DAFTAR PUSTAKA

Abdillah, A. E. 2021. Pengaruh *Essential Oil* Pala (*Myristica fragrans* H.) dalam Ransum sebagai Aditif Pakan terhadap Kecernaan Nutrien In Vitro. Skripsi. Fakultas Peternakan Universitas Gadjah Mada. Yogyakarta.

Adriani, R. Asra, S. Novianti, and Fatati. 2019. The effect of *Coleus amboinicus* L. supplementation on *in vitro* digestibility. Pakistan Journal of Nutrition. 18(3): 241-246.

Agusta, A, 2000, Minyak Atsiri Tumbuhan Tropika Indonesia. Penerbit ITB. Bandung.

Al-Bataina, B. A., Maslat, AO.and Al-Kofahi, MM. (2003). Element analysis and biological studies on ten oriental spices using XRF and Ames test. Journal of Trace Elements in Medicine and Biology, 17(2): 85–90.

Anggraeny, Y. N, H. Soetanto, Kusmartono, dan Hartutik. 2015. Sinkronisasi Suplai Protein dan Energi dalam Rumen untuk Meningkatkan Efisiensi Pakan Berkualitas Rendah. Wartazoa. 25(3): 107-116.

Anggraini A. D., W. Widodo, I. D. Rahayu, dan A. Susanto. 2019. Efektivitas penambahan tepung temulawak dalam ransum sebagai upaya peningkatan produktivitas ayam kampung super. Jurnal Sain Peternakan Indonesia. 14:222-227.

AOAC. 2005. Official Method of Analysis of the Association of Official Analitycal Chemist. 18th ed. Maryland: AOAC International. William Harwitz. United Stated of America.

Arrijani. 2005. Biologi dan konservasi marga Myristica di Indonesia. Biodiversitas. 6(2):147-151.

Astuti, M. 2007. Pengantar Ilmu Statistik untuk Peternakan dan Kesehatan Hewan. Cetakan ke-I. Binasti Publisher. Bogor.

Astuti, R. 2019. Pengaruh waktu distilasi minyak biji pala (*Myristica fragrans)* dengan metode distilasi uap dan identifikasi komponen kimiawi. Indonesian Journal of Laboratory. 1(2): 36-40.

Babinszky, L., J. Oliveira, and E. M. Santos. 2021. Advanced Studies in The 21st Century Animal Nutrition. Veterinary Medicine and Science. Portugal.

Bach, A., S. Calsamiglia., and M. D. Stern. 2005. Nitrogen metabolism in the rumen. Journal of Dairy Science. 88(1):9-21.

Bachtiar, K. R., S. Susanti, dan R. Mardianingrum. 2021. Uji akitvitas antiinflamasi senyawa dalam minyak atsiri Rimpang Bangle (*Zingiber purpureum Roxb*) secara *In Silico*. Journal of Pharmacopolium. 4(1): 36-43.

Bassole, I. H. N., and H. R. Juliani. 2012. Essential Oils in Combination and Their Antimicrobial Properties. Molecules. 17(4). 3989–4006.

Bayala, I. H. Bassole, and R. Scifo. 2014. Anticancer activity of essential oils and their chemical components-a review. Journal Cancer Resources. 4(6): 591-607.

Belanche, A., E. Ramos-Morales, and C. J. Newbold. 2016. In vitro screening of natural feed additives from crustaceans, diatoms, seaweeds and plant extracts to manipulate rumen fermentation. Journal Science. 9:3069-3078. Doi:10.1002/jsfa.7481.

Benchaar C. 2020. Feeding oregano oil and its main component carvacrol does not affect ruminal fermentation, nutrient utilization, methane emissions, milk production or milk fatty acid composition of dairy cows. Journal of Dairy Science. 103:1516-1527.

Broom L. J. and M. H. Kogut. 2018. Inflammation: Friend or foe for animal production. Poultry Science. 97(2): 510–514

Burt, S. 2004. Essential oils: their antibacterial properties and potential applications in foods. Review. International Journal of Food Microbiology 94: 223-253.

Busquet, M., S. Calsamiglia, A. Ferret, and C. Kamel. 2005. Screening for effects of plant extracts and active compounds of plants on dairy cattle rumen microbial fermentation in a continuous culture system. 124:597- 613.

