

References

- Abdullah, N and Hutagalung, R.I. (1988). Rumen fermentation, urease activity and performance of cattle given palm kernel cake-based diet. *Animal Feed Science and Technology* 20, 79 - 86.
- Abdullah, N, Ho, Y.W. and Jalaludin, S. (1991). Role of rumen microbes in the breakdown of agricultural by-products. In; *Integrated Tree Cropping and Small Ruminant Production Systems.. Proceeding of A Workshop on Research Methodologies Medan, September 9-14, 1990*. (L.C. Iniguez and M.D. Sanchez, editors), pp. 115 -127. Gaya tehnik, Bogor, Indonesia.
- Adams, D. C. and Kartchner, R. J. (1984). Effect of level of forage intake on rumen ammonia, pH, liquid volume and liquid dilution rate in beef cattle. *Journal of Animal Science* 58, 709-713.
- Agricultural Research Council. (1984). Report of the protein group of the agricultural research council working party on the nutrient requirements of ruminants, pp. 45. C.A.B.
- Aitchison, E. M., Rix, G. S. and Rowe, J. B. (1989). The effect of urea treatment of straw and lupin supplementation on intake, liveweight changes and wool growth in sheep. *Proceeding of the Australian Society of Animal Production*, 17, 134 - 138.
- Akin, D. E. and Windham, W. R. (1988). Influence of diet on rumen fungi. In: *The role of protozoa and fungi in ruminant digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 75-81. Penambul Books, Armidale, NSW.
- Akin, D. E., Gordon, G. L. R. and Hogan, J. P. (1983). Rumen bacterial and fungal degradation of *Digitaria pentzii* grown with or without sulphur. *Applied and Environmental Microbiology* 46, 738-748.
- Allden, W. G. (1979). Feed intake, diet composition and wool growth. In: *Physiological and Environmental Limitation to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 61-78. University of New England Publishing Unit. Armidale. NSW. Australia.
- Allison, M. J. (1969). Biosynthesis of amino acids by ruminal microorganisms. *Journal of Animal Science* 29, 797-807.
- Armstrong, D. G. and Hutton, K. (1975). Fate of nitrogenous compounds entering the small intestine. In: *Digestion and Metabolism in ruminant*. (I. W. McDonald and A. C. I. Warner, editors), pp. 432-447. University of New England Publishing Unit, Armidale, NSW. Australia.

- Arnold, G. W., Wallace, S. R. and De Boer, E. R. (1977). The comparative value for weaner sheep of stubble and grain of pea, vetch and lupin crops. *Australian Journal of Experimental Agriculture and Animal Husbandry* 17, 915-919.
- Baile, C. A. and Della-Fera, M. A. (1981). Mature of hunger and satiety central systems in ruminants. *Journal of Dairy Science* 64, 1140-1152.
- Baile, C. A. and Martin, F. H. (1971). Hormones and amino acids as possible factors in the control of hunger and satiety in sheep. *Journal of Dairy Science* 54, 897-905.
- Balch, C. C. and Campling, R. C. (1962). Regulation of voluntary food intake in ruminants. *Nutrition Abstract and Review* 32, 669-686.
- Barraza, M. L., Coppack, C. E., Brooks, K. N., Wilks, D. L., Sanders, R. G. and Latimer, Jr. G. W. (1992). Iron sulfate and feed pelleting to detoxify free gossypol in cotton seed diets for dairy cattle. *Journal of Dairy Science* 74, 3457-3467.
- Basset, J. M. (1975). Dietary and gastric-intestinal control of hormones regulating carbohydrate metabolism in ruminants. In: *Digestion and Metabolism in Ruminants*. (I. W. McDonald and A. C. I. Warner, editors), pp. 383-398. University of New England Publishing Unit, Armidale, NSW. Australia.
- Bauchop, T. (1979). Rumen anaerobic fungi of cattle and sheep. *Applied and Environmental Microbiology* 38, 148-158.
- Bauchop, T. (1981). The anaerobic fungi in rumen fibre digestion. *Agriculture Environment* 6, 339.
- Bauchop, T. (1984). The contribution of anaerobic fungi to digestion in ruminants. *Proceedings of Nutrition Society of Australia* 9, 45-51.
- Beever, D. E. (1993). Rumen function. In: *Quantitative aspects of Ruminant Digestion and Metabolism*. (J. M. Forbes and J. France, editors), pp. 187-215. C.A.B. International, UK.
- Ben-Ghedalia, D., Tagari, H., Bondi, A. and Tadmor, A. (1974). Protein digestion in the intestine of sheep. *British Journal of Nutrition* 31, 125-142.
- Bird, A. R., Rigney, S. J., Stephenson, R. G. A. and O'Sullivan, B. M. (1990). Copra meal supplementation of lambing ewes in north-west Queensland. *Proceeding of the Australian Society of Animal Production* 18, 456.
- Bird, S. H. and Dicko, M. (1987). Cottonseed supplements for sheep. In: *Recent Advance in Animal Nutrition in Australia*. (D. J. Farrel, editor), pp. 80-88. University of New England Publishing Unit, Armidale, NSW. Australia.

- Bird, S. H. and Leng, R. A. (1983). The influence of the absence of the rumen protozoa on ruminant production. In: *Recent Advances in Animal Nutrition in Australia 1983*. (D. J. Farrel and Pran Vohra, editors), pp. 110 - 118. University of New England Publishing Unit, Armidale, NSW. Australia.
- Bird, S. H. and Leng, R. A. (1985). Productivity responses to eliminating protozoa from the rumen of sheep. In 'Review In Rural Science 6'. (R. A. Leng *et al.*, editors), pp. 109-117. University of New England Publishing Unit, Armidale, NSW. Australia.
- Bird, S. H., Hill, M. K. and Leng, R. A. (1979). The effects of defaunation of the rumen on the growth of lambs on low-protein-high-energy diets. *British Journal of Nutrition* 42, 81-87.
- Black, J. L., Faichney, G. J. and Sinclair, R. E. (1982). Role of computer simulation in overcoming limitations to animal production from pastures. In: *Nutritional Limits to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 473-493. Commonwealth Agricultural Bureaux Farham Royal, UK.
- Black, J. L., Robards, G. E., and Thomas, R. (1973). Effects of protein and energy intakes on the wool growth of Merino wethers. *Australian Journal of Agriculture Research* 24, 399-412.
- Blackburn, T. H. (1965). Nitrogen metabolism in the rumen. In: *Physiology of digestion in the ruminant*. (R. W. Dougherty, R. S. Allen, W. Burroughs, N. L. Jacobson and A. D. McGilliard, editors), pp. 322-334 Butterworths, Washington.
- Blackman, N. L. (1990). The role for hormonal growth promotants and other chemical growth regulators in animal production. *Proceeding of The Australian Society of Animal Production* 18, 28-36.
- Blackwood, I., Hoffman, B., Callow, C., Allerton, D., Mckay, B. and Hennessy, D. (1991). *Practical protein supplements for the NSW beef industry*. New South Wales Agriculture. Sydney.
- Boer, M. and Sanchez, M. D. (1989). Improvement in the use of palm kernel cake as a feed supplement for grazing sheep. In: *Proceedings of the 12th Annual Conference of The Malaysian Society of Animal Production*, March 29-31, 1989, pp. 90-94. Genting Highlands, Malaysia.
- Boniface, A. N., Murray, R. M. and Hogan, P. J. (1986). Optimum level of ammonia in the rumen liquor of cattle fed a tropical pasture hay. *Proceeding of The Australian Animal Production* 16, 151 -154.
- Boon, B. and Dewart, R. (1974). Methods for identification and assays of virginiamycin in animal feeds. *Analyst* 99, 19-25.

