引用文献

阿部亮. 炭水化物成分を中心とした飼料分析法とその飼料栄養価評価への応用. 農林水産省畜産試験場研究資料, 2: 16-28. 1988.

Abe H, Abe A. Classification of cell wall digestibility of feedstuffs in the rumen. *Bulletin of National Institute of Animal Industry*, 51: 37-41. 1991.

阿部又信. 栄養素の消化. 新乳牛の科学 (津田恒之監修). 第1版. 55-75. 農文協. 東京. 1994.

足立吟也. 希土類って何だろう. 希土類物語 (足立吟也編). 2-19. 産業図書. 東京. 1992.

Akin DE. Histological and physical factors affecting digestibility of forages. *Agronomy Journal*, 81: 17-25. 1989.

甘利雅拡, 森登, 新宮博行, 柾木茂彦, 阿部亮. 乳牛におけるチモシー乾草の自由採食量と飼料組成, 第一胃内滞留時間, 消化率, 消化速度との関係. 日本草地学会誌, 44: 248-254. 1998.

Balch CC. Factors affecting the utilization of food by dairy cows. 1. The rate of passage of food through the digestive tract. *British Journal of Nutrition*, 4: 361-388. 1950.

板東健. トウモロコシサイレージを基本飼料とする牛乳生産に関する飼養学的研究. 北海道立農業試験場報告, 81: 1-89. 1993.

Beauchemin KA, Buchanan-Smith JG. Evaluation of markers, sampling sites and models for estimating rates of passage of silage or hay in dairy cows. *Animal Feed Science and Technology*, 27: 59-75. 1989.

Beauchemin KA, Iwassa AD. Eating and ruminating activities of cattle fed alfalfa and grass harvested at two stages of maturity. *Canadian Journal of Animal Science*, 73: 79-88. 1993.

Beauchemin KA, Rode LM, Eliason MV. Chewing activities and milk production of dairy cows fed alfalfa as hay, silage, or dried cubes of hay or silage. *Journal of Dairy Science*, 80: 324-333. 1997.

Bernard L, Chaise JP, Delval E, Poncet C. Validation of the main modeling methods for the estimation of marker retention times in the different compartments of gastrointestinal tract in sheep. *Journal of Animal Science*, 76: 2485-2495. 1998.

Blaxter KL, Graham NM, Wainman FW. Some observations on the digestibility of food by sheep, and on related problems. *British Journal of Nutrition*, 10: 69-91. 1956.

Cochran RC, Adams DC, Galyean ML, Wallace JD. Estimating particle turnover in the rumen of meal-fed beef steers: procedural evaluations. *Journal of Animal Science*, 63: 1469-1475. 1986.

Colluci PE, MacLeod GK, Grovum WL, McMillan I, Barney DJ. Digesta kinetics in sheep and cattle fed diets with different forage to concentrate ratios at high and low intakes. *Journal of Dairy Science*, 73: 2143-2156. 1990.

Comb DK, Shaver RD, Satter LD. Retention of rare earths by hay particles following incubation in fresh or autoclaved rumen fluid. *Journal of Dairy Science*, 75: 132-139. 1992.

Conrad HR, Pratt AD, Hibbs JW. Regulation of feed intake in dairy cows. 1. Change in importance of physical and physiological factors with increasing digestibility. *Journal of Dairy Science*, 47: 54-62. 1964.

Cottrell DF, Gregory PC. Regulation of gut motility by luminal stimuli in the ruminant. In: Physical Aspects of Digestion and Metabolism in Ruminants. (Tsuda T, Sasaki Y, Kawashima R. eds.) 3-32. Academic Press. Califolnia. 1991.

Crooker BA, Clark JH, Shanks RD. Rare earth elememts as markers for rate of passage measurements of individual feedstuffs through the digestive tract of ruminants. *Journal of Nutrition*, 112: 1353-1361. 1982.