Busquet, M., S. Calsamiglia, A. Ferret, and C. Kamel. 2006. Plant extracts affect in vitro rumen microbial fermentation. Journal of Dairy Science. 89: 761–771.

Busquet, M., S. Calsamiglia, A. Ferret, P. W. Cardozo, and C. Kamel. 2005. Effects of cinnamaldehyde and garlic oil on rumen microbial fermentation in a dual flow continuous culture. Jurnal of Dairy Science. 88(1): 2508-2516.

Cardozo, P. W., S. Calsamiglia, A. Ferret, dan C. Kamel. 2006. Effects of alfalfa extract, anise, capsicum, and a mixture of cinnamaldehyde and eugenol on ruminal fermentation and protein degradation in beef heifers fed a high-concentrate diet. Journal Animal Science. 84: 2801–2808.

Casamiglia S., M. Busquet, P. W. Cardozo, L. Castillejos, A. Ferret, and I. Fandino. 2007. The use of essential oils in ruminants as modifiers of rumen microbial fermentation. Penn State Dairy Cattle Workshop. November 13th-14th.

Castillejos L, S. Calsamiglia, A. Ferret. 2006. Effect of essential oil active compounds on rumen microbial fermentation and nutrient flow in in vitro systems. Journal Dairy Science. 89:2649-2658.

Castillejos, L., S. Calsamiglia, J. Martin-Terso, and H. Ter Wiklen. 2008. *In vitro* evaluation of effect of ten essential oils all three doses on ruminal fermentation of high concentrate feedlot-type diets. Animal Feed Science and Technology. 5(37): 259-270.

Chaney, L. A dan E. P. Marbach. 1962. Reagents for Determination of Urea and Ammonia. Clinical Chemistry. 8(2): 130–132. https://doi.org/10.1093/clinchem/8.2.130.

Chaves, A. V., K. Stanford, L. L. Gibson, T. A. McAllister, dan C. Benchaar. 2008. Effects of carvacrol and cinnamaldehyde on intake, rumen fermentation, growth performance, and carcass characteristics of growing lambs. Animal Feed Science and Technology. 145: 396–408.

Cheng, S. S., J. Y. Liu, C. G. Huang, Y. R. Hsui, W. J. Chen, and S. T. Chang. 2009. Insecticidal activities of leaf essential oils from Cinnamomum osmophloeum against three mosquito species. Bioresource Technology. 100: 457–464.

Cherian, G. 2009. A Guide to the Pronciples of Animal Nutrition. Oregon State University.

Choudhury, P. K., A. Z. M. Salem, R. Jena, S. Kumar, R. Singh, and A. K. Puniya. 2015. Rumen Microbiology: An Overview. In: A. K. Puniya, R. Singh, and D. N. Kamra, editors. Rumen Microbiology: From Evolution to Revolution. Springer India. pp. 3-16.

Clauss, M. and R. Hofmann. 2014. The digestive system of ruminants, and peculiarities of (wild) cattle. An Overview. In: M. Melletti., and J. Burton, editors. Ecology, Evolution and Behaviour of Wild Cattle: Implications for Conservation. Cambridge University Press. Pp. 57-62. Doi: 10.5167/uzh-100814.

Cobellis, G., A. Petrozzi, C. Forte, G. Acuti, M. Orru, M. C. Marcotullio, A. Aquino, A. Nicolini, V. Mazza, and M. T. Marinucci. 2015. Evaluation of the effects of mitigation on methane and ammonia production by using *Origanum vulgare* L. and *Rosmarinus officinalis* L. essential oil on in vitro rumen fermentation systems. Journal of Sustainability. 12856-12869.

Coutinho A, Antonelli, S. C. Mori, P. C. Soares, S. S. Kitamura, E. R. Ortolani. 2004. Experimental ammonia poisoning in cattle fed extruded or prilled urea: clinical findings. Brazilian Journal Veterinary Resouce Animal Science. 41: 67-74.

Cunningham, J. G., and Klein B. G. 2008. Tratado de Fisiologia Veterinária. 4ª edição. Rio de Janeiro: Editora Elsevier. pp 710.

Daning, D. A. R., C. Hanim, B. P. Widyobroto, dan L. M. Yusiati. 2020. Pemanfaatan minyak atsiri sebagai *rumen modifier* pada sapi perah. Wartazoa. 30(4): 189-200.