- Brand, A. A., Cloete, S. W. P. and Franck, F. (1991). The effect of supplementing untreated, urea-supplemented and urea-ammoniated wheat-straw with maize-meal and/or fish-meal in sheep. *South Africa Tydskr. Veek.* 21, 48-54.
- Bull, I. S., Rumpler, W. V. Sweeney, T. F. and Zinn, R. A. (1979). Influence of ruminal turnover on site and extent of digestion. *Federation Proceeding* 38, 2713-2719.
- Burrit, E. A. and Provenza, F. D. (1989). Food aversion learning: Conditioning lambs to avoid a palatable shrub (*Cercocarpus montanus*). *Journal of Animal Science* 67, 650.
- Burroughs, W., Nelson, D. K. and Mertens, D. R. (1975). Protein physiology and its application in the lactating cows. The metabolisable protein feeding standard. *Journal of Animal Science* 41, 933-944.
- Butler, L. (1981). Supplementary feeding of Merino wethers grazing weed-free stubble pasture. *Australian Journal of Experimental Agriculture and Animal Husbandry* 21, 272-276.
- Calderon-Cortes, Elliott, F. J. and Ford, C. W. (1988). Influence of rumen fungi on the nutrition of sheep fed forages diets. In: *The Roles of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 181-188. Penambul Books, Armidale. NSW.
- Campbell, R. G. (1988). Nutritional constraints to lean tissue accretion in farm animals. *Nutrition Research Review* 1, 233.
- Campling, R.C. (1970). Physical regulation of voluntary intake. In: *Physiology of Digestion and Metabolism In The Ruminants*. (A. T. Phillipson, editor), pp. 226 - 234. Oriel Press Ltd. London.
- Cecava, M. J. and Parker, J. E. (1993). Intestinal supply of amino acid in steers fed ruminally degradable and undegradable crude protein sources alone and in combination. *Journal of Animal Science* 71, 1596-1605.
- Cecava, M. J., Merchen, N. R., Berger, L. L., Mackie, R. I. and Fahey, G. C. Jr. (1991). Effects of dietary energy level and protein source on nutrient digestion and ruminal nitrogen metabolism in steers. *Journal of Animal Science* 69, 2230-2243.
- Cetinkaya, N. and Ozcan, H. (1994). Effects of different nitrogen sources on productive parameters in angora goats. *Small Ruminant Research* 14, 193-198.
- Chalupa, W. (1977). Manipulating rumen fermentation. *Journal of Animal Science* 45, 585-599.

- Champion, S. C. and Robards, G. E. (1994). Effects of supplements on wool growth responses of Merino, Romney and Tukidale sheep. *Proceedings of The Australian Society of Animal Production* 20, 178-181.
- Chapman, R. E. and Wheeler, J. L. (1963). Dyebanding: a technique for fleece growth studies. *Australian Journal of Science* 26, 53-54.
- Cheeke, P. R. (1991). *Applied Animal Nutrition Feed and Feeding*. McMillan Publishing Company, New York.
- Choo, B.S. (1992). Effect on Bypass Starch Supplement on Glucose Kinetics and Production in Roughage Fed Ruminant. *Ph.D. Thesis*. University of New England, Armidale. NSW. Australia.
- Church, D. C. (1975). *Digestive Physiology and Nutrition of Ruminants*. Vol. 1. *Digestive Physiology*. O & B. Books Corvallis. OR..
- Clark, J. H., Klusmeyer, T. H. and Cameron, M. R. (1992). Microbial protein synthesis and flows of nitrogen fractions to the duodenum of dairy cows. *Journal of Dairy Science* 75, 2304-2323.
- Coelho da Silva, J. F., Seeley, R. C., Beever, D. E., Prscott, J. H. D. and Armstrong, D. G. (1972). The effect in sheep of physical form and stage of growth on the sites of digestion of dried grass. 2. Sites of nitrogen digestion. *British Journal of Nutrition* 28, 357-371.
- Colebrook, W. F., Ferguson, K. A., Hemsley, J. A., Hogan, J. P., Reis, J. P. and Weston, R. H. (1968). A comparison of protein concentrates for wool growth. *Proceeding of The Australian Society of Animal Production* 7, 397-401.
- Coleman, G. S. (1988). Protozoal - bacterial interaction in the rumen. in: *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan., R. A. Leng and D. I. Demeyer, editors), pp. 13 - 28. Penambul Books Armidale, NSW.
- Conrad and Van Es. (1983). Efficient utilization of feed resources for livestock production. in: *Proceeding the Vth World Conference on Animal Production*. vol. 1. (I. Tasaki, A. Yokohama, Y. Asahida, K. Yamauchi, R. Kawashima, editors), pp. 103. Japanese Society of Zootechnical Science. Tokyo. Japan.
- Coombe, J. B. (1985). Rape and sunflower seed meals as supplements for sheep fed on oat straw. *Australian Journal of Agricultural Research* 36, 717-728.
- Coombe, J. B. (1992). Wool growth in sheep fed diets based on wheat straw and protein supplements. *Australian Journal of Agricultural Research* 43, 285-299.
- Cotta, M. A. and Hespell, R. B. (1986). Protein and amino acid metabolism of rumen bacteria. In: *Control of Digestion and Metabolism in Ruminants*. pp. 122-136. Prentice-Hall, Englewood Cliffs. USA.

- Cottle, D. J. (1991). Digestion and Metabolism. In: *Australian Sheep and wool Handbook*. (D. J. Cottle, editor), pp. 177-223. Inkata Press, Melbourne.
- Crawford, R. J. Jr., Hoover, W. H., Sniffen, C. J. and Crooker, B. A. (1978). Degradation of feedstuff nitrogen in the rumen versus nitrogen solubilities in three solvents. *Journal of Animal Science* 46,1768-1775.
- Crooker, B. A., Sniffen, C. J., Hoover, W. H. and Johnson, L. L. (1978). Solvents for soluble nitrogen measurements in feedstuffs. *Journal of Dairy Science* 61, 437-447.
- Czerkawski, J. W. (1986). *An Introduction to Rumen Studies*. Pergamon Press, Oxford, Sydney.
- Dayton, W. R. and Hathaway, M. R. (1991). Control of animal growth by glucocorticoids, thyroid hormones, autocrine and/or paracrine growth factors. In: *Growth Regulation in Farm Animals*, 7. (A. M. Person and T. R. Dutson, editors), pp. 17-45. Elsevier Applied Science London.
- Deetz, L. E. and Wangsness, P. J. (1981). Influence of intrajugular administration of insulin, glucagon and propionate on voluntary feed intake of sheep. *Journal of Animal Science* 53, 427-433.
- Demeyer, D. I. and Van Nevel, C. J. (1979). Effect of defaunation on the metabolism of rumen micro-organisms. *British Journal of Nutrition* 42, 515 - 524.
- Denny, G. D. (1990). Phenotypic variance of fibre diameter along wool staples and its relationship with other raw wool characters. *Australian Journal of Experimental Agriculture* 30, 463-467.
- Department of Agriculture New South Wales. (1979). Pastoral research on the Northern Tablelands New South Wales. The New South Wales Department of Agriculture in co-operation with CSIRO and University of New England. (R. Parkin, editor). Department of Agriculture New South Wales.
- Devendra, C. (1977). Utilization of feedingstuffs from the oil palm. in: *Feeding Stuffs for Livestock in South East Asia*. (C. Devendra and R.L. Hutagalung, editors), pp. 116-131. Malaysian Society of Animal Production, Selangor. Malaysia.
- Devendra, C. (1989). Ruminant production systems in developing countries. In: *Feeding Strategies for Improving Productivity of Ruminant Livestock in Developing Countries*. pp. 5 - 30. International Atomic Energy Agency, Vienna.
- Downes, A. M., Reis, P. J. and Hemsley, J. A. (1976). Protein and amino acids for wool growth. In: *Review in Rural Science II. From Plant to Animal Protein*. (T. M. Sutherland, J. R. McWilliam and R. A. Leng, editors), pp. 143-147. University of New England, Armidale, NSW. Australia.

- Downes, A. M., Reis, P. J., Sharry, L. F. and Tunks, D. A. (1970). Metabolic fate of parenterally administered sulphur-containing amino acids in sheep and effects on growth and composition of wool. *Journal of Biological Science* 23, 1077-1088.
- Doyle, P. T., Love, R. A., Dunlop, R. H. and White, C. L. (1992). Supplementation of young sheep with lupins plus sulfur and a complete mineral mix. *Australian Journal of Experimental Agriculture* 32, 267-271.
- Dulphy, J. P. and Demarquilly, C. (1994). The regulation and prediction of feed intake in ruminants in relation to feed characteristics. *Livestock Production Science*. pp. 1-12. Elsevier Science B. V.
- Egan, A. R. (1965). Nutritional status and intake regulation in sheep II. The influence of sustained duodenal infusion of casein or urea upon voluntary intake of low protein roughages by sheep. *Australian Journal of Agricultural Research* 16, 451-462.
- Egan, A. R. (1976). Manipulation of protein nutrition for maintenance and survival. In: *Review in Rural Science, II. From Plant to Animal Protein*. (T. M. Sutherland, J. R. McWilliam and R. A. Leng, editors), pp.135-142. University of New England Publishing Unit, Armidale, NSW. Australia.
- Egan, A. R. (1977). Nutritional status and intake regulation in sheep. VIII. Relation between the voluntary intake of herbage by sheep and the protein/energy ratio in the digestion products. *Australian Journal of Agricultural Research* 28, 907 - 915.
- Egan, A. R. (1985). Factors effecting nitrogen requirements for ruminants and the role of supplemental protein. In: *The utilization of fibrous agricultural residues as animal feeds*. pp. 25-33. IDP.
- Egan, J. K. and Doyle, P.T. (1980). The comparative intake and digestion of herbage diets by weaner and mature sheep. *Proceedings of The Australian Society of Animal Production*. 13: 475.
- Ehrlich, W. K., Upton, P. C., Cowan, R. T. and Moss, R. J. (1990). Copra meal as a supplement for grazing dairy cows. *Proceeding of the Australian Society of Animal Production* 18, 196 - 199.
- Erasmus, L. J., Botha, P. M. and Meissner, H. H. (1994). Effect of protein source on ruminal fermentation and passage of amino acids to the small intestine of lactating cows. *Journal of Dairy Science* 77, 3655-3665.
- Ferguson, K. A. (1975). The protection of dietary proteins and amino acids against microbial fermentation in the rumen. in: *Digestion and Metabolism in The Rumen*. (I. W. McDonald and A. C. I. Warner, editors), pp. 448-464. University of New England Publishing Unit, Armidale. NSW. Australia.