出岡謙太郎，板東健．とうもろこしサイレージの切断長がヒツジによる消化率に及ぼす影響．北海道立新得試験場研究報告，11: 39-41. 1981.

desBordes CK, Welch JG. Influence of specific gravity on rumination and passage of indigestible particles. *Journal of Animal Science*, 59: 470-475. 1984.

Dixon RM, Milligan LP. Removal of digesta components from the rumen of steers determined by sieving techniques and fluid, particulate and microbial markers. *British Journal of Nutrition*, 53: 347-362. 1985.

Dhanoa MS, Siddons RC, France J, Gale DL. A multicompartment model to describe marker excretion patterns in ruminant faeces. *British Journal of Nutrition*, 53: 663-671. 1985.

Egan JK, Doyle PT. A comparison of particulate marker for the estimation of digesta flow from the abomasum of sheep offered chopped oaten hay. *Australian Journal of Agricultural Research*, 35: 279-391. 1984.

Ellis WC, Huston JE. ^{144}Ce-^{144}Pr as a particulate digesta flow rate marker in ruminants. *Journal of Nutrition*, 95: 67-78. 1968.

Ellis WC, Matis JH, Lascano C. Quantitating ruminal turnover. *Federation Proceedings*, 38: 2702-2706. 1979.

Ewing DL, Johnson DE, Rumpler WV. Corn particle passage and size reduction in the rumen of beef steers. *Journal of Animal Science*, 63: 1509-1515. 1986.

Faichney GJ. The use of markers to partition digestion within the gastrointestinal tract in ruminants. In: Digestion and Metabolism in Ruminants. (McDonald IW, Waner ACI. eds.) 277-291. The university of New England. Australia. 1975.

Faichney GJ, Boston RC. Interpretation of faecal excretion patterns of solute and particle markers introduced into the rumen of sheep. *Journal of Agricultural Science*, 101: 575-581. 1983.

Faichney GJ, Gherardi SG. Relationships between organic-matter digestibility, dry-matter intake and solute mean retention times in sheep given a ground and pelleted diet. *Journal of Agricultural Science*, 106: 219-222. 1986.

FAO. Production year book. FAO. Rome. 1997.

Goering HK, Van Soest PJ. Forage fiber analyses (apparatus, reagents, procedures and some applications). In: Agriculture Handbook.(USDA eds.) 2-9. U.S. Government Printing Office. Washington, DC. 1970.

Goetsch AL, Galyean ML. Ruthenium phenanthroline, dysprosium and ytterbium as particulate markers in beef steers fed an all-alfalfa hay diet. *Nutrition Report International*, 27: 171-178. 1983.

Grenet E. A comparison of the digestion and reduction in particle size of lucerne hay (*Medicago sativa*) and Italian ryegrass hay (*Lolium italicum*) in the ovine digestive tract. *British Journal of Nutrition*, 62: 493-507. 1989.

Grovum WL, Williams VJ. Rate of passage of digesta in sheep. 4. Passage of marker through the alimentary tract and the biological relevance of rate-constants derived from the changes in concentration of marker in faeces. *British Journal of Nutrition*, 30: 313-329. 1973.

Grovum WL, Williams VJ. Rate of passage of digesta in sheep. 6. The effect of level of food intake on mathematical predictions of the kinetics of digesta in the reticulorumen and intestines. *British Journal of Nutrition*, 38: 425-436. 1977.

花坂昭吾・川村五郎・岡田清. ソルガムとトウモロコシサイレージの混合給与が採食量および乳生産に及ぼす影響. 東北農業研究, 41: 205-206. 1988.

Hartnell GF, Satter LD. Extent of particulate marker (samarium, lanthanum and cerium) movement from one digesta particle to another. *Journal of Animal Science*, 48: 375-380. 1979.

Hooper AP, Welch JG. Change of functional specific gravity of forages in various solutions. *Journal of Dairy Science*, 68: 1652-1658. 1984.

堀井聡. 一般成分分析法. 動物栄養試験法(森本宏編). 第1版. 280-298. 養賢堂. 東京. 1971.