De Guzman, and Siemonsman B. S. 1999. Spices. Vol 13. Plant Resources Of South-East Asia, Prosea Foundation. Bogor. 137-141.

Devi, P. 2009.The Compound maceligan isolated from Myristica fragrans. European Journal of Pharmacy Research. 2(11):1669-1675

Dhifi, W., S. Bellili, S. Jazi, N. Bahloul, and W. Mnif. 2016. Essential oils Chemical Characterization and Investigation of Some Biological Activities: A Critical Review. Medicines (Basel). 3 (4): 1-16.

Dicko A, Muanda F, Koné D, Soulimani R, Younos C. 2011. Phytochemical composition and antioxidant capacity of three 87ydrox medicinal plant parts. Evidence-Based Complementary and Alternative Medicine. pp 1–8.

Dore, J. and P. H. Gouet. 1991. Microbial interaction in the rumen. In: Rumen Microbial Metabolism and Ruminant Digestion. Jouany. INFRA, Paris. pp 71-88.

Duan, L., Tao, HW., Hao, X., Gu, QQ.and Zhu, WM. 2009. Cytotoxic and antioxidative phenolic compounds from the traditional Chinese medicinal plant, Myristica fragrans. Planta Medica. 75(11): 1241-1245.

Fathul, F., S. Tantalo, Liman, dan N. Purwaningsih. 2013. Pengetahuan Pakan Dan Formulasi Ransum. Universitas Lampung. Bandar Lampung.

Filipek, J. dan R. Dvorak. 2009. Determination of the volatile fatty acid content in the rumen liquid: comparison of gas chromatography and capillary isotachophoresis. Acta Veterinary. 78: 627-633. Doi:10.2754/avb200978040627.

France, J. and J. Dijkstra. 2005. Volatile Fatty Acid Production. In: Dijkstra, J., J. M. Forbes, and J. France. Quantitative Aspects of Ruminants Digestion and Metabolis. CABI Publising. Wallingford.

Franzolin, R. and B. Dehority. 2010. The role of pH on the survival of rumen protozoa in steers. Revista Brasileira De Zootecnia-Brazilian Journal of Animal Science. 39: 2262-2267.

Giweli, A., A. M. Džamić, M. Soković, M. S. Ristić, and P.D. Marin. 2012. Antimicrobial and antioxidant activities of essential oils of Satureja thymbra growing wild in Libya. Journal of Molecules. 17(5): 4836–4850.

Goel, J., K. Kadirvelu, C. Rajagopal, and V. K. Garg. 2005. Removal of lead (II) by adsorption using treated granular activated carbon: batch and column studies. Journal of Hazard Mater. 125(1): 211–220.

Gonzalez, A. R. C., M. E. Burrola-Barraza, J. Domiguez-Viveros, and A. Chavez-Martinez. 2014. Rumen microorganism and fermentation. Archivos de Medicina Veterinaria 46: 349-361.

Gopalakrishnan, M. 1992. Chemical composition of nutmeg and mace. Journal of Spices and Aromatic Crops. 1(3): 49-54.

Greathead, H. 2003. Plant and plant extracts for improving animal productivity. Nutrition Soc. 62:279–290. doi: 10.1079/pns2002197.

Griffin, S. G., S. G. Wyllie., J. L. Marham, and D. N. Leach. 1999. The role of structure and molecular properties of terpenoids in determining their antimicrobial activity. Journal Flavour and Fragrance. 14: 322-332

Guenther, E., 2006. Minyak Atsiri. Jilid 1. UI Press. Jakarta

Günal M, B. Pinski, and A. A. Ghazaleh. 2017. Evaluating the effects of essential oils on methane production and fermentation under in vitro conditions. Italy Journal Animal Science. 16: 500-506.

Gunal, M., A. Ishlak, A. A. Abughazaleh, and W. Khattab. 2014. Essential oil effect on rumen fermentation and biohydrogenation under in vitro conditions. Czech Journal Animal Science. 59 (10): 450-459.

Gunal, M., A. Ishlak, and A. A. Abughazaleh. 2013. Evaluating the effect of six essential oils on fermentation and biohydrogenation in *in vitro* rumen batch cultures. Czech Journal Animal Science. 6. 243-252.

