

DAFTAR KEPUSTAKAAN

- Achmad, A., J. Kassim, T.K. Suan, R.C. Amat, & T.L. Seey. 2012. Equilibrium, kinetic and thermodynamic studies on the adsorption of direct dye onto a novel green adsorbent developed from *Uncaria gambier* extract. *J. Physical Sci.* 23(1): 1-13
- Addisu Sh. 2016. Effect of dietary tannin source feeds on Ruminant fermentation and production of cattle; a review. *J. Anim. Feed Res.*, 6(2): 45-56.
- AFRC. 1992. Nutritive Requirements of Ruminant Animals: Protein. *Nutr. Abst. Rev.* 62: 787-835.
- Afzalani1, M. Zein, N. Jamarun & E. Musnandar. 2015. Effect of Increasing Doses of Essential Oil Extracted from Berastagi Orange (*Citrus sinensis* L.) Peels on Performance, Rumen Fermentation and Blood Metabolites in Fattening Bali Cattle. *Pak. J. Nutr.* 14 (8): 480-486
- Anantasook, N., M. Wanapat & A. Cherdthong. 2014. Manipulation of ruminal fermentation and methane production by supplementation of rain tree pod meal containing tannins and saponins in growing dairy steers. *J. Anim. Physio. Anim. Nutri.* 98(1): 50-55.
- Bach, A., S. Calsamiglia & M. D. Stern. 2005. Nitrogen Metabolism in the Rumen. *J. Dairy Sci.* 88(Supplement): E9-E21.
- Bakhtiar, A., Y. Sutrisno, & Sunarso. 2013. Pengaruh proteksi protein bungkil kelapa sawit dengan tanin terhadap fermentabilitasnya secara *in vitro*. *Anim. Agric. J.* 2: 232 – 239.
- Barry T.N. & W.C. McNabb. 1999. The implications of condensed tannins on the nutritive value of temperate forages fed to ruminants. *Brit J Nutr* 81: 263-272
- Batista E.D., E. Detmann, E.C. Titgemeyer, S.C.V. Filho, R.F.D. Valadares, L.L. Prates, *et al.* 2016. Effects of varying ruminally undegradable protein supplementation on forage digestion, nitrogen metabolism, and urea kinetics in Nellore cattle fed low-quality tropical forage. *J. Anim. Sci.* 94:201-216.
- Belanche, A., M. Doreau, J.E. Edwards, J.M. Moorby, E. Pinloche & C. J. Newbold. 2012. Shifts in the Rumen Microbiota Due to the Type of Carbohydrate and Level of Protein Ingested by Dairy Cattle Are Associated with Changes in Rumen Fermentation. *J. Nutr.* 142: 1684–1692
- Bolam, M.J., M.T. Connors, S.R. McLennan & D.P. Poppi. 1998. Variability in microbial protein supply under different supplementation strategies. *Anim. Prod. Aust.* 22: 398.
- Broudicou, L.P., A. Agbagla-Dobnani, Y. Papon, A. Cornu, E. Grenet & A.F. Broudicou. 2003. Rice straw degradation and biomass synthesis by rumen microorganisms in continuous culture in response to ammonia treatment and legume extract supplementation. *Anim. Feed Sci. Technol.* 105: 95–108.
- Bretschneidera, G, M. Peralta, F.J. Santini, J.P. Fay & C. Faverin. 2007. Influence of corn silage supplementation before alfalfa grazing on ruminal environment in relation to the occurrence of frothy bloat in cattle. *Anim. Feed Sci. Technol.* 136: 23-37.
- BSN (Badan Standarisasi Nasional). 2000. Standar Nasional Indonesia SNI 01-3391-2000. Syarat mutu gambir. Jakarta, Indonesia: BSN.
- BSN (Badan Standarisasi Nasional). 2009. Standar Nasional Indonesia SNI 3148. 2-2009. Pakan Konsentrat-Bagian 2: Sapi Potong. Jakarta, Indonesia: BSN.
- BSN (Badan Standarisasi Nasional). 2017. Standar Nasional Indonesia SNI 7651-4:2017. Bibit sapi potong bagian 4: sapi Bali. Jakarta, Indonesia: BSN.
- Bunglavan, S.J. & N. Dutta. 2013. Use of tannins as organic protectants of proteins in digestion of ruminants. *J. Livestock Sci.* 4 : 67-77.