Huston JE, Ellis WC. Evaluation of certain properties of radiocerium as an indigestible marker. *Journal of Agricultural and Food Chemistry*, 16: 225-230. 1968.

Huhtanen P, Kukkonen U. Comparison of methods, markers, sampling sites and models for estimating digesta passage kinetics in cattle fed at two levels of intake. *Animal Feed Science and Technology*, 52: 141-158. 1995.

Ichinohe T, Tamura T, Ueda K, Okubo M, Asahida Y. The particle size distributions of ingested boli, rumen digesta and feces in sheep fed orchardgrass hay harvested at different stages of maturity. *Animal Science and Technology*, 65: 701-708. 1994.

一戸俊義. 反芻胃内飼料片の粒度別動態解析法について. 栄養生理研究会報, 38: 89-114. 1994.

一戸俊義・田村忠・上田宏一郎・大久保正彦・朝日田康司. 刈取り期の異なる

オーチャードグラス乾草を１日１回給与しためん羊における反芻胃内容物重量の経時変化. 日本緬羊研究会誌, 29: 45-50. 1992.

井上直人・春日重光. ソルガム類サイレージの真の消化率と栄養評価. 日本草地学会誌, 44: 240-247. 1998.

和泉康史. サイレージ多給による搾乳牛の飼養技術に関する研究. 北海道立農業試験場報告, 69: 1-77. 1988.

Judkins MB, Krysl LJ, Barton RK. Estimating diet digestibility. A comparison of 11 techniques across six different diets fed to rams. *Journal of Animal Science*, 68: 1405-1415. 1990.

Jung HG. Forage lignins and their effects on fiber digestibility. *Agronomy Journal*, 81: 33-38. 1989.

Jung HG, Allen MS. Characteristics of plant cell walls affecting intake and digestibility of forages by ruminants. *Journal of Animal Science*, 73: 2774-2790. 1995.

亀岡暄一. 飼料の第一胃内消化. 乳牛の科学 (梅津元昌編). 第１版. 241-251. 農文協. 東京. 1982.

Kennedy PM. Influence of cold exposure on digestion of organic matter, rates of passage of digesta in the gastrointestinal tract, and feeding and

rumination behavior in sheep given four forage diets in the chopped, or ground and pelleted form. *British Journal of Nutrition*, 53: 159-173. 1985.

小池一正・高橋信一・松本フチ子・横山正勝. ソルゴー型ソルガムの熟期別生育・収量とサイレージ調製適期. 福島県畜産試験場研究報, 8: 29-35. 1995.

Kondo T, Mizuno K, Kato T. Some characteristics of forage plant lignin. *Japan Agricultural Research Quarterly*, 21: 47-52. 1987.

近藤恒夫. 牧草リグニンの特性に関する理化学的研究. 東北農業試験場報告, 85: 103-144. 1992.

小坂清巳. 消化率指示物質. 動物栄養試験法(森本宏編). 第1版. 392-393. 養賢堂. 東京. 1971.

小坂清巳. 飼料の化学分析. 粗飼料の品質評価ガイドブック(自給飼料品質評価研究会編). 1-29. 日本草地協会. 東京. 1994.

Kyker JC. Rare earths. In: Mineral Metabolism. (Coner CL, Bronner F. eds.) 499-541. Academic Press. California. 1961.

久馬 忠・近藤恒夫・大下友子. アルファルファおよびソルガム給与時のヒツジの採食・反芻時間と繊維摂取量の関係. 第86回日本畜産学会大会講演要旨, 139. 1992.

久馬 忠・近藤恒夫・大下友子. ヘイキューブとイナワラを給与したヒツジの採食･反芻時間における加法性の検討. 第 87 回日本畜産学会大会講演要旨, 92. 1993.

Lechner-Doll M, Kaske M, Engelhardt WV. Factors affecting the mean retention time of particles in the forestomach of ruminants and camelids. In: Physical Aspects of Digestion and Metabolism in Ruminants. (Tsuda T, Sasaki Y, Kawashima R. eds.) 455-482. Academic Press. California. 1991.

