REFERENCES

Almas, K. and A. E. Bender. 1980. Effect of heat treatment of legumes on available lysine. *J. Sci. Food Agric.* 31: 448-452.

Almas, K. and A. E. Bender. 1980. Effect of heat treatment of legumes on available lysine. *J. Sci. Food Agric.* 31: 448-452.

An, H., T. A. Seymour,J. W. Wu and M. T. Morrissey. 1994 Assay systems and characterization of Pacific whiting (*Merluccius* productus) protease. *J. Food Sci*. 59:277-281.

Anderson, R.L. and W. R. Wolf. 1995. Compositional changes in trypsin inhibitors, phytic acid, saponins and isoflavones related to soybean processing. *J. Nutr*. 125: 581S- 588S.

AOAC, 1995. Official Methods of Analysis of AOAC International. 16th edition, Arlington, Virginia, USA, AOAC International.

Bailey, M. J., Biely, P., and K. Poutanen. 1992. Interlaboratory testing of methods for assay of xylanase activity. *J. Biotechnol*. 23: 257-270.

Banerjee, U. C., R. K. Sani, W. Azmi and R. Soni. 1999. Thermostable alkaline protease from *Bacillus brevis* and its characterization as a laundry detergent additive. *Process Biochem*. 35: 213-219.

Barett, A. J. 1994. Proteolytic enzymes: serine and cysteine peptidases. *Methods Microbiol*. 244: 1-15.

Barett, A. J. 1995. Proteolytic enzymes: aspartic and metallopeptidases. *Methods Enzymol*. 248: 183.

Beal, J. D., P. H. Brooks and H. Schulze. 1998a. The effect of pre-treatment with different proteases on the *in vitro* digestibility of nitrogen in raw soyabean and four differently processed full fat soyabean meals. *In*: van Arendonk, J. A. M. (ed.). *Book of Abstracts of the 49th Meeting of the European Association of Animal Production, Warsaw, Poland.* Wangeningen Pers, Wangeningen, The Netherlands. PN 2.7 (Abstract) p. 264.

Beal, J. D., P. H. Brooks and H. Schulze. 1998b. The effect of the addition of a protease enzyme to raw or autoclaveed soya bean in the growth performance of liquid fed grower/fisher pigs. *British Society of Animal Science Winter Meeting*, Scarborough, UK, p. 161.

Beal, J. D., P. H. Brooks, and H. Schulze. 1998c. The hydrolysation of protein in raw and autoclaved soybean meals by a microbial protease. *British Society of Animal Science Winter Meeting*. Scarborough, UK, p. 167.

Beshay, U. 2003. Production of alkaline protease by Teredinobacter turnirae cells immobilized in Ca-alginate beads. African Journal of Biotechnology. 2: 60-65. Available online at http://www.academicjournals.org/AJB ISSN 1684–5315

Birk, Y. 1989. Protein protease inhibitors of plant origin and their significance in nutrition. In: Huisman J., van der Poel A.F.B. and Liener I. E. (eds.). Recent advances of Research in Antinytritional Factors in Legume Seeds. *Proceeding of the First International Workshop on 'Antinutritional Factors (ANFs) in Legume Seeds*'. Pudoc, Wageningen, The Netherlands, pp. 83-94.

Boguslawski, G., J. L. Shultz, and C. O. Yehle. 1983. Purification and characterization of an extracellular protease from *Flavobacterium arborescens*. *Anal. Biochem*. 132: 41-49.

Boisen, S. 1993. A model for feed evaluation based on *In Vitro* digestible dry matter and protein. In : *In Vitro* Digestion for Pigs and Poultry. M. F. Fuller (ed.) C.A.B. International, Wallingford Oxon, OX108DE, UK. p. 135-145.

Brenes, A., R. R. Marquardt, W. Guenter, W. and B. A. Rotter. 1993a. Effect of enzyme supplementation on the nutritional value of raw, autoclaved, and dehulled lupins (*Lupinus albus*) in chicken diets. *Poultry Sci.* 72: 2281-2293.

Brenes, A., Rotter, B.A, Marquardt, R.R. and Guenter, W. 1993b. The nutritional value of raw, autoclaved and dehulled peas (*Pisum sativum* L.) in chicken diets as affected by enzyme supplementation. *Can. J. Anim. Sc*i. 73: 605-614.