- Calsamiglia, S., A. Ferret, C.K. Reynolds, N.B. Kristensen & A.M. VanVuuren. 2010. Strategies for optimizing nitrogen use by ruminants. *Animal*. 4(7): 1184-1196.
- Cammack, K.M., K. J. Austin, W. R. Lamberson, G.C. Conant & H. C. Cunningham. 2018. Ruminant Nutrition Symposium: Tiny but mighty: the role of the rumen microbes in livestock production. *J. Anim. Sci.* 96:752-770.
- Chen, X.B. & M.J. Gomes. 1992. Estimation of Microbial Protein Supply to Sheep and Cattle Based on Urinary Excretion of Purine Derivatives an Overview of the Technical Details . International Feed Resources Unit, Occasional Publication, Rowett Research Institute, Aberdeen.
- Chizzotti, F.H.M., O.G. Pereira, L.O. Tedeschi, S.C.V. Filho, M.L. Chizzotti, M.I. Leao & D.H. Pereira. 2008. Effects of dietary nonprotein nitrogen on performance, digestibility, ruminal characteristics, and microbial efficiency in crossbred steers. *J. Anim. Sci.* 86: 1173-1181.
- Cieslak, A., P. Zmora, E. Pers-Kamczyc & M. Szumacher-Strabel. 2012. Effects of tannins source (*Vaccinium vitis idaea* L.) on rumen microbial fermentation *in vivo*. *J Anim. Feed Sci. Technol*, 176(104), 102-106
- Cole, H.H. & M. Ronning. 1974. *Animal Agricultural. The Biology of Domestic Animals and Their Use by Man*. W.H. Freeman & Co. San Francisco
- Coleman, G. S. 1975. The interrelationships between rumen ciliate protozoa and bacteria. In: *Digestion and Metabolism in the Ruminant* (McDonald, I. W. & Warner, A. C. I., eds.), pp. 149-164. University of New England Publishing Unit, Annidale, Australia.
- Daswir, I. & Kusuma. 1993. Sistem usaha tani gambir di Sumatera Barat. *Media Komunikasi. Penelitian dan Pengembangan Tanaman Industri*. No. 11 Februari 1993. Hal. 68 – 74.
- Dentinho, T.P., A.T. Beloá & R.J.B. Bessa. 2014 Digestion, ruminal fermentation and microbial nitrogensupply in sheep fed soybean meal treatedwith *Cistus ladanifer* L. tannins .*Small Ruminant Research*. 119 : 57-64
- Dey, A., N. Dutta, K. Sharma & A. K. Pattanaik. 2008. Effect of dietary inclusion of *Ficus infectoria* leaves as a protectant of proteins on the performance of lambs. *Small Ruminant Research*. 75: 105-114.
- Dickhoefer, U., S. Ahnert & A. Susenbeth. 2016. Effects of quebracho tannin extract on rumen fermentation and yield and composition of microbial mass in heifers. *J. Anim. Sci.* 94:1561-1575
- Evitayani, L. Warly, A. Fariani, T. Ichinohe & T. Fujihara. 2004. Study on Nutritive Value of Tropical Forages in North Sumatra, Indonesia. *Asian-Aust. J. Anim. Sci.* 17.11 : 1518-1523
- Ferdinal, N. 2014. A Simple purification method of catechin from gambier. *IJASEIT*. 4(6): 53-55.
- Fievez, V., O.J. Babayemi & D. Demeyer, 2005. Estimation of direct and indirect gas production in syringes: A tool to estimate short chain fatty acid production that requires minimal laboratory facilities. *Anim. Feed Sci. Technol*. 123-124: 197-210.
- Frutos, P., G. Hervas, F.J. Giraldez & A.R. Mantecon. 2004. Review. Tannins and ruminant nutrition. *Spanish Journal of Agric Res*. 2(2) : 191-202.
- General Laboratory Procedures. 1966. Departemen of Dairy Science. University of Wisconsin Medison.
- Getachew G., H.P.S. Makkar, & K. Becker. 2000. Tannins in tropical browses: effects on *in vitro* microbial fermentation and microbial protein synthesis in media containing different amounts of nitrogen. *J. Agric Food Chem* 48: 3581-3588

- Getachew, G., H.P.S. Makkar & K. Becker. 2001. Method of polyethylene glycol application to tannin-containing browses to improve microbial fermentation and efficiency of microbial protein synthesis from tannin-containing browses. *Anim. Feed Sci. Technol.* 92(12), 51-57.