- Finlayson, H. J. and Armstrong, D. G. (1986). The effect of methanal (formaldehyde) treatment of casein on its digestion *in vivo* and *in vitro*. *Journal of Science Food and Agriculture* 37, 742-752.
- Foot, J. Z., Russel. A. J. F., Maxwell, T. J. and Morris, P. (1973). Variation in intake among group-fed pregnant scotish black face ewes given restricted amount of food. *Animal Production* 17, 169-177.
- Forbes, J. M. (1971). Physiological changes affecting voluntary food intake in ruminants. *Proceedings of Nutrition Society* 30, 135-142.
- Forbes, J. M. (1995). Voluntary food intake and diet selection in farm animals. Commonwealth Agricultural Bureau. International. UK.
- Forbes, J. M. And France, J. (1993). Introduction. In: *Quantitative Aspects of Ruminant Digestion and Metabolism*. pp. 1-10. University Press, Cambridge.
- Foster, E., and Prentice, N. (1987). Barley In: *Nutritional quality of cereal grains: genetic and agronomic improvement*. (R.A. Olson and K.J. Frey, editors), pp. 337-396. Madison, Wisconsin. U.S.A.
- Galgal, K. K., McMeniman, N. P. and Norton, B. W. (1994). Effect of copra expeller pellet supplementation on the flow of nutrients from the rumen of sheep fed low quality pangola grass (*Digitaria decumbens*). *Small Ruminant Research* 15, 31 - 37.
- Gherardi, S. G. and Black, J. L. (1989). Influence of post-rumen supply of nutrients on rumen digesta load and voluntary intake of roughage by sheep. *British Journal of Nutrition* 62, 589-599.
- Gherardi, S. G., Kellaway, R. C. and Black, J. L. (1992). Effect of forage particle length on rumen digesta load, packing density and voluntary feed intake by sheep. *Australian Journal of Agricultural Research* 43, 1321-1336.
- Gluckman, P. D. (1986). The regulation of fetal growth. In: *Control and Manipulation of Animal Growth*. (P. J. Buttery, N. B. Haynes and d. B. Lindsay, editors), pp. 85-104. Butterworths. London.
- Godfrey, S. I., Boyce, M. D., Rowe, J. B. and Speijers, E. J. (1992). Changes within the digestive tract of sheep following engorgement with barley. *Australian Journal of Agricultural Research* 44, 1093-1101.
- Godfrey, S. I., Rowe, J. B., Speijers, E. J., and Toon, W. (1993). Lupins, barley or barley plus virginiamycin as supplements for sheep at different feeding intervals. *Australian Journal of Agricultural Research* 33, 135-140.
- Godfrey, S. I., Rowe, J. B., Thorniley, G. R., Boyce, M. D., and Speijers, E. J. (1995). Virginiamycin to protect sheep fed wheat, barley or oats from grain poisoning

- under simulated drought feeding conditions. *Australian Journal of Agricultural Research* 46, 393-401.
- Graham, N. McC. (1982). Maintenance and growth. In: *Sheep and Goat production*. (I. E. Coop, editor), pp. 81-101. Elsevier, Amsterdam.
- Grant, A. L. and Hefnerich, W. G. (1991). An overview of growth. in: *Growth Regulation in Farm Animals*. vol. 7. (A. M. Person and T. R. Dutton, editors), pp. 1-16. Elsevier Applied Science. London.
- Grenet, E., Breton, A., Barry, P. and Fonty, G. (1989). Rumen anaerobic fungi and plant substrate colonisation as affected by diet composition. *Animal Feed Science and Technology* 26, 55-70.
- Gulbrandsen, B., Standfast, N. F. and Kempton, T. J. (1990). Supplementation of grazing steers with copra meal. *Proceedings of Australian Society of Animal Production* 18, 236-239.
- Haaland, G. L., Tyrrell, H. F., Moe, P. W. and Wheeler, W. E. (1982). Effect of crude protein level and limestone buffer in diets fed at two levels of intake on rumen pH, ammonia-nitrogen, buffering capacity and volatile fatty acid concentration of cattle. *Journal of Animal Science* 55, 943-950.
- Hansford, K. A. and Kennedy, J. P. (1990). The relationship between variation in fibre diameter along staples and staple strength. *Proceeding of the 8th International Wool Textile Research Conference*, Christchurch. vol. 1, 590-598.
- Harrison, D. G., Beever, D. E., Thomsen, D. J. and Osborn, D. F. (1973). The influence of diet upon quantity and types of amino acids entering and leaving the small intestine of sheep. *Journal of Agricultural Science, Cambridge* 81, 391-401.
- Harrop, C. J. F. (1974). Nitrogen metabolism in the bovine stomach. 2. Factors influencing ruminal ammonia levels in sheep maintained on different diets. *Journal of Agricultural Science, Cambridge* 82, 409-417.
- Hartley, R.D. (1987). The chemistry of lignocellulosic materials from agricultural wastes in relation to processes for increasing their biodegradability. In: *Degradation of lignocellulosics in ruminants and in Industrial processes*. (J. H. Van der Meer, B. A. Rijkens and M. P. Ferranti, editors), pp. 3 - 12. Elsevier Applied Science. London.
- Hawthorne, W. A. (1980). Lupin grain as a supplement for grazing or penned steers. *Proceedings of The Australian Society of Animal Production* 13, 289-292.
- Hecker, J. F. (1983). *The Sheep as an Experimental Animal*. Academic Press, London.

- Hegarty, R. S., Nolan, J. V. and Leng, R. A. (1994). The effect of protozoa and of supplements with nitrogen and sulfur on digestion and metabolism in the rumen of sheep. *Australian Journal of Agricultural Research* 45, 1215-1227.
- Hemsley, J. A. and Reis, P. J. (1984). Amino acids and wool growth. In : *Ruminant physiology Concepts and Consequences*. (S. K. Baker, J. M. Gawthorne, J. B. Mackintosh, and D. B. Purser, editors). University of Western Australia. Perth.
- Hennessy, D. W. (1987). The physiology of digestion in an Australian context. In : *Proceedings of The Sheep and Wool Seminar and Refresher Course Goulburn*, April 1987. pp. 1.1 - 1.12. Department of Agriculture New South Wales
- Hennessy, D. W. and Williamson, P. J. (1988). Effect of protein meal supplement on the growth and reproduction of Hereford heifers and cows grazing a native grass pasture in the subtropics. *Australian Journal of Experimental Agriculture* 28, 439-446.
- Hennessy, D. W., Williamson, P. J., Lowe, R. F. and Baigent, R. (1981). The role of protein supplements in nutrition of young grazing cattle and their subsequent productivity. *Journal of Agricultural Science, Cambridge* 96, 205-212.
- Hill, G. D. (1977). The composition and nutritive value of lupin seed. *Nutrition Abstract Review B*. 47, 511-529.
- Hodge, R. W., Watson, M. J. and Kat, C. (1984). Fermentation of wheat or lupins in the rumen of sheep. *Canadian Journal of Animal Science* 64 (Suppl.), 29 - 30.
- Hodgson, J. (1982). Influence of sward characteristic on diet selection and herbage intake by the grazing animal. In: *Nutritional Limit to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 153-166. C.A.B. Farnham House, UK.
- Hogan, J. P. and Weston, R. H. (1967). The digestion of two diets of differing protein content but with similar capacities to sustain wool growth. *Australian Journal of Agricultural Research* 18, 973-981.
- Hogan, J. P., Elliot, N. M., and Hughes, A. D. (1979). Maximum wool growth rates expected from Australian Merino genotypes. In: *Physiological and Environmental Limitations to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 43-59. University of New England Publishing Unit, Armidale, NSW. Australia.
- Hogan, J. P. (1982). Digestion and utilization of protein. In: *Nutritional Limit to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 245-257. C.A.B. Farnham House, UK.
- Hogg, B. W. (1991). Compensatory growth in ruminants. In: *Growth Regulation in Farm Animals*. vol. 7. (A. M. Person and T. R. Dutson, editors), pp. 103-134. Elsevier Applied Science. London.