Gunawan. I. W. G. dan I. M. Karda. 2015. Indentifikasi senyawa minyak atsiri dan uji aktivitas antioksidan ekstrak etanol kulit batang kepuh (*Sterculia foetida* L.). Chemical Prog. 8(1): 12-16.

Hackmann, T. J dan J. L. Firkins. 2015. Maximizing efficiency of rumen microbial protein production. Front. Microbiol. 6(465):1–16.

Hall, M.B. and G. B. Huntington. 2008. Nutrient synchrony: sound in theory, elusive in practice. J Anim Sci. 86:E287- E292.

Hammer K. A., Carson C. F., Riley T. V. 2003. Antifungal activity of the components of Melaleuca alternifolia (tea tree) oil. Journal of Applied Microbiology, 95, 853–860.

Hatew, B., S. C. Podesta, H. Van Laar, J. L. Ellis, J. Djikstra, and A. Bannink. 2015. Effects of dietary 89ydrox content and rate of 75 fermentation on methane production in lactating dairy cows. Jounal Dairy Science 98: 486-499.

Hindratiningrum, N., M. Bata, S. A. Santosa. 2011. Produk fermentasi rumen dan produksi protein mikroba sapi lokal yang diberikan pakan jerami amoniasi dan beberapa bahan pakan sumber energi. Agripet. 11(2): 29-34.

Hristov, A. N., J. K. Ropp, S. Zaman, and A. Melgar. 2008. Effects of essential oils on in vitro ruminal fermentation and ammonia release. Animal Feed Science and Technology. 14: 55–64.

IFRA International Fragrance Association. 2009. IFRA Standars (46 amandement).

Intan, H. P. 2018. Uji Fitokimia dan Uji Aktivitas Antibakteri Minyak Atsiri Daun Kemangi (*Ocimum basilicum* l.) Terhadap Pertumbuhan *Propionibacterium acnes* ATCC 11827 Secara *in Vitro*. Skripsi. Universitas Sanata Dharma. Yogjakarta.

IPCC Intergovernmental Panel on Climate Change. 2006. Guidelines for Nation Greenhouse Gas Inventories. *http://www.ipccnggip.iges.or.jp/public/2006gl/ind ex.html*.

Isman, M. B. 2000. Plant essential oils for pest and disease management. Crop Protection. 19: 603-608.

Jayanegara, A. 2008. Reducing methane emissions from livestock. Nutritional approaches. Proceedings of Indonesian Students Scientific Meeting (ISSM). 18-21.

Jayanegara, A. dan A. Sofyan. 2008. Penentuan aktivitas biologis tanin beberapa hijauan secara *in vitro* menggunakan 'Hohenheim Gas Test' dengan polietilen glikol sebagai determinan. Media Peternakan. 51: 44-52.

Jouany, J. P., and D. P. Morgavi. 2007. Use of natural product as alternatives to antibiotic feed additives in ruminant production. Animal. 1: 1443- 1466.

Kalemba, D., and A. Kunicka. 2003. Antibacterial and antifungal properties of essential oils. Curr. Med. Chem. 10:813–829.

Kali, L. 2017. The effects of a blend of essential oils on rumen efficiency of lactating dairy cows. Thesis. South Dakota State University.

Kamra, D. N. 2005. Rumen microbial ecosystem. Journal Current science. 89(1): 124-135.

Kamra, D. N., N. Agarwal, and L. C. Chaudhary. 2006. Inhibition of ruminal methanogenesis by tropical plants containing secondary compounds. International Congress Series 1293, 156 – 163.

Karlsson, J., M. Ramin, M. Kass, M. Lindberg, and K. Holtenius. 2019. Effects ofreplacing wheat starch with 90ydroxyl on mthane emissions, milk production, and feed efficiency in dairy cows fed grass silagebased diets. Journal. Dairy Science102: 7927-7935.

Karsli, M. A., J. R. Russell. 2002. Prediction of the voluntary intake and digestibility of forage-based diets from chemical composition and ruminal degradation characteristics. Turkish J. Vet. Anim Sci. 26:249-255.

Keidane, D., and E. Birgele. 2003. The efficacy of feed on the intra ruminal and intra abomasal pH dynamics in goats. Veterinarija IR Zootechnika 22(44): 58-61.