Brücker R. S., O. Shoseyov, and R. H. Doi. 1990. Multiple active forms of a novel serine protease from *Bacillus subtilis*. *Mol. Gen. Genet*. 221: 486-490.

Caine, W. R., M. W. A. Verstegen, W. C. Sauer, S. Tamminga and H. Schulze. 1998 Effect of protease treatment of soybean meal on content of total soluble matter and crude protein and level of soybean trypsin inhibitors. *Anim. Feed Sci. Technol*. 71:177-183.

Chakraborty, R, M. Srinivasan. 1993. Production of a thermostable alkaline protease by a new *Pseudomonas* sp. by solid substrate fermentation. *J. Microb. Biotechnol.* 8: 7-16.

Chaloupka J. 1985. Temperature as a factor regulating the synthesis of microbial enzymes. *Microbiol. Sci*. 2: 86-90.

Chu, I. M., C. Lee and T. S. Li. 1992. Production and degradation of alkaline protease in batch cultures of *Bacillus subtilis* ATCC 14416. *Enzyme. Microb. Technol*. 14: 755-761.

Claus, D. and R. C. W. Berkeley. 1986. Genus *Bacillus* Cohn 1872, pp. 1105-1139. In: Sneath, P. H. A., F. G. Priest, M. Goodfellow and G. Todd, (eds.), *Bergey's Manual of Systematic Bacteriology*, Vol. 2. Williams and WilkinsCo., Baltimore, MD.

Debabov, V.G. 1982. The industrial use of Bacilli. In: Dubnau D. A., (ed.), The Molecular Biology of the Bacilli, Academic Press, Inc. pp.331-370.

Dhurandhar, N.H. and K. C. Chang. 1990. Effect of cooking on firmness, trypsin inhibitors, lectins and cysteine/cystine content of navy bean and red kidney beans. *J. Food Sci.* 55: 470-474.

Douglas, M. W., C. M. Parsons, and T. Hymowitz, 1999. Nutritional evaluation of lectin-free soybeans for poultry. *Poultry Sci*. 78:91-95.

Draéu, D. and J. P. Lalles. 1999. Contribution to the study of gut hypersensitivity reactions to soybean proteins in preruminant calves and early-weaned piglets. *Livest. Prod. Sci*. 60: 209-218.

Dunsford, B. R., D. A. Knabe, and W. E. Haensly. 1989. Effect of dietary soybean meal on the microscopic anatomy of the small intestine in the early weaned pig. *J. Anim. Sci*. 67: 1855.

Engelen, A.J. (1994). Simple and rapid determination of phytase activity. *Journal of AOAC. International*. 77: 760-764.

Fitzgerald, P. M. D., B. M. McKeever, J. F. Van Middlesworth, J. P. Springer, J. C. Heimbach, C. T. Leu, W. K. Herber, R. A. F. Dixon, and P. L. Darke. 1990. Crystallographic analysis of a complex between human immunodeficiency virus type 1 protease and acetyl-pepstatin at 2.0A resolution. *J. Biol. Chem*. 265: 14209-14219.

Frankena, J., G. M. Koningstein, H. W. van Verseveld and A. H. Stouthamer. 1986. Effect of different limitations in chemostat cultures on growth and production of exocellular protease by *Bacillus licheniformis. Appl*. *Microbiol*. *Biotechnol*. 24: 106-112.

Fujiwara N and K. Yamamoto. 1987. Production of alkaline protease in a low cost medium by alkalophilic *Bacillus* sp. and properties of the enzyme. *J*. *Ferment*. *Technol*. 65 :345-348.

George, S, V. Raju, M. R. V. Krishnan, T. V. Subramanian and K. Jayaraman. 1995. Production of protease by *Bacillus amyloliquefaciens* in solid-state fermentation and its application in the unhairing of hides and skins. *Process Biochem.* 30: 457-462.

Godfrey, T., and S. West. 1996. Industrial enzymology, 2nd ed., p. 3. Macmillan Publishers Inc., New York.

Goldberg, I., B. Sneh, E. Battat and D. Klein. 1980. Optimization of a medium for a high yield production of spore-crystal preparation of *Bacillus thuringiensis* effective against the egyptian cotton leaf worm *Spodoptora littoralis* boisd. *Biotechnol*. *Lett*. 2: 419-426.