Lee JA, Pearce GR. The effectiveness of chewing during eating on particle size reduction of roughages by cattle. *Australian Journal of Agricultural Research*, 35: 609-618. 1984.

Mader TL, Teeter RG, Horn GW. Comparison of forage labeling techniques for conducting passage rate studies. *Journal of Animal Science*, 58: 208-212. 1984.

柾木茂彦. サイレージの分析法. 粗飼料の品質評価ガイドブック(自給飼料品質評価研究会編). 88-94. 日本草地協会. 東京. 1994.

Matis JH. Gammma time-dependency in Blaxter's compartmental model. *Biometrics*, 28: 597-602. 1972.

松本弘子・菅原和夫. 酸化クロムカプセルによる放牧緬羊の排糞量推定方法の検討. 日本草地学会誌, 41: 357-359. 1996.

McBride BW, Milligan LP, Turner BV. Endscopic observation of reticulo-omasal orifice of cattle. *Journal of Agricultural Science*, 101: 749-750. 1983.

McLeod MN, Minson DJ. Large particle breakdown by cattle eating ryegrass and alfalfa. *Journal of Animal Science*, 66: 992-999. 1988.

Mertens DR, Ely LO. A dynamic model of fiber digestion and passage in the ruminant for evaluating forage quality. *Journal of Animal Science*, 49: 1085-1095. 1979.

Mertens DR. Predicting intake and digestibility using mathematical models of ruminal function. *Journal of Animal Science*, 64: 1548-1558. 1987.

Mertens DR. Creating a system for meeting the fiber requirements of dairy cows. *Journal of Dairy Science*, 80: 1463-1481. 1997.

Minson DJ. Intake of forage by housed ruminants. In: Forage in Ruminant Nutrition. 9-59. Academic press. California. 1990a.

Minson DJ. Intake of grazed forage. In: Forage in Ruminant Nutrition. 60-84. Academic press. California. 1990b.

三秋尚・田中重行・川村修・田中利治・古谷晴信・大橋登美男・山内清・芳賀聖一・三角守. トウモロコシサイレージとソルガムサイレージの産乳性の比較. 日本畜産学会報, 60: 127-132. 1989.

Momont PA, Pruitt RJ, Emerick RJ, Pritchard RH. Controlled release chromic oxide and alkaline peroxide lignin marker methods. *Journal of Range Manage*, 47: 418-423. 1994.

Moore JA, Poore MH, Swingle RS. Influence of roughage source on kinetics of digestion and passage, and on calculated extents of ruminal digestion in beef steers fed 65% concentrate diets. *Journal of Animal Science*, 68: 3412-3420. 1990.

Moore JA, Pond KR, Poore MH, Goodwin TG. Influence of model and marker on digesta kinetic estimates for sheep. *Journal of Animal Science*, 70: 3528-3540. 1992.

Murphy MR, Nicoletti JM. Potential reduction of forage and rumen digesta particle size by microbial action. *Journal of Dairy Science*, 67: 1221-1226. 1984.

Murphy MR, Kennedy PM, Welch JG. Passage and rumination of inert particles varying in size and specific gravity as determined from analysis of faecal appearance using multicompartment models. *British*

Journal of Nutrition, 62: 481-491. 1989.

Murphy MR. Chemical and physical properties of lignocellulose that limit intake and digestion. In: Microbial and Plant Opportunities to Improve Lignocellulose Utilization by Ruminants. (Akin DE, Ljungdahl LG, Wilson JR, Harris PJ. eds.) 17-22. Elsevier Science. New York. 1990.

Ndlovu LR, Buchanan-Smith JG. Utilization of poor quality roughages by sheep: effects of alfalfa supplementation on ruminal parameters, fiber digestion and rate of passage from the rumen. *Canadian Journal of Animal Science*, 65: 693-703. 1985.