Keunen, J. E., J. C. Plaizier, I. Kyriazakis, T. F. Duffield, T. M. Widowski, M. I. Lindinger, and B. W. McBride. 2002. Effect of sub-acute ruminal acidosis model on the diet selection of dairy cows. J. Dairy Sci. 85:3304–3313.

Khateri, N., Azizi O., and H. Jahani-Azizabadi. 2017. Effects of a specific blend of essential oils on apparent nutrient digestion, rumen fermentation and rumen microbial populations in sheep fed a 50:50 alfalfa hay: Concentrate diet. Asian-Australas J Anim Sci. 30:370-378.

Kiran, and S. Deswal. 2020. Role of feed additives in ruminants's production: A Review. J. Pharma Inv. 9(2): 394-397.

Knapp, J. R., G. L. Laur, P. A. Vadas, W. P. Weiss, and J. M. Tricarico. 2014. Enteric methane in dairy cattle production: Quantifying the opportunities and impact of reducing emissions. Journal of Dairy Science. 97: 3231-3261.

Kolling, G. J., S. C. B. Stivanin, A. M. Gabbi, F. S. Machado, A. L. Ferreira, and M. M. Campos. 2018. Performance and methane emissions in dairy cows fed oregano and green tea extracts as feed additives. *J. Dairy Sci.* 101: 4221–4234. Doi: 10.3168/jds.2017-13841

Laporan Inventarisasi Gas Rumah Kaca (GRK), dan Monitoring, Pelaporan, Verifikasi (MPV). 2019. Direktorat Jendral Pengendalian Perubahan Iklim. Kementrian Lingkungan Hidup dan Kehutanan. Jakarta.

Liju, V. B., Jeena, K., and Kuttan, R. 2011. An evaluation of antioxidant, anti-inflammatory, and antinociceptive activities of essential oil from Curcuma longa. L. Indian Journal of Pharmacology. 43(5): 526–531.

Lin, B., Y. Lu, J. H. Wang, Q. Liang, and J. X.Liu. 2012. The effects of combined essential oils along with fumarate on rumen fermentation and methane production in vitro. J Anim Feed Sci. 21: 198-210.

Liu, H., V. Vaddella, and D. Zhou. 2011. Effects of chestnut tannins and coconut oil on growth performance, methane emission, ruminal fermentation, and microbial populations in sheep. *J. Dairy Sci.* 94, 6069–6077. Doi: 10.3168/jds.2011-4508

Macheboeuf. D., D. P. Morgavi. Y. Papon, J. L. Mousset, M. Arturo-Schaan. 2008. Dose response effects of essential oils on *in vitro* fermentation activity of the rumen microbial population. Animal Feed Science and Technology. 145:335–350.

Martin, C., M. Doreau, dan D. P. Morgavi. 2008. Methane mitigation in ruminants: from rumen microbes to the animal. Herbivores Research Unit. France.

Marzuki, I. 2007. Karakteristik produksi, proksimat atsiri pala Banda. Makalah Pada Seminar Nasional Akselerasi Inovasi Teknologi Pertanian Spesifik Lokasi Mendukung Ketahanan Pangan di Wilayah Kepulauan. BPTP Maluku 29-30 Oktober 2007.

Masruri, R. W. Amini, and M. F. Rahman. 2016. Potassium permanganate-catalyzed alpha-pinene Oxidation: Formation of coordination compound with Zinc (II) and Copper (II), and growth inhibition activity on Staypylococcus aureus and Eccherchia coli. Indonesia Journal Chemical. 16(1): 135-139.

Mawar. I. K. G. Wiryawan., dan S. Suharti. 2019. Karakteristik fermentasi rumen dan keseimbangan nitrogen domba yang diberi minyak kanola murni dan terenkapsulasi. Jurnal Ilmu dan Teknologi Peternaka Tropis. 6(3): 358-366.

McDonald, P., R. A. Edwards, J. F. D. Greenhalgh, and C. A Morgan. 2002. Animal Nutrition. 6th Ed. Pretice all, London

McDonald, P., R. A. Edwards, J. F. D. Greenhalgh, C. A. Morgan, L. A. Sinclair, dan R. G. Wilkinson. 2011. Animal Nutrition. 7th ed. Pearson, UK. Pp. 171-189.