Govers, M. J. A. P., J. A. Lapre, H. T. de Vries and R. van der Meer. 1993. Dietary soybean protein compared with casein damages colonic epithelial proliferation in rats. *J*. *Nutr*. 123: 1709-1713.

Han, Y., C. M. Parsons, and T. Hymowitz, 1991. Nutritional evaluation of soybeans varying in trypsin inhibitor content. *Poultry Sci*. 70: 896-906.

Haq, I. U., H. Mukhtar, S. Daudi, S. Ali and M. A. Qadeer. 2003. Production of Proteases by a locally isolated mould culture under lab conditions. Biotechnology. 2: 30-36.

Hartley, B. S. 1960. Proteolytic enzymes. *Annu. Rev. Biochem*. 29: 45-72.

Helsper, J.P.F.G., Y. P. J van Loon, R. P. Kwakkel, A. van Norel and A. F. B. van der Poel. 1996. Growth of broiler chicks fed diets containing tannin-free and tannin-containing near-isogenic lines of faba bean (*Vicia faba* L.). *J. Agric. Food Chem*. 44: 1070-1075.

Henning, S. J. 1981. Postnatal development: Coordination of feeding, digestion, and metabolism. *Am. J. Physiol*. 241: G199-G124.

Hettiarachchy, N. S. and U. Kalapathy. 1998. Functional properties of soy proteins. In: Whitaker, J. P. (ed.). *Functional Properties of Proteins and Lipids*. ACS Symp. Ser. No. 708. Amer. Chem. Soc., Washington, D.C.: 80–87.

Hibbs, M. S., K. A. Hasty, J. M. Seyer, A. H. Kang, and C. L. Mainardi. 1985. Biochemical and immunological characterization of the secreted forms of human neutrophil gelatinase. *J. Biol. Chem*. 260: 2493-2500.

Higuchi, M., I. Tsuchiya and K. Iwai. 1984. Growth inhibition and small intestinal lesions in rats after feeding with isolated winged bean lectin. *Agric. Biol. Chem*. 48: 695-701.

Huisman, J. and A. F. P. van der Poel, A.F.B. 1989. Comparison of effects of antinutritional factors (ANF) in different animal species. In: Huisman, J., T.F.B., van der Poel and I.E. Liener (eds.). *Recent Advances of Research in Antinutritional Factors in Legume Seeds,* pp. 317-327. Pudoc, Wageningen, the Netherlands.

Huisman, J. and G. H. Tolman. 1992. Antinutritional factors in the plant protein of diets for non-ruminants. In: Gransworthy, P. C., Haresign W. and Cole D. J. A. (eds.). *Recent Advances in Animal Nutrition*. Butterworth-Heinemann, Oxpord, pp. 3-32.

Huo, G.C., V. R. Fowler, J. Inborr and M. Bedford. 1993. The use of enzymes to denature antinutritive factors in soyabean. In: van der Poel A. F. B., J. Huisman and H. Saini (eds.). *Recent Advances of Research in Antinutritional Factors in Grain Legume Seeds,* pp. 517-521. EAAP Publication No. 70 Wageningen Press, The Netherlands.

Ichihara, M., Mutia, R., Uchida, S., Djajanegara, A. and Sukmawati, A. 1994. Nutritional value of autoclaved wing bean (*Psophocarpus tetragonolobus*) for rats. *Proceeding of the 7th AAAP Animal Science Congress, Bali, Indonesia.* 3: 179-180.

Igbasan, F.A. and Guenter, W. 1996. The enhancement of nutritive value of peas for broiler chickens: An evaluation of micronization and dehulling processes. *Poultry Sci*. 75: 1243-1252.

International Union of Biochemistry. 1992. Enzyme nomenclature. Academic Press, Inc., Orlando.

Janssen, P. H., K. Peek, H. W. Morgan. 1994. Effect of culture conditions on the production of a extracellular proteinase by *Thermus* sp. Rt41A. *Appl*. *Microbiol*. *Biotechnol*. 41: 400-406.

Joo, H. S., C. G. Kumar, G. C. Park, K. T. Kim, S. R. Paik and C. S. Chang. 2002. Optimization of the production of an extracellular alkaline protease from *Bacillus horikoshii*. *Process Biochem*. 38: 155-159.