- Gomez, K.A. & A.A Gomez. 1981. Statistical procedures for agricultural research with emphasis on rice. The International Rice Research Institute. Philippines.
- Griswold, K.E., G.A. Apgar, J. Bouton & J.L. Firkins. 2003. Effects of urea infusion and ruminal degradable protein concentration on microbial growth digestibility and fertation in continuous culture. *J. Anim. Sci.* 81(1): 329-336.
- Guyader, J., M. Eugène, P. Nozière, D. P. Morgavi, M. Doreau & C. Martin. 2014. Influence of rumen protozoa on methane emission in ruminants: a meta-analysis approach. *Animal.* 8(11): 1816-1825
- Habib, G. 2007. Experience with development and feeding of multinutrient feed supplementation blocks in Pakistan. In: *Feed Supplementation Blocks*. Makkar *et al.* Ed. FAO. Rome
- Hagerman, A.E. 2002. Tannin Chemistry. Handbook. Department Chemistry dan Biochemistry. Miami Univ. Oxford.
- Handiwirawan, E. & B. Tiesnamurti. 2015. Pertambahan bobot badan sapi Bali dan PO yang digemakan berdasarkan skor temperamen. *Prosiding Seminar Nasional Teknologi Peternakan dan Veteriner.*
- Haryani, E. 2003. Analisis kadar Catechin dari Gambir dengan Berbagai Metode. *Buletin Teknik Pertanian.* 8(1).
- Hermon, Maramis & Erpomen. 2008. Kandungan energi dan protein dalam ransum berbasis sinkronisasi degradasi protein dan bahan organik dalam rumen sapi lokal Unpublished Lap. Penelitian, Unand, Padang.
- Heuzé V., G. Tran, R. Baumont, 2016. *Buffalo grass (Paspalum conjugatum)*. Feedipedia, a programme by INRA, CIRAD, AFZ and FAO. <https://www.feedipedia.org/node/407> acces on April 1, 2017
- Hindratiningrum, N., M. Bata & Suparwi. 2011. Produksi protein mikroba dan neraca nitrogen sapi lokal jantan yang diberi jerami padi amoniasi. *Animal Production.* 11(2): 116-121
- Hoffmann, E.M. S. Muetzel, & K. Becker, K. 2002. A modified dot-blot method of protein determination applied in the tannin-protein precipitation assay to facilitate the evaluation of tannin activity in animal feeds. *Brit. J. Nutr.* 87:421-426.
- Hoffmann, E.M., N. Selje-Assmann & K. Becker. 2008. Dose studies on anti-proteolytic effects of a methanol extract from *Knautia arvensis* on *in vitro* ruminal fermentation. *Anim. Feed Sci. Technol.* 145:285-301.
- Holder, V.B. 2012. The effects of slow release urea on nitrogen metabolism in cattle. Dissertation. University of Kentucky.
- Hoover, W.H. & T.K. Miller. 1992. Rumen digestive physiology and microbial ecology. *Bull.* 708T. Agric. Forestry Exp. Stn., W.V. Univ., Morgantown, WV
- ICARDA. 2011. Animal Nutrition and Product Quality Laboratory Manual. International Center for Agricultural Research in the Dry Areas. Syria. 92pp.
- Jain, N., S.P. Tiwari & P. Singh. 2005. Effect of urea molasses mineral granules (UMMG) on rumen fermentation pattern and blood biochemical constituents in goat kids fed sola (*Aeschynomene indica* Linn) grassbased diet. *Vet. Arhiv.* 75: 521-530.
- Jayanegara, A., H.P.S. Makkar & K. Becker. 2009. *In vitro* methane emission and rumen fermentation of hay diet contained purified tannins at low concentration. *Media Peternakan.* 32(3): 185-195.

- Jenny, I., Surono & M. Chritiyanto. 2012. Produksi amonia, undegraded protein dan protein total secara *in vitro* bungkil biji kapuk yang diproteksi dengan tanin alami. *Animal Agricultural Journal*. 1(1): 277-284.