Mcintosh, F. M, P. Williams, R. Losa, R. J. Wallace, D. A. Beever, and C. J. Newbold. 2003. Effects of Essential Oils on Ruminal Microorganisms and Their Protein Metabolism. 69: 5011–5014.

Mempin, R, H. Tran, C. N. Chen, H. Gong , K. K. Ho., and S. W. Lu. 2013. Release of extracellular ATP by bacteria during growth. Bmc Microbiol. 13.

Millen, D. D, R. D. L. Pacheco, and M. De B. Arrigoni. 2016. Rumenology. Springer International Publishing. Switzerland.

Morgavi, D. P., W. J. Kelly., P.H. Janssen., and G. T. Attwood. 2013. Rumen microbial (meta)genomics and its application to ruminant production. Animal. 7(1): 184-201.

Moss, A. R., J. P. Jouany, J. Newbold. 2000. Methane production by ruminants: its contribution to global warming. Ann Zootech. 49:231-253.

Nagaraja, T. G., C. J. Newbold, C. J. van Nevel, D. I. Demeyer. 1997. Manipulation of ruminal fermentation. Dordrecht. Netherlands. Pp: 523–632.

Niehaus, A. 2009. Rumenotomy and Rumenostomy. In: D.E. Anderson, and D.M. Rings, editors. Food Animal Practice 5th edition. Saunders. pp. 27-20.

Niwinska, B. 2012. Digestion in ruminants. In: Carbohydrates-Comprehensive Studies on Glycobiology and Glycotechnology. Chang, C.-F. (Ed.). InTech. United Kingdom. pp. 245-258.

Nolan, J. V. and R. C. Dobos. 2005. Nitrogen transactions in ruminants. Pages 177-206 in Quantitative Aspects of Ruminant Digestion and Metabolism. 2nd ed. J. Dijkstra, J. M. Forbes, and J. France, Wageningen University, Netherlands.

Nooriyan S. M. E. and Y. Rouzbehan. 2017. Effect of essential oil of eucalyptus (*Eucalyptus globulus* labill) and angelica (*Heracleum persicum* desf. Ex fischer) on in vitro ruminal fermentation, protozoal population, and methane emission using afshari sheep inoculum. Journal of Agricultural Science Technology. 100: 553-567.

Ouattara, B., R.E. Simard., R A. Holley., G.J.P. Piette., and A. Be´gin. 1997. Antibacterial activity of selected fatty acids and essential oils against six meat spoilage organisms. Int. J. Food Microbiol. 37: 155-162.

Owens, F. N., and M. Basalan. 2016. Ruminal Fermentation. Pages 63- 102 in Rumenology. Millen, D., D. Beni, M. Arrigoni, Lauritano, R. Pacheco, Springer, Cham.

Pamungkas, D., Y. N. Anggraeni, Kusmartono, dan N. H. Krisna. 2008. Produksi asam lemak terbang dan amonia rumen sapi Bali pada imbangan daun lamtoro (L. Leucocephala) dan pakan lengkap yang berbeda. Seminar nasional teknologi peternakan dan veteriner.

Patra, A. K, and Z. Yu. 2012. Effects of essential oils on methane production and fermentation by, and abundance and diversity of, rumen microbial populations. Appl Environ Microbiol. 78:4271-4280.

Patra, A. K, and Z. Yu. 2015. Essential oils affect populations of some rumen bacteria in vitro as revealed by microarray (RumenBactArray) analysis. Front Microbial. 6:1–13.

Pirmohammadi R., Yansari A. T., Hamidi B. A., Manafiazar G. 2007. Effect of different fibrous and non-fiber carbohydrate levels on nutrients digestibility of total mixed ration using in vivo in buffalo. Ital J Anim Sci. 6: 476-479.

Qiao, J., Z. Tan, and N. Wang. 2014. Potential and existing mechanism of enteric methane producing in ruminants. Scienta Agricola 71(5): 345-355.

Rahayu, R. I., A. Subrata, dan J. Achmadi. 2018. Fermentabilitas ruminal *in vitro* pada pakan berbasis jerami padi amoniasi dengan suplementasi tepung bonggol pisang dan 93ydroxyl. Jurnal Peternakan Indonesia. Vol 20 (3): 166-174.