- Hoover, W. H., and Stokes, S. R. (1991). Balancing carbohydrates and protein for optimum rumen microbial yield. *Journal of Dairy Science* 74, 3630-3644.
- Huber, J. T. and Kung, Jr. L. (1981). Protein and nonprotein nitrogen utilization in dairy cattle. *Journal of Dairy Science* 64, 1170-1195.
- Huber, J. T., Lichtenwalner, R. E., and Thomas, J. W. (1973). Factors effecting the response of lactating cows to ammonia-treated corn silages. *Journal of Dairy Science* 56, 1283.
- Hume, I. D. (1970). Synthesis of microbial protein in the rumen II. A response to higher volatile fatty acids. *Australian Journal of Agricultural Research* 21, 297-304.
- Hume, I. D. (1982). Digestion and metabolism. In: *A course manual in nutrition and growth*. (H. L. Davies, editor), pp. 31-45. The Australian Universities International Development Program. Melbourne.
- Hungate, R. E. (1966). *The rumen and its microbes*. Academic Press. New York.
- Hunter, R. A. And Vercoe, J. E. (1984). The role of urea in the nutrition of ruminants fed low quality roughage diets. In: *Outlook on Agriculture*. 13 (3), 154-159. Pergamon Press, Britain.
- Hutson, G. D. and Van Mourik. (1981). Food preferences of sheep. *Australian Journal of Experimental Agriculture and Animal Husbandry* 21 : 575 -582.
- Hvelplund, T. (1985). Digestibility of rumen microbial protein and undegraded dietary protein estimated in the small intestine of sheep and by *in sacco* procedure. *Acta Agriculturae Scandinavica* 25 (suppl.), 132 - 143.
- Hvelplund, T. and Madsen, J. (1985). Amino acids passage to the small intestine in dairy cows compared with estimates of microbial protein and undegraded dietary protein from analysis on the feed. *Acta Agriculturae Scandinavica* 25 (suppl.), 21 - 36.
- Hynd, P. I., Valentine, S. C. and Bartsch, B. D. (1985). Rumen protozoa numbers in dairy cows fed barley or lupins. *Proceedings of The Nutrition Society of Australia* 10, 147.
- Institute National de la Recherche Agriculture. (1978). Alimentation des Ruminants. INRA publication, Versailles, France. p. 579.
- International Feedstuffs Institute. (1982). *Central and Southeast Asia tables of feed composition*. Utah State University, Logan, USA.
- Jalaludin, S. (1989). Ruminant feeding systems in Southeast Asia. In: *Feeding Strategies for Ruminant Productivity of Ruminant Livestock in Developing*

- Countries*. Panel proceeding series, pp. 31-50. International Atomic Energy Agency, Vienna.
- Jarrige, R., Demarquilly, C., Dulohy, J. P., Hoden, A., Robelin, J., Beranger, C., Geay, Y., Journet, M., Malterre, C., Micol D. and Petit, M. (1986). The INRA 'fill unit' system for predicting the voluntary intake of forage-based diets in ruminants: a Review. *Journal of Animal Science* 63, 1737-1738.
- Javier, E. G. (1978). Integration of fodder production with intensive cropping system in Southeast Asia. In: *Feeding Stuff for Livestock in SoutEast Asia*. C.Devendra and R. I. Hutagalung, editors). Malaysian Society of Animal Production, Serdang, Selangor, Malaysia.
- Jelan, Z. A. (1991). Feeding agricultural by-products to small ruminants in integrated tree cropping production systems. In: *Integrated Tree Cropping and Small Ruminant Production Systems*. Proceeding of a Workshop on Research Methodologies Medan, September 9 -14, 1990. (L. C. Iniguez and M. D. Sanchez, editors) pp. 109 -114. Gaya Tehnik, Bogor, Indonesia.
- Johnson, R. R. (1976). Influence of carbohydrate solubility on non-protein nitrogen utilization in the ruminant. *Journal of Animal Science* 43, 184-191.
- Jouany, J. P. (1988). Effect of diet on population of rumen protozoa in relation to fibre digestion. In: *The Roles of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 59-74. Penambul Books, Armidale. NSW.
- Jouany, J. P. and Thivend, P. (1989). Non genetic manipulation of rumen microbes. In: *Biotechnology for Livestock Production*. pp. 277 - 289. F.A.O.
- Journet, M., Champredon, C., Pion, R. and Verite, R. (1983). Physiological basis of the protein nutrition of high production cows critical analysis at the allowance. In: *IVth International Symposium on Protein Metabolism and Nutrition*. Clermont - Ferrand (France). 5 - 9 Sept. 1983. INRA.
- Kahn, L. P. (1994). The use of lithium chloride for estimating supplement intake in grazing sheep: Estimates of heritability and repeatability. *Australian Journal of Agricultural Research* 45, 1731-1739
- Kaufmann, W. and Luppig, W. (1982). Protected proteins and protected amino acids for ruminants. In: *Protein contribution of feedstuffs for ruminants*. (El Miller, I. H. Pike and A. J. H. Van Es, editors), pp. 37-75. Butterworths, London.
- Kay, M. (1983). Meeting the energy and protein requirements of the growing animal. In: *The Principle of Cattle Production*. (H. Swan and W. H. Broster, editors), pp. 255-269. Butterworths, London.

- Kayouli, C. and Belhadj, M. T. (1989). Application of biotechnology in the near east. In: *Biotechnology for Livestock Production*. FAO. 435 - 441
- Kempton, T. J. (1979). Protein to energy ratio of absorbed nutrients in relation to wool growth. In: *Physiological and Environmental Limitation to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 209-222. University of New England Publishing Unit. Armidale. NSW. Australia.
- Kempton, T. J., Nolan, J. V. and Leng, R. A. (1979). Protein nutrition of growing lambs. 2. Effect on nitrogen digestion of supplementing a low-protein-cellulosic diet with either urea, casein or formaldehyde-treated casein. *British Journal of Nutrition* 42, 303-315.
- Kennedy, P. M. and Milligan, L. P. (1978). Factors effecting transfer of urea from the blood to the rumen of sheep. *Canadian Journal of Animal Science, Abstract* 58, 814.
- Kenney, P. A. (1985). Effect of lupin grain and type of cereal grain on the value of a hay supplement in the diet of lambing ewes during drought. *Australian Journal of Experimental Agriculture* 25, 766-770.
- Kenney, P. A., Reeve, J. L., Baxter, R. W. and Cumming, I. A. (1980). Effect of different levels of the supplements lupin grain, lucerne, wheat and wheat with urea and sulphur fed during mating in February to Border Leicester x Merino ewes in North-East Victoria. *Australian Journal of Experimental Agriculture and Animal Husbandry* 20, 15-19.
- Kowalczyk, J. (1988). Protein and amino acid requirement and metabolism in ruminants. In: *European Association for Animal Production*. 35: 10.
- Krebs, G. L., Leng, R. A. and Nolan, J. V. (1988). Effect on bacterial kinetics in the rumen of eliminating rumen protozoa or supplementing with soyabean meal or urea in sheep on low protein fibrous feed. In: *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 295-300. Penambul Books, Armidale, NSW.
- Krishnamoorthy, U. Soller, H., Stengass, H. and Menke, K. H. (1995). Energy and protein evaluation of tropical feedstuffs for whole tract and ruminal digestion by chemical analysis and rumen inoculum studies *in vitro*. *Animal Feed Science and Technology* 52, 177-188.
- Kropp, J. R., Johnson, R. R., Males, J. R. and Owens, F. N. (1977). Microbial protein synthesis with low quality roughage rations: isonitrogenous substitution of urea for soybean meal. *Journal of Animal Science* 46, 837- 854.
- Kung, Jr. L., Huber, J. T. and Satter, L. D. (1983). Influence of nonprotein nitrogen and protein of low rumen degradability on nitrogen flow and utilization in lactating dairy cows. *Journal of Dairy Science* 66, 1863-1872.