- Jing, X.P., Q.H. Peng, R. Hu, H.W. Zou, H.Z. Wang, X.Q. Yu, J.W. Zhou, A.A. Degen, & Z.S. Wang. 2018. Dietary supplements during the cold season increase rumen microbial abundance and improve rumen epithelium development in Tibetan sheep. *J. Anim. Sci.* 96:293-305.
- Jolazadeh, A.R., M. Dehghan-banadaky & K. Rezayazdi. 2015. Effects of soybean meal treated with tannins extracted from pistachio hulls on performance, ruminal fermentation, blood metabolites and nutrient digestion of Holstein bulls. *Anim. Feed Sci. Technol.* 203(0): 33-40.
- Jouany, J.P. 1996. Effect of rumen protozoa on nitrogen utilization by ruminants *J.Nutr.* 126: 1335S-1346S.
- Kardaya, D., K.G. Wiryawan, A. Parakkasi & H.M. Winugroho. 2010. *In vitro* slow-release urea contained in rice straw-based diets to increase efficiency of rumen microbial protein synthesis. *JITV* 15(2): 105-117.
- Kardaya, D., K.G. Wiryawan, A. Parakkasi & H.M. Winugroho. 2009. *In vitro* slow-release urea characteristics under different molasses levels contained in rice straw based diets. *JITV* 14(3): 177-191.
- Karsli, M.A. & J.R. Russell. 2001. Effects of some dietary factors on ruminal microbial protein synthesis Turkey *J. Vet. Anim. Sci.* 25: 681-686.
- Kasim, A. 2011. *Proses produksi dan industri hilir gambir*. Jakarta, Indonesia: Universitas Andalas Press.
- Kasim, A., A. Asben, & S. Mutiar. 2015. Kajian kualitas gambir dan hubungannya dengan karakteristik kulit tersamak. *Majalah Kulit, Karet, dan Plastik* Vol. 31 No. 1: 55-64
- Kementrian Pertanian. 2017. Peta Jalan (Roadmap) Sapi Menjuju Indonesia Sebagai Lumbung Pangan Dunia 2045. 1st ed. Jakarta: Kementerian Pertanian.
- Keputusan Menteri Pertanian Nomor: 325/kpts/OT.140/1/2010 tentang Penetapan Rumpun Sapi Bali.
- Khanbabaee, K & T.V. Ree. 2001. Tannins: Classification and Definition. *Nat. Prod. Rep.*, 2001, 18, 641-649.
- Komolong, M., D.G. Barber & D.M. McNeill. 2001. Post-ruminal protein supply and N retention of weaner sheep fed on a basal diet of lucerne hay (*Medicago sativa*) with increasing levels of quebracho tannins. *Anim. Feed Sci. Technol.* 92: 59-72.
- Krause, D.O., S.E. Denman, R.I. Mackie, M. Morrison, A.L. Rae, & G.T. Attwood. 2003. Opportunities to improve fiber degradation in the rumen: microbiology, ecology, and genomics. *FEMS Microbiology Reviews.* 27(5): 663-693.
- Krehbiel, C.R. 2014. Invited Review: Applied nutrition of ruminants: Fermentation and digestive physiology. *Professional Animal Scientist*, 30(2): 129-139
- Krueger, W.K.H., Gutierrez-Bañuelos, G.E. Carstens, B.R. Mind, W.E. Pinchakd, R.R. Gomez, R.C. Yiersonc, N.A. Kruegerc, & T.D.A. Forbese. 2010. Effects of dietary tannin source on performance, feed efficiency, ruminal fermentation, and carcass and non-carcass traits in steers fed a high-grain diet. *Anim. Feed Sci. Technol.* 159 : 1-9
- Kumar, R & M. Singh. 1984. Tannins: their adverse role in ruminant nutrition. *J Agr Food Chem* 32: 447-453.

- Lazzarini I, E. Detmann, C.B. Sampaio, M.F. Paulino, S.C.V. Filho, M.A.Souza, & F.A. Oliveira. 2009. Intake and digestibility in cattle fed low-quality tropical forage and supplemented with nitrogenous compounds. *Revista Brasileira de Zootecnia*. 38:2021–2030.
- Makkar, H.P.S., M. Sanchez & A.W. Speedy. Feed Supplementation Block. Food and Agriculture Organization of the United Nations, Rome.
- Makkar, H.P.S. 2007. Feed supplementation block technology-past, present and future. In: *Feed Supplementation Blocks*. Makkar *et al.* ed. FAO. Rome.