Kakade, M. L. and R. J. Evans. 1965. Nutritive value of navy bean (*Phaseolus vulgaris*). *Br*. *J*. *Nutr*. 19: 269-276.

Kanekar,P. P., S. S. Nilegaonkar, S. S. Sarnaik, A .S. Kelkar. 2002. Optimization of protease activity of alkaliphilic bacteria isolated from an alkaline lake in India. *Bioresour. Technol*. 85: 87-93.

Kawamura, F. and R. H. Doi. 1984. Construction of a *Bacillus subtilis* double mutant deficient in extracellular alkaline and neutral proteases. *J. Bacteriol.* 160: 442-444.

Kerovuo, J., M. Lauraeus, P. Nurminen, N. Kalkkinen and J. Apajalahti. 1998. Isolation characterization, molecular gene cloning, and sequencing of a novel phytase from *Bacillus subtilis*. *Appl. Environ. Microbiol*. 64: 2079-2085

Kornegay, E. T. 2000. Digestion of phosphorus and other nutrients the role of phytases and factors influencing their activity. In: Bedford, M. R. and G. G. Partridge, (eds.), *Enzyme in farm animal nutrition*. CABI publishing. CABI International, Wallingford, UK.

Krogdahl, A. and H. Holm. 1983. Pancreatic proteinases from man, trout rat, pig, cow, chicken, mink and fox. Enzyme activities and inhibition by soybean and lima bean proteinase inhibitors. *Comp. Biochem. Physiol*. 74B: 403-409.

Krogdhal, A., T. B. Lee. and J. J. Olli. 1994. Soybean protease inhibitors affect intestinal trypsin activities and amino acids digestibilities in rainbow trout (Oncorhyncus mykiss). *Comp. Biochem. Physiol*. 107A: 215-219.

Leterme, P., Monmart, T. and Thewis, A. 1992. Varietal distribution of the trypsin inhibitor activity in peas (*Visum sativum* L.). *Anim. Feed Sci. Technol.* 37: 309-315.

Li, D. F., J. L. Nelssen, P. G. Reddy, F. Blecha, R. D. Klemm, D. W. Giesting, J. D. Hancock, G. L. Allee and R. D. Goodband. 1991. Measuring suitability of soybean products for early-weaned pigs with immunological criteria. *J. Anim. Sci*. 69: 3299.

Liener, I. E. 1953. Soyin, a toxic protein from the soybean. I. Inhibition of rat growth. *J. Nutr*. 49: 529-539.

Liener, I. E. 1986. Nutritional significance of lectins in the diet. Pages 527–547 In: Liener, I. E., N. Sharon and I. J. Goldstein, (eds.). *The Lectins: Properties, Functions and Applications in Biology and Medicine*. Academic Press, Orlando, FL.

Liener, I. E. 1994. Implication of antinutritional components in soybean foods. *Crit. Rev. Food. Sci. Nutr.* 34: 31-67.

Liener, I.E., 1989. Antinutritional factors in legume seeds: state of the art. In: Huisman, J., T.F.B. van der Poel and I. E. Liener (eds.). *Recent advances of research in antinutritional factors in legume seeds*., Pudoc, Wageningen, pp 6-14

Lin, L. L., C. C. Chyau and W. H. Hsuã. 1998. Production and properties of a raw-starch-degrading amylase from the thermophilic and alkaliphilic *Bacillus* sp. TS-23. *Biotechnol. Appl. Biochem*. 28: 61–68.

Lindberg, R. A., L. D. Eirich, J. S. Price, L. Wolfinbarger, Jr., and H. Drucker. 1981. Alkaline protease from *Neurospora crassa*. *J. Biol. Chem*. 256: 811-814.

Lorenzsonn, V. and W. A. Olsen, 1982. *In vivo* responses of rat intestinal epithelium to intraluminal dietary lectins. *Gastroenterology*. 82: 838-848. (Abstract)

Lowry, O. H., N. J. Rosebrough, A. L. F. and R. J. Randall. 1951. Protein measurement with the Folin-Phenol reagents. *J. Biol. Chem.* 193: 265-275.

Malathi, S, and R. Chakraborty. 1991. Production of alkaline protease by a new *Aspergillus flavus* isolate under solid substrate fermentation conditions for use as a depilation agent. *Appl. Environ. Microbiol.* 57: 712-716.