- Kung, Jr. L., Maciorowski, K., Powel, K. M., Weidner, S. and Eley, C. L. (1991). Lupin as a protein supplement for growing lambs. *Journal of Animal Science* 69, 3398-3405.
- Lambourne, L. J. (1975). Cattle nutrition and production. In: *A Course Manual in Tropical Beef Cattle Production*. pp. 5-59. Australian-Asian Universities Cooperation Scheme. Dai Nippon Printing Co, Ltd. Hongkong.
- Langlands, J. P. (1968). The feed intake of grazing sheep different in age, breed, previous nutrition, and liveweight. *Journal of Agricultural Science, Cambridge* 71, 167-172.
- Langlands, J. P. and Hamilton, B. A. (1969). Efficiency of wool production of grazing sheep. 2, Differences between breeds and strains varying in age. *Australian Journal of Experimental Agriculture and Animal Husbandry* 9, 254-257.
- Lawrence, A. B. and Wood-Gush, D. G. M. (1988). Influence of social behaviour on utilization of supplemental feed blocks by Scottish hill sheep. *Animal Production* 46, 203-212.
- Leche, T. F., Groenendyk, G. H., Westwood, N. H., and Jones, M. W. (1982). 'Composition of animal feedstuffs in Australia.' Australian Feeds Information Centre, Division of Animal Production, CSIRO, Sydney.
- Lee, G. J. and Williams, A. J. (1994). Nutritional responses in wool growth by four Merino genotype of differing wool growth performance. *Australian Journal of Agriculture Research* 45, 1171 -1187.
- Leng, R. A. (1970). Formation and production of volatile fatty acids in the rumen. in: *Physiology of Digestion and Metabolism in Ruminant*. (A.T. Phillipson, editor), pp. 406-421. Oriel Press, U.K.
- Leng, R. A. (1982). Dynamic of protozoa in the rumen of sheep. *British Journal of Nutrition* 48, 399-415.
- Leng, R. A. (1982a). Modification of rumen fermentation. in: *Nutritional Limits to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 427-453. C.A.B. Farnham Royal. UK.
- Leng, R. A. (1988). Dynamics of protozoa in the rumen. In: *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R.A. Leng and D.I. Demeyer, editors), pp. 51-58. Penambul Books, Armidale, NSW.
- Leng, R. A. (1989). Some factors influencing the efficiency of feed utilisation by ruminants with special reference to the tropics. In: *Recent Advances in Animal Nutrition in Australia 1989*. (D. J. Farrell, editor), pp. 75-85. Department of Biochemistry, Microbiology and Nutrition, University of New England. Armidale, NSW. Australia.

- Leng, R. A. (1990). Factors affecting the utilization of "poor-quality" forages by ruminants particularly under tropical conditions. *Nutrition Research Review* 3, 277-303.
- Leng, R. A. (1991). Optimizing herbivore nutrition. In: *Recent Advances on the Nutrition of Herbivores* 1991. (D. J. Farrell, editor), pp. 268 - 280. Department of Biochemistry, Microbiology and Nutrition. University of New England. Armidale. NSW. Australia.
- Leng, R. A. (1991a). Further observation on the efficiency of feed utilization for growth in ruminants fed forage based diets. In: *Recent Advances in Animal Nutrition in Australia* 1991. (D. J. Farrell, editor), pp. 28 - 44. Department of Biochemistry, Microbiology and Nutrition. University of New England. Armidale. NSW. Australia.
- Leng, R. A. (1991b). Improving ruminant production and reducing methane emission from ruminants by strategic supplementation. *United States Environmental Protection Agency* (EPA).
- Leng, R. A. (1992). Drought feeding strategies: *Theory and Practice*. Penambul Books, Armidale.
- Leng, R. A. (1993). Quantitative Ruminant Nutrition. A Green Science. *Australian Journal of Agricultural Research* 44 (3), 363-380.
- Leng, R. A. and Nolan, J. V. (1984). Nitrogen metabolism in the rumen. *Journal of Dairy Science* 67(5), 1072-1089.
- Leng, R. A. and Preston, T. R. (1983). Nutritional strategies for the utilization of agro-industrial by-products by ruminants and extension of the principles and technologies to the small farmer in Asia. *The Fifth World Conference in Animal Production*, Tokyo, August 1983. pp. 310-318.
- Leng, R. A., Davis, J. and Hill, M. K. (1984). Estimation of bypass protein based on wool growth. *Proceedings of The Australian Society of Animal Production* 15, 431-433.
- Leng, R. A., Dellow, D. and Waghorn, G. (1986). Dynamics of large ciliate protozoa in the rumen of cattle fed on diets of freshly cut grass. *British Journal of Nutrition* 56, 455-462.
- Leng, R. A., Nolan, J. V., Bird, S. H. and Romulo, B. (1989). Manipulation of wool growth in sheep. In: *Biotechnology for Livestock Production*. pp. 207-215. F.A.O. New York.
- Lindsay, D. B. (1970). Carbohydrate metabolism in ruminants. in: *Physiology of Digestion and Metabolism in Ruminant*. (A. T. Phillipson, editor), pp. 438-451. Oriel Press, England.

- Lindsay, J. A., Mason, G. W. J. and Toleman, M. A. (1982). Supplementation of pregnant cows with protected protein when fed tropical forage diet. *Proceedings of The Australian Society of Animal Production* 14, 67-68.
- Lobato, J. F. and Pearce, G. R. (1978). Variability in the intake of supplements by grazing sheep. *Proceedings of Australian Animal Production* 12, 164. (Abstract).
- MacRae, J. C., Ulyatt, M. J., Pearce, P. D. and Hendtlass, J. (1972). Quantitative intestinal digestion of nitrogen in sheep given formaldehyde-treated casein supplements. *British Journal of Nutrition* 27, 39-50.
- Madsen, J. and Hvelplund, T. (1985). Protein degradation in the rumen. *Acta Agricultura Scandinavica, Supplement* 25, 103-124.
- Mathers, J. C. and Miller, E. L. (1980). A simple procedure using ^{35}S incorporation for the measurement of microbial and undegraded food protein in ruminants digesta. *British Journal of Nutrition* 43, 503-515.
- McSweeney, C. S., Mackie, R. I. and White, B. A. (1994). Transport and intracellular metabolism of major feed compounds by ruminal bacteria: The potential for metabolic manipulation. *Australian Journal of Agricultural Research* 45, 731 - 756.
- Merchen, N., Hanson, T. and Klopfenstein, T. (1979). Ruminant bypass of brewers dried grain protein. *Journal of Animal Science* 49, 192-197.
- Mertens, D. R. (1993). Rate and extent of digestion. In: *Quantitative Aspects of Ruminant Digestion and Metabolism*. (J. M. Forbes and J. France, editors), pp. 13 - 51. University Press, Cambridge.
- Miles, R. D., Janky, D. M. and Harms, A. H. (1984). Virginiamycin and broiler performance. *Poultry Science* 63, 1218-1221.
- Milne, J. A., Christie, A. and Russel, A. J. F. (1979). The effect of nitrogen and energy supplement on the voluntary intake and digestion of heather by sheep. *Journal of Agricultural Science, Cambridge* 92, 635-643.
- Minson, D. J. (1982). Effect of chemical and physical composition of herbage eaten upon intake. In: *Nutritional Limit to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 167-182. C.A.B. Farnham House, UK.
- Mountfort, D. O. and Asher, R. A. (1983). Role of catabolite regulatory mechanisms in control of carbohydrate utilization by the rumen anaerobic fungus *Neorallimastix frontalis*. *Applied Environmental Microbiology* 46, 1331-1338.
- Mulholland, J. G. (1987). Animal and climatic factors affecting the voluntary intake of sheep. In: *Proceedings of The Sheep and Wool Seminar and Refresher Course*