- Manh, N.S, M. Wanapat, S. Uriyapongson, P. Khejornsart & V. Chanthakhoun. 2012. Effect of eucalyptus (*Camaldulensis*) leaf meal powder on rumen fermentation characteristics in cattle fed on rice straw. *African J. Agri. Research*. 7(14) : 2142-2148
- Mao, S.Y., W. Zhu, Q.J. Wang & W. Yao. 2007. Effect of daidzein on *in vitro* fermentation by microorganisms from the goat rumen. *Anim. Feed Sci. Technol.* 136: 154–163.
- Martin C., L. Millet, G. Fonty & B. Michalet-Doreau. 2001. Cereal supplementation modified the fibrolytic activity but not the structure of the cellulolytic bacterial community associated with rumen solid digesta. *Reprod. Nutri. Develop.* 41: 413–424.
- McDonald, P., R.A. Edward, J.F.D. Greenhalgh, C.A. Morgan, L.A. Sinclair, & R.G. Wilkinson. 2010. *Animal Nutrition*. Seventh ed. Prentice Hall.
- McDougall, E.I. 1948. Studies on ruminant saliva. 1. The composition and output of sheep's saliva. *The Biochemical Journal* 43, 99–109.
- McMahon, L.R., T.A. McAllister, B.P. Berg, W. Majak, S.N. Acharya, J.D. Popp, B.E. Coulman, Y. Wang & K.J. Cheng. 2000. A review of the effects of forage condensed tannins on ruminal fermentation and bloat in grazing cattle. *Can. J. Plant. Sci.* 80: 469-485.
- McNeill, D.M., N. Osborne, M. Komolong, D. Nankervis. 1999. Condensed tannins in the *Leucaena* genus and their nutritional significance for ruminant. In: Shelton, H.M., R.C. Gutteridge, B.F. Mullin, R.A. Bray. (Eds.), *Leucaena—Adaptation, Quality and Farming Systems*. ACIAR Proceedings no. 86: 205–214.
- McSweeney C.S., B. Palmer, D.M. McNeill, D.O. Krause. 2001. Microbial interactions with tannins: nutritional consequences for ruminants. *Anim. Feed Sci. Tech.* 91: 83-93.
- Min, B.R., T.N. Barry, G.T. Attwood & W.C. McNabb. 2003. The effect of condensed tannins on the nutrition and health of ruminants fed fresh temperate forages: a review. *Anim. Feed Sci. Technol.* 106(14): 3-19.
- Mohamed, R. & A.S. Chaudhry. 2008. Methods to study degradation of ruminant feeds. *Nutrition Research Reviews*, 21(1), 68-81.
- Mullik, M.L. 2006. Strategi suplementasi untuk meningkatkan efisiensi sintesis protein mikroba rumen pada ternak sapi yang mengkonsumsi rumput kering tropis. *JITV* 11(1): 15-23.
- Mullik, M.L., D.P. Poppi, & S.R. McLennan. 2009. Quantification of the efficiency of rumen microbial protein synthesis in steers fed green tropical grass. *JITV* 14(2): 110-117.
- Ningrat, R.W.S., M. Zain, Erpomen, H. Suryani. 2018. Effects of supplementation of different sources of tannins on nutrient digestibility, methane production and daily weight gain of beef cattle fed on ammoniated oil palm frond based diet. *Int. J. Zool. Res.* 14(1): 8-13
- Noviandi, C.T., J.S. Eun, M.D. Peel, B.L. Waldron, B.R. Min, & D.R. ZoBell. 2014. Effects of energy supplementation in pasture forage on *in vitro* ruminal fermentation characteristics in continuous cultures. *The Profesional Animal Scientist*. 30: 13-22.

- Noziere P, J.M. Besle, C. Martin & B. Michalet-Doreau. 1996. Effect of barley supplement on microbial fibrolytic enzyme activities and cell wall degradation rate in the rumen. *J. Sci. Food and Agric.* 72: 235–242.
- NRC (National Research Council). 2000. *Nutrient Requirement of Beef Cattle*. 8th Edition. National Academy Press.
- Oba, M & M.S. Allen. 2003. Effect of diet fermentability on efficiency of microbial nitrogen production in lactating dairy cows. *J. Dairy Sci.* 86:195-207.
- Ogimoto, K. & S. Imai. 1982. *Atlas of Rumen Microbiology*. Japan Scientific Societies Press. Tokyo.