Mandels, M., R. Andreotti and C. Roche. 1976. Measurements of saccharifying cellulase. *Biotechnol. Bioeng. Symp.* 6: 21-33.

Marquardt, R.R., J. A. McKirdy, A. T. Ward and L. D. Campbell. 1975. Amino acids, hemagglutinin levels and proximate analysis of faba beans (*Vicia faba*) and fababean fraction. *Can. J. Anim. Sci.* 55: 421-429.

Marsman, G. J. P., H. Gruppen, A. J. Mul and A. G. Voragen. 1997. *In vitro* accessibility of untreated, toasted and extruded soybean meals for proteases and carbohydrases. *J. Agric. Food Chem.* 45: 4088-4095.

Mathew, A., M. Pestova and R. Clift. 1997. Weaning changes intestinal coating. National Hog Farmer. (Online). Available: http://nationalhogfarmer.com /ar/ farming_ swine_research_review/index.htm [March 2, 2003].

Matsubara, H. and J. Feder. 1970. The enzyme. Academic Press. New York.

Mehrotra, S., P. K. Pandey, R. Gaur, N. S. Darmwal. 1999. The production of alkaline protease by a *Bacillus* species isolate. *Bioresour. Technol.* 67: 201-203.

Metebe, K. 1989. The effect of dry and moist heat on some chemical properties of winged bean seed. *Tropical Grain Legume Bull.* 36: 32-33.

Metebe, K. 1989. The effect of dry and moist heat on some chemical properties of winged bean seed. *Tropical Grain Legume Bull.* 36: 32-33.

Milner, J. A., D. J. Martin and A. Smith. 1996. Oxygen transfer conditions in the production of alpha-amylase by *B amyloliquefaciens*. *Enzyme. Microb. Technol.* 18: 507-512.

Mizuno, K., and H. Matsuo. 1984. A novel protease from yeast with specificity towards paired basic residues. *Nature.* 309:558–560.

Moon, S. H. and S. J. Parulekar. 1991. A parametric study of protease production in batch and fed-batch cultures of *Bacillus firmus*. *Biotechnol. Bioeng.* 37: 467-83.

Moon, S. H. and S. J. Parulekar. 1993. Some observations on protease production in continuous suspension cultures of *Bacillus firmus*. *Biotechnol. Bioeng.* 41: 43-54.

Murphy, T. and C. Tisdell. 1995. Trends in the Thai livestock industry, animal health implications and Thailand' s development: an introduction. Research Reports and Papers in Animal Health Economics No. 8. Department of Economics, University of Queensland Brisbane, Australia.

Myer, R.O. and J. A. Froseth. 1983. Heat processed small red beans (*Phaseolus vulgaris*) in diets for young pigs. *J. Anim. Sci*. 56: 1089-1096.

Nehete, P. N., V. D. Shah, R. M. Kothari. 1986. Isolation of a high yielding alkaline protease variant of *Bacillus licheniformis*. *Enzyme. Microb. Technol*. 8: 370-372.

Norris, J. R., R. C. W. Berkeley, N. A. Logan and A. G. O' Donnell. 1981. The genera *Bacillus* and Sporolactobacillus, pp. 1711-1742. In: M. P. Starr, H. Stolp, H. G. Turper, A. Balows and H. G. Schlegel (eds.), *The Prokaryotes: A Handbook on Habitats, Isolation, and Identification of Bacteria*, Vol. 2. Springer-Verlag, Berlin.

Okada, J., H. Shimogaki, K. Murata, H. Kimura, and K. Oba. January 1986. Genetically engineered *Bacillus subtilis* for extracellular protease manufacture. *Japanese patent 61,12,287*.

Oliveira, A. C., and V. C. Sgarbierri, 1986. Effect of diets containing dry beans (*Phaseolus vulgaris* L.) on the rat excretion of endogenous nitrogen. *J. Nutr*. 116: 2387–2392.

Oliveira, A. C., B. C. Vidal, and V. C. Sgarbieri, 1989. Lesions of intestinal epithelium by ingestion of bean lectins in rats. *J. Nutr. Sci. Vitaminol*. 35: 315-322.

Ozaki, K., S. Shikata, SKawai, S. Ito and K. Okamoto. 1990. Molecular cloning and nucleotide sequence of a gene for alkaline cellulase from Bacillus sp. KSM-635. J. Gen. Microbiol. 136, 1327-1334.