- Goulburn, April 1987. pp. 12.1 - 12.11. Department of Agriculture New South Wales.
- Mulholland, J. G., Combe, J. B. and McManus, W. R. (1976). Effect of starch on the utilization by sheep of straw diet supplemented with urea and minerals. *Australian Journal of Agricultural Research* 27, 139-153.
- Murphy, M. R., Baldwin, R. L. and Koong, L. J. (1982). Estimation of stoichiometric parameters for rumen fermentation of roughage and concentrate diets. *Journal of Animal Science* 55, 411-421.
- Murray, P. J., Godfrey, S. I. and Rowe, J. B. (1990). Sulphur supplementation of lupin grain for sheep. *Proceedings of The Australian Society of Animal Production* 18, 320-323.
- Murray, P. J., Rowe, J. B., Aitchison, E. M., and Winslow, S. G. (1992). Liveweight gain and wool growth in sheep fed rations containing virginiamycin. *Australian Journal of Experimental Agriculture* 32, 1037-1043.
- Murray, P. J., Rowe, J. B., and Speijers, E. J. (1991). A sulfur supplementation and the use of flavomycin with lupin grain for sheep. *Australian Journal of Agricultural Research* 42, 1323-1333.
- Nagaraja, T. G., Avery, T. B., Bartley, E. E., Galitzer, S. J. and Dayton, A. D. (1981). Prevention of lactic acidosis in cattle by lasalocid or momensin. *Journal of Animal Science* 53, 206-215.
- Nagaraja, T. G., Godfrey, S. I., Winslow, S. W., Rowe, J. B. and Kemp, K. E. (1995). Effect of virginiamycin on ruminal fermentation in faunated or ciliate-free sheep overfed with barley grain. *Small Ruminant Research*. 17, 1-8. Elsevier.
- Nagaraja, T. G., Taylor, M. B., Harmon, D. L. and Boyer, J. E. (1987). In vitro lactic acid inhibition and alterations in volatile fatty acid production by antimicrobial feed additives. *Journal of Animal Science* 65, 1064-1076.
- Naseer, Z., Alam, M., Choo, B. S., Khan, M. F. and Muller, Z. O. (1985). The effect of high pressure steam and chemicals on rumen degradability and chemical composition of bagasse. In: *Proceeding 3rd AAAP Animal Science Congress, Korea*. pp. 996 - 998.
- Newbold, C. J., Chamberlain, D. G. and Williams, A. G. (1986). The effects of defaunation on the metabolism of lactic acid in the rumen. *Journal of Science Food and Agriculture* 37, 1038-1090.
- Nikolic, J. A., Pavlicevic, A., Zeremski, D. and Negovanovic, D. (1979). Adaptation to diets containing significant amounts of non-protein nitrogen. In: *Digestive Physiology and Metabolism in Ruminants*. pp. 603-617.

- Nocek, J. E. and Tamminga, S. (1991). Site of digestion of starch in the gastrointestinal tract of dairy cows and its effect on milk yield and composition. *Journal of Dairy Science* 74, 3598-3629.
- Nolan, J. V. (1987). Factors affecting protein deposition in ruminants. In: *Recent Advances in Animal Nutrition in Australia* 1987. (D. J. Farrell, editor), pp. 50-68. University of New England Publishing Unit, Armidale. NSW. Australia.
- Nolan, J. V. (1993). Nitrogen kinetics. In: *Quantitative Aspects of Ruminant Digestion and Metabolism*. (J. M. Forbes and J. France, editors), pp. 123-143. C.A.B. International. UK.
- Nolan, J. V. and Leng, R. A. (1989). Manipulation of the rumen to increase ruminant production. in: *Integrated Tree Cropping and Small Ruminant Production Systems*. Proceeding of a Workshop on Research Methodologies Medan, Indonesia. September 9 -14, 1990. (L. C. Iniguez and M. D. Sanchez, editors), pp. 149 -166.
- Nolan, J. V. and Stachiw, S. (1979). Fermentation and nitrogen dynamics in Merino sheep given a low-quality-roughage diet. *British Journal of Nutrition* 42, 63-79.
- Nolan, J. V., Norton, B. W. and Leng, R. A. (1976). Further studies on the dynamics of nitrogen metabolism in sheep. *British Journal of Nutrition* 35, 127-147.
- National Research Council. (1984). *Nutrient Requirements of Beef Cattle*. National Academy Press, Washington, D.C.
- National Research Council. (1985). *Ruminant Nitrogen Usage*. National Academy Press, Washington, D.C.
- Oddy, V. H. (1987). Energy and protein requirement of sheep - source of variation. In: *Proceedings of The Sheep and Wool Seminar and Refresher Course Goulburn*, April 1987. pp. 2.1 -2.19. Department of Agriculture New South Wales
- Oddy, V. H., Gooden, J. M. and Annison, E. F. (1984). Partitioning of nutrients in Merino ewes. I. Contribution of skeletal muscle, the pregnant uterus and the lactating mammary gland to total energy expenditure. *Australian Journal of Biological Science* 37, 375-388.
- Oldham, J. D. (1984). Protein-energy interrelationships in dairy cows. *Journal of Dairy Science* 67, 1090-1114.
- Oosting, S. J., Bockholt, H. A., Los, M. J. N. and Leffering, C. P. (1993). Intake and utilization of energy from ammonia-treated and untreated wheat straw by steers and whether sheep given a basal diet of grass pellets and hay. *Animal Production* 47, 227-236.
- Orpin, C. G. (1984). The role of ciliate protozoa and fungi in the rumen digestion of plant cell walls. *Animal Feed Science and Technology* 10, 21.

- Orpin, C. G. and Hart, Y. (1980). Digestion of plant particles by rumen phycomycetes *in vitro*. *Journal of Applied Bacteriology* 49, 124.
- Orskov, E. R. (1979). Possible nutritional constraints in meeting energy and amino acid requirements of the highly productive ruminant. In: *Digestive Physiology and Metabolism in Ruminants*. Proceeding of the 5th International Symposium on Ruminant Physiology. (Y. Ruckebusch and P. Thivend, editors). pp. 309-323.
- Pearce, P. D. and Bauchop, T. (1985). Glycosidases of the rumen anaerobic fungus *Neocallimastix frontalis* grown on cellulosic substrates. *Applied Environmental Microbiology* 49, 1265-1269.
- Perdok, H. B. (1983). Increase of availability of feed resource. In: *Proceeding the Vth World Conference on Animal Production* 1. (I. Tasaki, A. Yokohama, Y. Asahida, K. Yamauchi, R. Kawashima, editors), pp. 103. Japanese Society of Zootechnical Science, Tokyo, Japan.
- Perdok, H. and Leng, R. A. (1988). Rumen ammonia requirements for efficient digestion and intake of straw by cattle. In: *The Roles of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 291-293. Penambul Books. Armidale. NSW.
- Perdok, H. B. (1987). Ammoniated Rice straw as a feed for growing cattle. *PhD. Thesis*. University of New England, Armidale. NSW. Australia.
- Pilgrim, A. F., Gray, F. V., Weller, R. A. and Belling, B. (1970). Synthesis of microbial protein from ammonia in the sheep's rumen and the proportion of dietary nitrogen converted into microbial nitrogen. *British Journal of Nutrition* 24, 589-598.
- Pond, W. G., Church, D. C. and Pond, K. R. (1995). *Basic Animal Nutrition and Feeding*. 4th edition. John Wiley and Sons. New York.
- Poppi, D. P. and McLennan, S. R. (1995). Protein and energy utilization by ruminants at pasture. *Journal of Animal Science* 73, 278-290.
- Preston, T. R. (1984). New approach to animal nutrition in the tropics. In: *World Animal Science. Development of Animal Production Systems*. (B. Nestel, editor), pp. 379-395.
- Preston, T. R. (1976). Protein supplementation in intensive feeding situations for growth and lactation. In: *Review in Rural Science, II. From Plant to Animal Protein*. (T. M. Sutherland, J. R. McWilliam and R. A. Leng, editors), pp. 129-133. University of New England Publishing Unit. Armidale, NSW. Australia.
- Preston, T. R. and Leng, R. A. (1987). *Matching Ruminant Production Systems with Available Resources in The Tropic and Sub-Tropics*. Penambul Books. Armidale, Australia.

