Ruminant. Second Edition. Comstock Publishing Associates Cornell University Press. A Division of Ithaca and London.

Vilanova, C., G. Marco, D. Laura, G. Salvador, S. Vicente, B. Esther, R. Daniel, and P. Manuel. 2012. Bacteria from acidic to strongly alkaline insect midguts: potential sources of extreme cellulolytic enzymes. Biomassa and Bioenergy. 45 : 288-294.

Vincken, J.P., L. Heng, A. De Groot, and J.H. Gruppen. 2007. Saponins, classification and occurrence in the plant kingdom. Phytochem. 68: 275-297.

Wahyuni, I. M., A. Muktiani, dan C. Marry. 2014. Kecernaan bahan kering dan bahan organik dan degradabilitas serat pada pakan yang disuplementasin tanin dan saponin. Jurnal Agripet. 14(2) : 115-133

Wallace R.J., N.R. McEwan, F.M. McIntosh, B. Teferedegne and C.J. Newbold. 2002. Natural products as manipulators of rumen fermentation. Asian-Austr Journal Animal Science. 15:1458-1468

Wallace, R.J., L. Arthaud and C.J. Newbold. 1994. Influence of *Yucca schidigera* extract on ruminal ammonia concentrations and ruminal microorganism. Appl Environ Microbiol. 60:1762- 1767.

Wang, Y. and T. A. McAllister. 2002. Rumen microbes, enzymes, and feed digestion. Asian-Aust. J. Anim. Sci. 11: 1659-1676.

Wang, Y., T.A McAllister, L.J. Yanke and P. R. Cheeke. 2000. Effects of steroidal saponins from *Yucca schidigera* extract on ruminal microbes. Journal. Appl. Microbiol. 88, 887–896al ammonia concentrations and ruminal microorganism. Appl. Environ. Microbiol. 60 : 1762–1767.

Wang, Y and S. Nam. 2009. Experiment: Starch Hydrolysis by Amylase. Department of Chemical and Biomolecular Engineering. University of Maryland.

Wang, Y., T.A. McAlliser, l. J. Yanke, Z. J. Xu, P. R. Cheeke and K.J. Cheng. 2011. *In Vitro* effect of steroidal saponins from *Yucca scbidigera* extract on rumen microbes. Journal Applied Microbiology. 88:887-896.

Williams, A. G., and S.E. Withers. 1991. Effect of ciliate protozoa on the activity of polysaccharide-degrading enzymes and fibre breakdown in the rumen ecosystem. Journal of Applied Bacteriology. 70(2) : 144–155.

Wina, E.. S. Muetzel. E. Hoffmann. H.P. Makkar and K. Becker. 2005. Saponins containing methanol extract of *Sapindus rarak* affect microbial fermentation, microbial activity and microbial community structure in vitro. Animal Feed Science and Technology. 121(1-2) : 159–174.

Wiseman, J., and W. J. A. Cole. 1990. Feed Stuff Evaluation. Butterworth. London.

Yusak, Y. 2004. Pengaruh suhu dan buffer asetat terhadap hidrolisis cmc oleh enzim selulase dari ekstrak *Aspergillus niger* dalam media campuran onggok dan dedak. Jurnal Sains Kimia. 8 (2): 35–36.

Yogyaswari, S.A., M.I. Rukmi dan B. Raharjo. 2016. Ekplorasi bakteri selulolitik dari cairan rumen sapi peranakan fries holland (pfh) dan limousine peranakan ongole (limpo). Jurnal Biologi. 5(4): 70-80.