Rialita, T., W. P. Rahayu, L. Nuraida, B. Nurtama. 2015. Aktivitas antimikroba minyak esensial jahe merah (*Zingiber officinale* var. *Rubrum*) dan lengkuas merah (*Alpinia purpurata* K. *Schum*) terhadap bakteri patogen dan perusak pangan. Agritech. 35(1): 43-52.

Rinidar dan M. Isa. 2017. Biokimia Dasar Pencernaan dan Absorbsi Makanan. Syiah Kuala University Press. Aceh. Pp: 168.

Rodianawati, I., P. Hastuti, and M. N. Cahyanto. 2015. Nutmeg's (*Myristica fragrans* Houtt) oleoresin: effect of heating to chemical compositions and antifungal properties. The First International Symposium on Food and Agro-biodiversity (ISFA2014).

Russel, J. B. 2002. Rumen microbiology and its role in ruminant nutrition. 1st ed. Itacha (US): James B Russell Publishing Co.

Sahin, F., M. Gulluce, D. Daferera, and A. Sokmen. 2004. Biological activities of the essential oils and methanol extract of Origamum vulgare in the Eastern Anatolia region of Turkey. Food Control. 15(7): 549-557.

Sari, L. D. Lesmana, Taharuddin. 2018. Ekstraksi minyak atsiri dari daging buah pala (tinjauan pengaruh metode destilasi dan kadar air bahan). Seminar Nasional dan Teknologi. Fakultas Teknik Universitas Lampung. 1-6.

Schmidt, J., and E. Zsedely. 2011. Nutrition of Ruminants. Agricultural and Foof Science Non-profit Ltd. Kaposvar Unoversity. Hungaria.

Sejian, V., I. Hyder, T. Ezeji, J. Lakritz, R. Bhatta, J. P. Ravindra, C. S. Prasad, dan R. Lal. 2015. Global Warming : Role of Livestock. Research Gate. 141-169.

Sipahelut, S. G. dan I. Telussa. 2011. Karakteristik minyak atsiri dari daging buah pala melalui beberapa teknologi proses. Jurnal Teknologi Hasil Pertanian. 4(2): 126-134)

Soebarinoto, S. Chuzaemi, dan Mashudi. 1991. Ilmu Gizi Ruminansia. Jurusan Nutrisi dan Makanan Ternak. Fakultas Peternakan. Universitas Brawijaya. Malang.

Suryani, Ni. N., I. K. M. Budiasa, dan I. P. A. Astawa. 2014. Fermentasi rumen dan sintesis protein mikroba kambing Peranakan Ettawa yang diberi pakan dengan komposisi hijauan beragam dan level konsentrat berbeda. Majalah Ilmiah Peternakan. 17(2): 56-60.

Syahrir S., K. G. Wiryawan, A. Parakkasi, M. Winugroho, and O. N. P. Sari. 2009. Efektivitas daun murbei sebagai pengganti konsentrat dalam sistem rumen in vitro. Media Peternakan. 32:112-119.

Tanuwiria, U. H., B. Ayuningsih, dan Mansyur. 2005. Fermentabilitas dan kecernaan ransum lengkap sapi perah berbasis jerami padi dan pucuk tebu teramoniasi (in vitro). J. Ilmu Ternak. 5(2): 64-69

Thao, T., M. Wanapat, S. Kang, and A. Cherdthong. 2015. Effects of supplementation of eucalyptus (*E.camaldulensis*) leaf meal on feed intake and rumen fermentation efficiency in swamp buffaloesn. Asian Australas. J. Anim. Sci. 28(7) :951-957.

Tsai M L. , C. T. Wu, T. F. Lin, W. C. Lin, Y. C. Huang, C. H. Yang. 2013. Chemical composition and biological properties of essential oils of two mint species. Trop J Pharm Res. 12:577-582.

Vanwonterghem, I., P. N. Evans, D. H. Parks, P. D. Jensen, B. J. Woodcroft, P. Hugenholtz, and G. W. Tyson. 2016. Methylotropic

methanogeneis discovered in the archaeal phylum Verstraetearchaeota. Nature Microbiology 1: 170.