- Rahman, Abd. M. Y., Wong, H. K., Zaini, H. and Sharif, H. (1990). Preliminary observation on the alleviation of copper toxicity in sheep fed palm kernel meal based diet. In: *Proceedings of the 12th Annual Conference of The Malaysian Society of Animal Production*, March 29-31, 1989, Genting Highlands, Malaysia. pp. 75-79.
- Ralphs, M. H. and Cheney, C. D. (1993). Influence of cattle age, lithium chloride dose level, and food type in the retention of food aversions. *Journal of Animal Science* 71, 373 -379.
- Reis, P. J. (1979). Effects of amino acids on the growth and properties of wool. In: *Physiological and Environmental Limitations to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 223-242. University of New England Publishing Unit. Armidale. NSW. Australia.
- Reis, P. J., Tunks, D. A. and Munro, S. G. (1992). Effects of abomasal protein and energy supply on wool growth in Merino sheep. *Australian Journal of Agricultural Research* 43, 1353-1366.
- Risco, L. A., Holmberg, C. A. and Kutches, A. (1992). Effect of graded concentrations of gossypol on calf performance: toxicological and pathological considerations. *Journal of Dairy Science* 75, 2787-2798.
- Ritchie, A. J. M. and Ralph, I. G. (1990). Relationship between total fibre diameter variation and staple strength. *Proceedings of Australian Society of Animal Production* 18, 543.
- Roche, J. F. and Quirke, J. F. (1986). The effect of steroid hormones and xenobiotics on growth of farm animals. In: *Control and Manipulation of Animal Growth*. (P. J. Buttery, N. B. Haynes and D. B. Lindsay, editors), pp. 39-51. Butterworth. London
- Roffler, R. E. and Satter, L. D. (1975). Relationship between ruminal ammonia and non-protein nitrogen utilization by ruminants. 1. Development of model for predicting non-protein nitrogen utilization by cattle. *Journal of Dairy Science* 58, 1880-1888.
- Rowe, J. B., Brown, G., Ralph, I. G., Ferguson, J. and Wallace, J. F. (1989). Supplementary feeding of young Merino sheep, grazing wheat stubble, with different amounts of lupin, oat or barley grain. *Australian Journal of Experimental Agriculture* 29, 29-35.
- Rowe, J. B., Tudor, G. D., Dixon, R. M. and Egan, A. R. (1991). Cereal or legume grain as supplements for animals grazing stubble or dry pasture. In: *Recent Advances in Animal Nutrition in Australia 1991*. (D. J. Farrell, editor), pp. 72-82. University of New England, Armidale, NSW. Australia.
- Sastradipradja, D. and Sutardi, T. (1978). Utilization of feeding stuffs by ruminants in Indonesia. In: *Feeding Stuffs for Livestock in South East Asia*. (C. Devendra

- and R. L. Hutagalung, editors), pp. 104-115. Malaysian Society of Animal Production, Selangor. Malaysia.
- Satter, L. D. and Roffler, R. E. (1976). Relationship between ruminal ammonia and non-protein nitrogen utilization by ruminants. In: *Traces Studies on Non-Protein Nitrogen for Ruminants III*. pp. 119-137. International Atomic Energy Agency, Vienna.
- Satter, L. D., and Slyter, L. L. (1974). Effect of ammonia concentration on rumen microbial protein production *in-vitro*. *British Journal of Nutrition* 32, 199 - 207.
- SCARM. (1990). Feeding Standards for Australian livestock. *Ruminants*. CSIRO, Australia.
- Schingoethe, D. J. (1984). Interrelationships between protein solubility and energy sources for cattle. *Canadian Journal of Animal Science, supplement* 64, 199-200.
- Schurch, A. (1980). The nutritional value of protein. In: *Proceeding of 3rd EAAP-Symposium on Protein Metabolism and Nutrition*. European Association for Animal Production Publication no. 27 (H. J. Oslage and K. Rohr, editors), pp. 7-28.
- Schwartz, H. M. and Gilchrist, F. M. C. (1975). Microbial interaction with the diet and the host animal. In: *Digestion and Metabolism in Ruminant*. (I. W. McDonald and A. C. I. Warner, editors), pp. 165-179. University of New England Publishing Unit, Armidale, NSW. Australia.
- Seeback, R. M., Springell, P. H. and O'Kelly, J. C. (1971). Alteration in host metabolism by the specific and nirectic effects of the cattle tick (*Boophilus microplus*). I. Food intake and body weight growth. *Australian Journal of Biological Science* 24, 373-380.
- Siddons, R. C., Nolan, J. V., Beever, D. E. and MacRae, J. C. (1985). Nitrogen digestion and metabolism in sheep consuming diets containing contrasting forms and levels of N. *British Journal of Nutrition* 54, 175-187.
- Siddons, R. C., Paradine, J., Gale, D. L. and Evans, R. T. (1985). Estimation of the degradability of dietary protein in the sheep rumen by *in vivo* procedures. *British Journal of Nutrition* 54, 545-561.
- Sinclair, L. A., Garnsworthy, P. C., Newbold, J. R., and Buttery, P. J. (1993). Effect of synchronizing the rate of dietary energy and nitrogen release on rumen fermentation and microbial protein synthesis in sheep. *Journal of Agricultural Science, Cambridge* 120, 251-263.
- Smith, R. H. (1979). Synthesis of microbial nitrogen compound in the rumen and their subsequent digestion. *Journal of Animal Science* 49, 1604-1614.

- Soetanto, H. (1985). Studies in the Role of Rumen. An aerobic Fungi and Protozoa in Fibre Digestion. A Thesis of Rural Science of The University of New England, Armidale, NSW. Australia.
- Soetanto, H., Gordon, G. L. R., Hume, I. D. and Leng, R. A. (1985). The role of protozoa and fungi in fibre digestion in the rumen of sheep. In: *Proceeding of the 3rd AAAP Animal Science Congress 2*. 805-807.
- Somers, M. (1961). Factors influencing the secretion of nitrogen in sheep saliva. *Australian Journal of Experimental Biology* 39, 111-156.
- Sriskandarajah, N. (1985). Effect of supplement on utilisation of native pasture by goats. In: *Proceeding of 3rd AAAP Animal Science Congress*, pp. 848-850. Seoul, Korea.
- Sriskandarajah, N. and Komolong, M. (1987). Evaluation of crop by-product for ruminant feeding in Papua New Ginea. *Proceedings of 4th AAAP Animal Science Congress*, pp. 239. Hamilton, New Zeland.
- Sriskandarajah, N and Kelleway, R. C. (1983). Effect of alkali treatment of wheat straw on microbial protein synthesis in cattle. In: *Proceeding the 5th World Conference on Animal Production*. vol. 2. (I. Tasaki, A. Yokohama, Y. Asahida, K. Yamauchi, R. Kawashima, editors). Japanese Society of Zootechnical Science. Tokyo. Japan.
- Staples, L. D., McPhee, S. R., Williams, A. H. and Johnson, R. J. (1993). The application of new technology for the protection of amino acids to improve wool production and body growth in sheep. In: *Recent Advances in Animal Nutrition in Australia 1993*. (D. J. Farrell, editor), pp. 22- 33. University of New England, Armidale, NSW. Australia.
- Steel, J. W. and Symons, L. E. A. (1979). Current ideas on the mechanisms by which gastro-intestinal helminths influence the rate of wool growth. In: *Physiological and Enviromental Limitation to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 311-320. University of New England Publishing Unit. Armidale, NSW. Australia.
- Steel, R. D. G. and Torrie, J. H. (1981). *Principles and Procedures of Statistics A Biometrical Approach*. Second edition McGraw-Hill, Inc. New York.
- Stern, M. D. and Hoover, W. H. (1979). Methods of determining and factors effecting rumen microbial protein synthesis. A review. *Journal of Animal Science* 49, 1590-1603.
- Storm, E. and Orskov, E. R. (1984). The nutritive value of rumen micro-organisms in ruminants: 4. The limiting amino acids of microbial protein in growing sheep determined by a new approach. *British Journal of Nutrition* 52, 613-620.

- Storm, E., Brown, D. S. and Orskov, E. R. (1983). The nutritive value of rumen micro-organisms in ruminants: 3. The digestion of microbial amino and nucleic acids in and losses of endogenous nitrogen from the small intestine of sheep. *British Journal of Nutrition* 50, 479-485.
- Sudana, I. B. and Leng, R. A. (1986). Effects of supplementing a wheat straw diet with urea or a urea-molasses block and/or cottonseed meal on intake and liveweight change of lambs. *Animal Feed Science and Technology* 16, 25-35. Elsevier, Amsterdam.
- Suharyono. (1992). Estimation of Dietary Intake in Sheep, Using Lithium as a Marker. *Masters Thesis*. University of New England, Armidale, NSW. Australia.
- Suharyono., Nolan, J. V., and Kent, J. (1991). Estimation of supplement intake in individual grazing ruminants using lithium chloride as a marker. In: *Recent Advance in Animal Nutrition in Australia*. (D. J. Farrell, editor), pp. 16A. University of New England Publishing Unit, Armidale, NSW. Australia.
- Sundstol, F., Kossila, V., Thunder, O., and Vestergaard Thomson, K. (1977). Evaluation of the feeding value of straw. A comparison of laboratory methods in nordic countries. In: *Proceedings of Forage Quality*. (Kuntson, P. G., editor), pp. 167 - 175. Seminar at Uppsala. Sweden.
- Sutton, J. D. (1979). Digestion and end product formation in the rumen from production rations. in: *Digestive Physiology and Metabolism in Ruminants. Proceeding of the 5th International Symposium on Ruminant Physiology*. (Y. Ruckebusch and P. Thivend, editors).
- Tamminga, S. (1980). Amino acid supply and utilisation in ruminants. In: *European Association for Animal Production Publication*. no. 27. *Proceeding of the 3rd EAAP- Symposium on Protein Metabolism and Nutrition* 2, 379- 395.
- Tamminga, S. (1977). The protein requirements of dairy cattle and developments in the use of protein, essential amino acids and non-protein nitrogen, in the feeding of dairy cattle. In. *Protein and Non-Protein Nitrogen for Ruminan*. Recent development in the use of nitrogen source. *A seminar of the United Nations Economic Commission for Europe*. Geneva 10 - 13 January. Published by Pergamon Press.
- Tamminga, S. (1979). Protein degradation in the forestomach of ruminants. *Journal of Animal Science* 49, 1615-1630.
- Tamminga, S. (1982). Energy-protein relationships in ruminant feeding: similarities and differences between rumen fermentation and postruminal utilization. In: *Protein Contribution of Feedstuffs for Ruminants*. (E. Miller, I. H. Pike and A. J. H. Van Es, editors), pp. 4 - 17. Butterworths. London.