中嶋芳也・中山一三・熊谷弘明・竹内陶二郎・西田清・大矢浩司・奥村誠. 反芻家畜における粗飼料の乾物摂取量と消化ダイナミクスの関係 -乾物摂取量におよぼすルーメン内分解性および通過速度の影響-. 日本畜産学会東北支部会報, 44: 148. 1994.

名久井忠・阿部亮・岩崎薫・早川政市. トウモロコシサイレージの子実が牛糞中に排泄される割合. 日本草地学会誌, 23: 84-85. 1977.

名久井忠・阿部亮・岩崎薫・早川政市. トウモロコシホールクロップサイレージ給与における乳牛と羊の消化率の比較. 日本草地学会誌, 28: 111-116. 1982.

名久井 忠.北日本におけるトウモロコシホールクロップサイレージの効率的調

製・貯蔵のモデルと栄養価並びに養分収量推定法の開発に関する研究. 北海道農業試験場研究報告, 162:25-121. 1995.

Nocek JK, Kohn RA. In situ particle size reduction of alfalfa and timothy hay as influenced by form and particle size. *Journal of Dairy Science*, 71: 932-945. 1988.

小原嘉昭. 窒素化合物. 新乳牛の科学 (津田恒之監修). 第1版. 132-143. 農文協, 東京. 1987.

岡本全弘. 乾草の粉砕や細切がめん羊の反芻行動に及ぼす影響. 北海道立新得畜産試験場研究報告, 10: 37-40. 1979.

岡本全弘・出岡謙太郎・板東健. とうもろこしサイレージの切断長が乳牛の反芻行動に及ぼす影響. 北海道立新得畜産試験場研究報告, 10: 33-36. 1979.

Okamoto M, Miyazaki R, Oura R, Sekine J. Particle pool size and turnover rate of ingesta in the reticulo-rumen of normal and absesses sheep. *Asian-Australasian Journal of Animal Science*, 3: 243-246. 1990.

岡本全弘. 反芻家畜における粗飼料の物理的消化に関する研究. 日本畜産学会報. 62: 717-725. 1991.

小野寺良次. タンパク質. ルーメンの世界 －微生物生態と代謝機能－ (神立誠, 須藤恒二監修). 第1版. 278-353. 農山漁村文化出版. 東京. 1985.

Oshio S. Particle size reduction and passage rate of digesta through the gastro-intestinal tract of cattle fed orchardgrass hay. *Bulletin of National Grassland Research Institute*, 46: 27-38. 1992.

大下友子・柾木茂彦・久馬 忠・近藤恒夫・名久井 忠. スィートソルガム搾汁残渣サイレージの飼料特性および化学的・生物的処理による飼料価値の改善. 東北農業試験場研究報告, 84: 173-185. 1992.

大下友子・久馬 忠・近藤恒夫. 乾草給与めん羊の消化管通過速度測定における希土類元素の標識方法の比較. 日本畜産学会報, 66: 875-881. 1995.

大下友子・久馬 忠・近藤恒夫. 希土類元素を標識した乾草およびその中性デタージェント繊維の去勢ヒツジ消化管通過速度. 日本畜産学会報, 68: 169-176. 1997a.

大下友子・久馬 忠・近藤恒夫. 刈り取り時期が異なるチモシー乾草のめん羊における採食・反芻時間と消化管通過速度. 日本草地学会誌, 43: 288-292. 1997b.

大下友子・久馬 忠・近藤恒夫. 大豆粕の添加がチモシー乾草摂取めん羊における消化率, 採食・反芻時間および消化管通過速度に及ぼす影響. 日本草地学会誌, 43: 293-297. 1997c.

大下友子・久馬 忠・近藤恒夫. トウモロコシおよびソルガムサイレージの切

断長の違いがめん羊の採食反芻時間と消化管通過速度に及ぼす影響. 東北農試研報, 92: 105-112. 1997d.

大下友子・久馬 忠・近藤恒夫. 物理的形態が異なるアルファルファ乾草を摂取したヒツジの採食反芻時間および反芻胃通過速度. 第92回日本畜産学会大会講演要旨, 57. 1997e.