Wajizah, S., Samadi, Usman, Y. dan Mariana, E., 2015. Evaluasi nilai nutrisi dan kecernaan In Vitro pelepah kelapa sawit (Oil Palm Fronds) yang difermentasi menggunakan Aspergillus niger dengan penambahan sumber karbohidrat yang berbeda. Jurnal Agripet. 15 (1): 13-19.

Wallace, R. J., N. R. McEwan., F. M. McIntosh., B. Teferedegne., and C. J. Newbold. 2002. Natural products as manipulators of rumen fermentation. Asian Aus J Anim Sci. Doi: 15. 10.5713/ajas.2002.1458.

Wallace, R. J., T. J. Snelling., C. A. McCartney., I. Tapio., and F. Strozzi. 2017. Application of meta-omics techniques to understand greenhouse gas emissions originating from ruminal metabolism. Genet. Sel. Evol. 49(9) : 3-14. https://doi.org/10.1186/s12711-017-0285-6.

Wang J., H. Li, L. Zhang, Y. Zhang, M. Yue, B. Shao, J. Wang. 2014. Histomorphometric characterization of forestomach of yak (Bos grunniens) in the QinghaiTibetan Plateau. International Journal of Morphology 32 : 871–881.

Wang, B., Jia, M., Fang, L., Jiang, L., and Li, Y. 2018. Effects of eucalyptus oil and anise oil supplementation on rumen fermentation characteristics, methane emission, and digestibility in sheep. *J. Anim. Sci.* 96, 3460–3470. Doi: 10.1093/jas/sky216

Wibowo, D. P., Y. Febriani, H. Riasari, dan D. L. Aulifa. 2018. Komposisi minyak atsiri, uji aktivitas antioksidan dan antibakteri biji pala (*Myristica frangrans* Houtt.) dari Garut Jawa Barat. Indoneisan Journal of Pharmaceutical Science and Technology. 5(3): 82-87.

Widiawati, Y., M. Winugroho, E. Teleni and A. Thalib. 2007. Fermentation kinetics (*in vitro*) of *Leucaena leucocephala*, *Gliricidia sepium* and *Calliandra callothyrsus* leaves the pattern of gas production, organic matter degradation, pH, NH_3 and VFA concentration; estimated CH_4 and microbial biomass production. JITV. 12(3).

Yanuartono, Y., A. Nururrozi, S. Indarjulianto, dan H. Purnamaningsih. 2019. Peran protozoa pada pencernaan ruminansia dan dampak terhadap linkungan. Journal of Tropical Animal Production. 20(1): 16-28.

Yasin, M. Y., M. Z. Hupron, M. Khomarudin, A. F. Hadiarto, Lestariningsih. 2021. The important role of rumen microbes in ruminants. 4(1): 33-42.

Young, R. T. 2014. Essential oil safety – 96ydrox tisserand. 2nd ed. Williamson EM, editor. London (UK): Elsevier BV.

Zain, M., T. Sutardi, Suryahadi, and N. Ramli. 2008. Effect of defaunation and supplementation methionine 96ydroxyl analogue and branched chain amino acid in growing sheep diet based on palm press fiber ammoniated. Pakistan Journal Nutrition. 7(6): 813-816.

Zhang, H.L., Y. Chen, C. L. Xu, and Y. X Yang. 2013. Effect of branched chain amino acids on in vitro ruminal fermentation of wheat straw. Asian-Australasian Journal Animal Science. 26:523-528.

Zhou, R., J. Wu, X. Lang, L. Liu, D. P. Casper, C. Wang. L. Zhang, S. Wei. 2020. Effects of oregano essential oil on in vitro ruminal fermentation, methane production, and ruminal microbial community. Journal of Dairy Science. 103(3): 2303-2314.

Zulfa, I. H., Z. Bachruddin, and A. Kurniawati. 2019. Effects of lemongrass leaves as essential oil sources on rumen microbial ecology and nutrient digestibility in an in vitro system. Pakistan Journal of Nutrition. 18(3): 254-259.

Zyl, V., L. Robyn, T. S. Seatlholo, V. Vuuren, F. Sandy, M. Alvaro, Biological Activities of 20 Nature Identical Essential Oil Constituents, The Journal of Essential Oil Research JEOR http://findarticles.com/p/articles/mi_qa4091/is_20 0601/ai_n17173910/, 2006.