- Olijhoek, D.W., P. Lovendahl, J. Lassen, A.L.F. Hellwing, J.K. Hoglund, M.R. Weisbjerg, S.J. Noel, F. McLean, O. Hojberg & P. Lund. 2017. Methane production, rumen fermentation, and diet digestibility of Holstein and Jersey dairy cows being divergent in residual feed intake and fed at 2 forage-to-concentrate ratios. *J. Dairy Sci.* 101:1–15.
- Orskov, E.R. 1982. *Protein Nutrition Ruminants*. 2nd edition. Academic Press Limited, London.
- Owens, F.N., S. Qi, & D.A. Sapienza. 2014. Invited Review: Applied protein nutrition of ruminants-current status and future directions. *The Professional Animal Science.* 30: 150-179.
- Ozutsumi Y., K. Tajima, A. Takenaka & H. Itabashi. 2005. The effect of protozoa on the composition of rumen bacteria in cattle using 16S rRNA gene clone libraries. *Biosci Biotechnol Biochem* 69, 499–506.
- Paengkoum, P., J.B. Liang, Z.A. Jalan, & M. Basery. 2006. Utilization of Steam-treated Oil Palm Fronds in Growing Saanen Goats: II. Supplementation with Energy and Urea. *Asian-Aust. J. Anim. Sci.* 19 (11): 1623-1631.
- Pambayun, R., M. Gardjito, S. Sudarmadji, & K.R. Kuswanto. 2007. Kandungan fenol dan sifat antibakteri dari berbagai jenis ekstrak produk gambir (*Uncaria gambir* Roxb). *Majalah Farmasi Indonesia* 18(3):141-146.
- Piluzza, G., L.Sulas & S. Bullitta. 2013. Tannins in forage plants and their role in animal husbandry and environmental sustainability: a review. *Grass and Forage Sci.*
- Phillips, W.A., G.W. Horn & N.A. Cole. 2011. The Relevancy of Forage Quality to Beef Production. *Crop Science.* 51: 410-419
- Polyorach, S.M. Wanapat, A. Cherdthong, S.Kang. 2016. Rumen microorganisms, methane production, and microbial protein synthesis affected by mangosteen peel powder supplement in lactating dairy cows. *Trop Anim Health Prod* (2016) 48:593–601
- Priyanto, D. 2011. Strategi Pengembangan Usaha Ternak Sapi Potong dalam Mendukung Program Swasembada Daging Sapi dan Kerbau Tahun 2014. *Jurnal Litbang Pertanian.* 30(3): 108-116.
- Putra, D.T.B. 2011. Pengaruh suplementasi daun waru (*Hibiscus tiliaceus* L.) terhadap karakteristik fermentasi dan populasi protozoa rumen secara in vitro. Skripsi. Fak. MIPA. USM. Surkarta.
- Rahmawati. 2012. Proteksi protein bungkil kedelai dengan hijauan sumber tanin dan pengaruhnya terhadap pencernaan zat-zat makanan dan karakteristik cairan rumen secara in-vitro. Unpublished Tesis, UNAND, Padang.
- Rahmawati, B. Noveri, P.D. Amri & Prima. 2012. Isolasi katekin dari gambir (*Uncaria gambir* Roxb) untuk sediaan farmasi dan kosmetik. *Jurnal Penelitian Farmasi Indonesia* 1(1): 6-10.

- Ramaiyulis, Sujatmiko & Y. S. Amir. 2013. Pertumbuhan protozoa dalam cairan rumen sapi yang disuplementasi dengan defaunator sisa pengolahan daun gambir secara *in vitro*. Prosiding Seminar Nasional Optimalisasi Sistem Pertanian Terpadu. Payakumbuh.
- Rangari, V.D. 2007. Tannin Containing Drugs. Pharmacognosy. J.L. Chaturvedi College of Pharmacy. New Nandanvan. Nagpur.
- Rochman, Suroño & A. Subrata. 2012. Pemanfaatan tanin ampas teh dalam proteksi protein bungkil biji jarak terhadap konsentrasi amonia, undegraded dietary protein dan protein total secara *in vitro*. Anim. Agric. J. 1(1): 257–264.