大下友子・久馬 忠・近藤恒夫. 飼料のヒツジ消化管通過速度の測定における固相マーカーとしての酸化クロムと希土類元素の比較. 東北畜産学会報, 48: 1-6. 1998.

Pearce GR, Moir RJ. Changes in particle size in the reticulorumen of sheep. *Australian Journal of Agricultural Research*, 18: 119-125. 1967.

Pond KR, Ellis WC, Matis JH, Ferrerio HM, Sutton JD. Compartment models for estimating attributes of digesta flow in cattle. *British Journal of Nutrition*, 60: 571-595. 1988.

Pond KR, Ellis WC, Matis JH, Deswysen AG. Passage of chromium -mordanted and rare earth-labeled fiber: Time of dosing kinetics. *Journal of Animal Science*, 67: 1020-1028. 1989.

Poore MH, Moore JA, Swingle RS. Differential passage rates and digestion of neutral detergent fiber from grain and forages in 30, 60 and 90% concentrate diets fed to steers. *Journal of Animal Science*, 68: 2965-2973.

1990.

Poppi DP, Norton BW, Minson DJ, Hendricksen RE. The validity of the critical theory for particles leaving the rumen. *Journal of Agricultural Science*, 94: 275-280. 1980.

Robinson PH, Sniffen CJ, Van Soest PJ. Influence of level of feed intake on digestion and bacterial yield in the forestomachs of dairy cattle. *Canadian Journal of Animal Science*, 65: 437-444. 1985.

Rode LM, Satter LD. Effect of amount and length of alfalfa hay in diets containing barley or corn on site of digestion and rumen microbial protein synthesis in dairy cow. *Canadian Journal of Animal Science*, 69: 445-454. 1988.

桜井直樹・山本良一・加藤陽治. 糖類の基礎. 植物細胞壁と多糖類. 第1版. 73-127. 培風館. 東京. 1991.

SAS/STAT™ ユーザーズガイド. Release 6.03 Edition. 569-666. SAS 出版局. 東京. 1990.

佐藤明子. 寒冷地における安定多収ソルガムの高品質調製技術. 岩手県畜産試験場研究報告, 19: 8-28. 1991.

Shaver RD, Nytes AJ, Satter LD, Jorgensen NA. Influence of amount of feed

intake and forage physical form on digestion and passage of prebloom alfalfa hay in dairy cows. *Journal of Dairy Science*, 69: 1545-1559. 1986.

Shaver RD, Satter LD, Jorgensen NA. Impact of forage fiber content on digestion and digesta passage in lactating dairy cows. *Journal of Dairy Science*, 71: 1556-1565. 1988.

柴田章夫. 産乳飼料の利用. 新乳牛の科学 (津田恒之監修). 第1版. 275-288. 農文協. 東京. 1994.

Smith LW. A review of the use of intrinsically ^{14}C and rare earth- labeled neutral detergent fiber to estimate particle digestion and passage. *Journal of Animal Science*, 67: 2123-2128. 1989.

Sollenberger LE, Cherney DJR. Evaluating forage production and quality. In: Forage. 5th ed. vol. 2. The Science of Grassland Agriculture. (Barnes RF, Miller DA, Nelson CJ. eds.) 97-110. Iowa State University Press. Iowa. 1995.

Spain JN. 乳牛での重要な100日間. 畜産の研究, 54: 273-279. 2000.

Sudweeks EM, Ely LO, Mertens DR, Sick LR. Assessing minimum amounts and form of roughages in ruminant diets: Roughage value index system. *Journal of Animal Science*, 53: 1406-1411. 1981.

Sutherland TM. Particle separation in the forestomachs of sheep. In: Aspects of Digestive Physiology in Ruminants. (Dobson A, Dobson MJ. eds.) 43-73. Cornell University Press. New York. 1988.

滝川明宏. 消化試験法. 動物栄養試験法 (森本宏編). 第1版. 208-211. 養賢堂. 東京. 1971.