- Tamminga, S. (1983). Recent advance in our knowledge on protein digestion and absorption in ruminants. In: *Protein Metabolism and Nutrition*. 4th International Symposium.1, 263-281. Clermont-Ferrand (France).
- Tamminga, S. and Van Hellemond, K. K. (1977). The protein requirements of dairy cattle and developments in the use of protein, essential amino acids and non-protein nitrogen, in the feeding of dairy cattle. In: *Protein and NonProtein Nitrogen for Ruminants. Recent Developments in The Use of Nitrogen Source*. pp. 9. A Seminar of The United Nations Economic Commission for Europe, Geneva. Pergamon Press.
- Tan, P. V. and Bryant, M. J. (1991). The effects of dietary supplements of fish meal on the voluntary food intake of store lambs. *Animal Production* 52, 271-278.
- Teleni, E., King, W. R., Rowe, J. B. and McDowell, G. H. (1989). Lupin and energy-yielding nutrients in ewes. I. glucose and acetate biokinetics and metabolic hormones in sheep fed a supplement of lupin grain. *Australian Journal of Agricultural Research* 40, 913-924.
- Theodorou, M. K. and France, J. (1993). Rumen microorganisms and their interaction. In: *Quantitative Aspects of Ruminant Digestion and Metabolism*. (J.M. Forbes and J. France, editors), pp. 145 - 164. University Press, Cambridge.
- Thomas, I. R. (1986). Mutton and lamb production. In: *The Pastoral Industries of Australia: practice and technology of sheep, cattle, goat and deer production*. (Alexander and O. B. Williams, editors), pp. 104-130. Sydney University Press.
- Thompson, A. N. and Curtis, K. M. S. (1990). The effect of lupin or oat grain supplements on liveweight change, staple strength and position of break for sheep grazing dry annual pastures. *Proceedings of The Australian Society of Animal Production* 18, 400-403.
- Titgemeyer, E. C., Merchen, N. R. and Berger, L. L. (1989). Evaluation of soybean meal, corn gluten meal, blood meal and fish meal as sources of nitrogen and amino acids disappearing from the small intestine of steer. *Journal of Animal Science* 67, 262-275.
- Ushida, K., Jouany, J. P. and Thivend, P. (1986). Role of rumen protozoa in nitrogen digestion in sheep given two isonitrogenous diets. *British Journal of Nutrition* 56, 407-419.
- Ushida, K., Jouany, J. P., Lassalas, B. and Thivend, P. (1984). Protozoal contribution to nitrogen digestion in sheep. *Canadian Journal of Animal Science, Supplement* 64, 20-21.
- Ushida, K., Jouany, J. P., Kayouli, C. and Demeyer, D. I. (1988). Effect of defaunation on fibre digestion in sheep fed NH₃-treated straw based diets. In : *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan., R. A.

- Leng and D. I. Demeyer, editors), pp. 307 - 308. Penambul Books Armidale, NSW.
- Valentine, S. C and Bartsch, B. D. (1988). Degradation of dry matter, crude protein, fat, crude fibre and nitrogen-free-extract in milled barley and lupin grains incubated in nylon bags in the rumen of dairy cows. *Journal of Agriculture Science, Cambridge* 110, 395-398.
- Van der Meer, J. M. and Van Es, A. J. H. (1987). Optimal degradation of lignocellulosic feed by ruminants and *in vitro* digestibility test. In: *Degradation of Lignocellulosics in Ruminants and in Industrial Processes*. (J. M. Van Der Meer, B. A. Rijkens and M. P. Ferranti, editors), pp. 21-31. Elsevier Applied Science, London.
- Van Es, A. J. H. (1983). Which information on feed is most needed in practical livestock feeding? In: *Feed Information and Animal Production*. (G. E. Robards and R. G. Packham, editors), pp. 115 - 118. Australia.
- Van Houtert, M. F. J. and Leng, R. A. (1993). The effect of supplementation with protein, lipid and propionate on nutrition partitioning in roughage fed lambs. *Animal Production* 56, 341 - 349.
- Van Soest, P. J. (1994). *Nutritional ecology of the ruminant*. 2nd edition. Comstock Publishing Associates, Cornell University Press, USA.
- Van Soest, P. J. (1982). *Nutritional Ecology of the Ruminant*. O & B Books, Inc. United States of America.
- Veira, D.M. (1986). The role of ciliate protozoa in nutrition of the ruminant. *Journal of Animal Science* 63, 1547-1560.
- Weller, R. A. and Pilgrim, A. F. (1974). Passage of protozoa and volatile fatty acids from the rumen of the sheep and from continuous *in vitro* fermentation system. *British Journal of Nutrition* 32, 341-351.
- Weston, R. H. (1979). Feed intake regulation in sheep. In: *Physiological and Environmental Limitation to Wool Growth*. (J. L. Black and P. J. Reis, editors), pp. 163-177. University of New England Publishing Unit. Armidale, NSW. Australia.
- Weston, R. H. (1982). Animal factors affecting feed intake. In: *Nutritional Limit to Animal Production from Pasture*. (J. B. Hacker, editor), pp. 183-198. C.A.B. Farnham House, UK.
- Weston, R. H. (1984). Rumen digesta load in relation to voluntary feed consumption and rumination in roughage-fed young sheep. *Canadian Journal of Animal Science, Supplement* 64, 324-325.

- Weston, R. H. (1985). The regulation of feed intake in herbage-feed ruminants. *Proceedings of The Nutrition Society of Australia* 10, 55-62.
- Weston, R. H. (1989). Factors limiting the intake of feed by sheep. XV. Voluntary feed consumption and digestion in lambs fed chopped roughage diets varying in quality. *Australian Journal of Agriculture Research* 40, 643-661.
- Widdowson, E. M. and Lister, D. (1991). Nutritional control of growth. In: *Growth Regulation in Farm Animals 7*. (A. M. Person and T. R. Dutson, editors), pp. 67-101. Elsevier Applied Science. London.
- Williams, A. G. (1988). Metabolic activities of rumen protozoa. In: *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 97-126. Penambul Books, Armidale, NSW.
- Williams, A. J. (1991). Wool growth. in: *Australian Sheep and Wool Handbook*. (D. J. Cottle, editor), pp. 224-242. Inkata Press, Melbourne.
- Williams, I. H. (1982). Growth and energy: principles of growth of animals. In: *A course Manual in Nutrition and growth*. (H. L. Davies, editor), pp. 3-23. The Australian Universities International Development Program. Melbourne.
- Wilson, J. R. and Engels, F. M. (1988). Do rumen fungi have a significant direct role in particle size reduction? In: *The Role of Protozoa and Fungi in Ruminant Digestion*. (J. V. Nolan, R. A. Leng and D. I. Demeyer, editors), pp. 255-257. Penambul Books, Armidale, NSW.
- Wohlt, J. E., Clark, H. and Blaisdell, S. F. (1976). Effect of sampling location, time and method on concentration of ammonia nitrogen in rumen fluid. *Journal of Dairy Science* 59, 459-464.
- Wolff, J. E. and Bergman, E. N. (1972). Gluconeogenesis from plasma amino acids in fed sheep. *American Journal of Physiology* 223, 455.
- Wright, P. L. (1971). Body weight gain and wool growth response to formaldehyde treated casein and sulphur amino acids. *Journal of Animal Science* 33, 137-141.
- Zimmerman, C. A., Rakes, A. H., Daniel, T. E. and Hopkins, B. A. (1992). Effect of total and rumen undegradable protein on the performance of cows fed low fiber diets. *Journal of Dairy Science* 75, 1954 - 1964.
- Zinn, R. A., Bull, L. S. and Hemken, R. W. (1981). Degradation of supplemental protein in the rumen. *Journal of Animal Science* 52, 857-866.