- Rufino, L.M.A., E. Detmann, D. Gomes, W.L.S. Reis, E.D. Batista, S.C.V. Filho, & M.F. Paulino. 2016. Intake, digestibility and nitrogen utilization in cattle fed tropical forage and supplemented with protein in the rumen, abomasum, or both. J. Anim.Sci.Tech. 7(11):1-10
- Russel, J.B. 2002. Rumen Microbiology and Its Role in Ruminant Nutrition. NY. Ithaca.
- Russel, J.B., & D.B. Wilson. 1996. Why Are Ruminal Cellulolytic Bacteria Unable to Digest Cellulose at Low pH?. J Dairy Sci 79:15C13-1509
- Sajati, G., B.W.H.E. Prasetyo & Suroño. 2012. Pengaruh ekstrusi dan proteksi dengan tanin pada tepung kedelai terhadap produksi gas total dan metan secara *in vitro*. Animal Agricultural Journal. 1(1) : 241 – 256.
- Salah, N., D. Sauvart & H. Archimede. 2014. Nutritional requirements of sheep, goats and cattle in warm climates: a meta-analysis. Animal. 8(9):1439-1447.
- Sasongko, W.T., L.M. Yusiati, & Z. Bachruddin. 2010. Optimalisasi pengikatan tanin daun nangka dengan protein Bovine serum albumin. Buletin Peternakan. 34 : 154-158.
- SCA (Standing Commettee on Agriculture). 2007. Feeding Standards for Australian Livestock. Standing Committee on Agriculture, CSIRO, publications. Melbourne, Australia. JITV .11(1):36-41.
- Schroeder, J.W. 2013. Forage Nutrition for Ruminants. AS1250 (Revised). from www.ag.ndsu.edu
- Seshadri, R., S.C. Leahy, G.T. Attwood, K.H. Teh, S.C. Lambie, A.L. Cookson, E.A. Eloe-Fadros, G.A. Pavlopoulos, & M. Hadjithomas. 2018. Cultivation and sequencing of rumen microbiome members from the Hungate1000 Collection. Nature Biotechnology. doi:10.1038/nbt.4110
- Shultz T.A., & E. Shultz. 1969. Estimation of rumen microbial nitrogen by three analytical methods. J Dairy Sci. 53: 781-784.
- Sio, S., H.Y. Sikone, & C.A. Usboko. 2018. nutrient digestion and body weight gain of balinese cows getting basic ration of spear grass and rosewood leaves supplemented with falcata tree leaves. International Journal of Life Sciences. 2(2): 1-11
- Sniffen, C.J. & T.H. Herdt. 1991. Dairy nutrition management. Food Anim. Pract. 7:311-362.
- Soedjana, T.D., S. Bahri, K. Diwyanto, A. Priyanti, N. Ilham, S. Muharsini, & B. Tiesnamurti. 2012. Menakar potensi penyediaan daging sapi dan kerbau di dalam negeri menuju swasembada 2014. Pusat Penelitian Dan Pengembangan Peternakan. Badan Penelitian dan Pengembangan Pertanian, Kementerian Pertanian. Jakarta (ID): Iaard Pr.
- Souza M.A., E. Detmann, M.F. Paulino, C.B. Sampaio, I. Lazzarini, & S.C.V. Filho. 2010. Intake, digestibility and rumen dynamics of neutral detergent fibre in cattle fed low-quality tropical forage and supplemented with nitrogen and/or starch. Tropical Animal Health and Production. 42(6):1299-310.
- Subrata, A., A. Agus & L.M. Yusiati. 2005. Pemanfaatan tanin ampas teh terhadap efek defaunasi, parameter fermentasi rumen dan sintesis protein mikroba secara *in vitro*. Agrosains. 18 (4) : 473-487.

- Sugoro, I & I. Yuniarto. 2006. Pertumbuhan protozoa dalam cairan rumen kerbau yang disuplementasi tanin secara *in vitro*. J. Ilmiah aplikasi isotop dan radiasi A Scientific Journal for The Applications of Isotopes and Radiation. 2 : 48-57
- Sutardi, T. 2001. Revitalisasi peternakan sapi perah melalui penggunaan ransum berbasis limbah perkebunan dan suplementasi mineral organik. Laporan akhir RUT VIII 1. Kantor menteri negara riset dan teknologi dan LIPI.