Teeter RG, Owens FN, Mader TL. Ytterbium chloride as a marker for particulate matter in the rumen. *Journal of Animal Science*, 58: 465-473. 1984.

Turnbull GW, Thomas EE. Evaluation of rare-earth markers using an in vitro ruminal fermentation system and effect of processing method on ruminal turnover of sized corn particles. *Journal of Animal Science*, 64: 1835-1841. 1987.

Tyrrell HF, Moe PW. Effect of intake on digestive efficiency. *Journal of Dairy Science*, 58: 1151-1163. 1974.

宇田川武俊. システム・ダイナミックス. 応用統計ハンドブック (奥野忠一編). 第5版. 養賢堂. 東京. 1986.

Udén P, Colucci PE, Van Soest PJ. Investigation of chromium, cerium and cobalt as markers in digesta. Rate of passage studies. *Journal of Science of Food and Agriculture*, 31: 625-632. 1980.

上田宏一郎・一戸俊義・田村忠・大久保正彦・朝日田康司. 刈り取り時期の異なるオーチャードグラス乾草およびアルファルファ乾草を給与したヒツジにおける反芻胃内容物粒度別飼料片の繊維成分含量. 日本畜産学会報, 66: 949-956. 1995.

上田宏一郎. 乾草の自由摂取量と反芻胃内飼料片の粒度別動態との関連. 北海道大学農学部邦文紀要, 20: 1-57. 1997.

Ueda K, Ichinohe T, Tamura T, Okubo M and Asahida Y. Efficiency of chewing for breakdown of large particles during eating and ruminating in sheep fed hay. *Animal Science and Technology*, 68: 917-925. 1997.

Ulyatt MJ, Dellow DW, John A, Reid CSW, Whaghorn GC. Contribution of chewing, during eating and rumination, to the clearance of digesta from the ruminoreticulum. In: Control of Digestion and Metabolism in Ruminants. (Milligan LP, Grovum WL, Dobson A. eds.) 498-515. Englewood Cliffs. New Jersey. 1986.

Van Soest PJ. Carbohydrates. In: Nutritional Ecology of Ruminants. 95-117. Cornell University Press. New York. 1982.

Van Soest PJ. Nutritional concepts. In: Nutritional Ecology of Ruminants. 2nd ed. 7-21. Cornell University Press. New York. 1994a.

Van Soest PJ. Intake. In: Nutritional ecology of Ruminants. 2nd ed. 335-353. Cornell University Press. New York. 1994b.

Van Soest PJ. Mathematical applications. In: Nutritional ecology of ruminants. 2nd ed. 354-370. Cornell University Press. New York. 1994c.

Van Soest PJ. Digestive flow. In: Nutritional Ecology of Ruminants. 2nd ed. 371-384. Cornell University Press. New York. 1994d.

Weigand E, Meyer U, Guth N. Intake, chewing activity and carbohydrate digestibility by lactating dairy cows fed maize silage with a different physical structure. *Journal of Animal Physiology and Nutrition*, 69: 120-132. 1993.

Welch JG, Smith AM. Influence of forage quality on rumination time in sheep. *Journal of Animal Science*, 58: 813-818. 1969.

Welch JG. Physical parameters of fiber affecting passage from the rumen. *Journal of Dairy Science*, 69: 2750-2754. 1986.

Wilson JR. Influence of plant anatomy on digestion and fibre breakdown. In: Microbial and plant opportunities to improve lignocellulose utilization by ruminants. (Akin DE, Ljungdahl LG, Wilson JR, Harris PJ. eds.) 99-117. Elsevier Science. New York. 1990.

Wilson JR, Mertens DR. Cell wall accessibility and cell structure limitations to microbial digestion of forage. *Crop Science*, 35: 251-259. 1995.

Young MC, Theurer B, Ogden PR, Nelson GW, Hale WH. Dysprosium as an indicator in cattle digestion trials. *Journal of Animal Science*, 43: 1270-1279. 1976.