- Tan, H.Y., C.C. Sieo, N. Abdullah, J.B. Liang, X.D. Huang & Y.W. Ho. 2011. Effects of condensed tannins from *Leucaena* on methane production, rumen fermentation and population of methanogens and protozoa *in vitro*. Anim. Feed Sci. Technol. 169(3-4): 185-193.
- Tavendale, M.H., L.P. Meagher, D. Pacheco, N. Walker, G.T. Attwood & S. Sivakumaran. 2005. Methane production from *in vitro* rumen incubation with *Lotus pedunculatus* and *Medicago sativa*, and effect of extractable condensed tannin fractions on methanogenesis. Anim. Feed Sci. Technol. 123/124: 403-419.
- Teixeira, C.R.V., R.P. Lana, J. Tao & T.J. Hackmann. Comparing the responses of rumen ciliate protozoa and bacteria to excess carbohydrate. FEMS Microbiology Ecology. 93. 6 : 1-12
- Tiemann, T.T., C.E. Lascano, H.R. Wettstein, A.C. Mayer, M. Kreuzer, H.D. Hess. 2008. Effect of the tropical tannin-rich shrub legumes *Calliandra calothyrsus* and *Flemingia macrophylla* on methane emission and nitrogen and energy balance in growing lambs. Animal 2, 790–799
- Tilley, J.M.A. & R.A. Terry. 1963. A Two stage technique for the *in vitro* digestion of forage crops. J. Br. Grassl. Soc. 18: 104-111.
- Van Soest, P.J. 1994. Nutritional Ecology of the Ruminant, 2nd Edition. Cornell University Press, Ithaca, NY. 253-255.
- Vu, D.D. 2007. Use of urea molasses multivitamin blocks for improving cattle productivity in Viet Nam. In: Feed Supplementation Blocks. Makkar et al. Ed. FAO. Rome.
- Waghorn, G. 2008. Beneficial and detrimental effects of dietary condensed tannins for sustainable sheep and goat production—Progress and challenges. Anim. Feed Sci. Technol. 147: 116–139
- Waghorn, G.C. & W.T. Jones. 1989. Bloat in cattle. 46. Potential of dock (*Rumex obtusifolius*) as an antibloat agent for cattle. New Zealand. J. Agric. Res. 32: 227–235.
- Wanapat M., A. Cherdthong, K. Phesatcha, & S. Kang. 2015. Dietary sources and their effects on animal production and environmental sustainability. Animal Nutrition. 1:96–103
- Wang, B., M. Jia, L. Fang, L. Jiang & Y. Li. 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.
- Wina, E., & D. Abdurrohman. 2005. The Formation of ruminal bypass protein (*in vitro*) by adding tannins isolated from *Calliandra calothyrsus* leaves or formaldehyde. JITV. 10(4): 274-280.
- Wischer, G., J. Boguhn, H. Steingas, M. Schollenberger and M. Rodehutschord. 2013. Effects of different tannin-rich extracts and rapeseed tannin monomers on methane formation and microbial protein synthesis *in vitro*. Animal, 7(11), 1796–1805.
- Wiyatna, M.F., E. Gurnadi & K. Mudikdjo. 2012. Produktivitas sapi Peranakan Ongole pada peternakan rakyat di kabupaten Sumedang. Jurnal Ilmu Ternak. 12(2): 22-25
- Yanez-Ruiz, D.R., N.D. Scollan, R.J. Merry & C.J. Newbold. 2006. Contribution of rumen protozoa to duodenal flow of nitrogen, conjugated linoleic acid and vaccenic acid in steers

fed silages differing in their water-soluble carbohydrate content. *British Journal of Nutrition*. 96: 861–869

Yulistiani, D., Z.A. Jelani, & J.B. Liang. 2016. *In vitro* protein digestibility and fermentability of mulberry (*Morus alba*) – *Leucaena foliata* mixed feed. *JITV* 21(1):9-18.

Zahari, M.W., P.Chandrawathani, R.A. Sani, M.S.N. Ismail & A. Oshibe. 2007. Production and evaluation of medicated urea-molasses mineral blocks for ruminants in Malaysia. In: *Feed Supplementation Blocks*. Makkar *et al.* Ed. FAO. Rome.

Zamsari, M. Sunarso & Sutrisno. 2012. Pemanfaatan tanin alami dalam memproteksi protein bungkil kelapa ditinjau dari fermentabilitas protein secara *in vitro*. *Animal Agriculture J.* 1(1): 406-41.