Parsons, C. M. and Y. Zhang, 1997. Digestibility of amino acids in high-lysine soybean meal. *Poultry Sci*. 76(Suppl. 1):85. (Abstract).

Partridge, G. G. 2000. The role and efficacy of carbohydrase enzymes in pig nutrition. In: Bedford, M. R. and G. G. Partridge, (eds.), *Enzyme in farm animal nutrition*. CABI publishing. CABI International, Wallingford, UK.

Pearl, L. H., and W. R. Taylor. 1987. A structural model for the retroviral proteases. *Nature.* 329:351–354.

PIC USA. 19999. Nursery phase, Nutrition and diet management concepts. Technical Update, *Nutrition*. (On line). Available: http://www.pig.co.uk/usa/resources /tech_updates/NUT_3_1.pdf.

Plumb J. A., R. Milroy, S. B. Kaye. 1989. Effects of the pH dependence of 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide-formazan absorption on chemosensitivity determined by a novel tetrazolium based assay. *Canc. Res*. 49: 4435-4440.

Pollution Control Department. (no date). Effluent Standard for Pig Farm. Effluent Standards. Information and Services, Water Quality Standards. Ministry of Natural Resources and Environment. (Online). Available: http://www .pcd.go.th. [March 2, 2003].

Priest, F. G. 1977. Extracellular enzyme synthesis in the genus Bacillus. *Bacteriol. Rev*. 41: 711-753.

Priest, F. G. 1993. Systematics and ecology of Bacillus. In: Hoch, J. A. and R. Losick, (eds.), *Bacillus subtilis and other gram-positive bacteria : biochemistry , physiology, and molecular genetics*, American Society for Microbiology, Washington, D.C. pp. 3-16.

Provincial Livestock office. (no date). Basic livestock data 2002. Collected By: Data Processing and Statistics Branch, Planning Division, Department of Livestock Development, Ministry of Agriculture and Cooperatives. (On line). Available: http://www.dld.go.th/yearly/yearly45/yearly45.html. [March 2, 2003].

Pusztai, A., 1991. Plant Lectins. Cambridge University Press, Cambridge, UK.

Pusztai, A., E. M. W. Clarke, T. P. King, and J. C. Stewart, 1979. Nutritional evaluation of kidney beans (*Phaseolus vulgaris*): chemical composition, lectin content and nutritional value of selected cultivars. *J. Sci. Food Agric*. 30:843-848.

Pusztai, A., S. W. B. Ewen, G. Grant, W. J. Peumans, E. J. M. van Damme, L. Rubio, and S. Bardocz, 1990. Relationship between survival and binding of plant lectins during small intestinal passage and their effectiveness as growth factors. *Digestion*. 46: 308–316.

Qin, G., E. R., M. W. ter Elst., A. F. B. Bosch and van der Poel. 1996. Thermal processing of whole soya bean: Studies in the inactivation of antinutritional factors and effects on ileal digestibility in piglets. *Anim. Feed Sci. Technol*. 57: 313-324.

Raimbault, M. 1998. General and microbiological aspects of solid substrate fermentation. *Process Biotechnol,* Electronic Journal of Biotechnology http://www.ejb.org/content/vol1/issue3/full/9/index.html

Raja Noor, Z. A. R., C. N. Razak, K. Ampon, B. Mahiran, M. Z. W. Y. Wan, B. S. Abu. 1994. Purification and characterization of a heat-stable alkaline protease from *Bacillus stearothermophilus* F1. *Appl. Microbiol. Biotechnol.* 40: 822-827.

Rao, M. B., A. M. Tanksale, M. S. Ghatge and V. V. Deshpande. 1998. Molecular and biotechnological aspects of microbial proteases. *Microbiol. Mol. Bio. Review*. 62: 597-635.

Rexen, B. 1981. Use of enzymes for improvement of feed. *Anim. Feed Sci. Technol.* 6: 105-114.

Rick, W. and H. P. Stegbauer. 1974. α-amylase measurement of reducing groups. In H. V. Bergmeyer (ed.), Methods of enzymatic analysis, 2nd ed., vol. 2, Academic Press, New York.

Rodriguez, J.P. and H. S. Bayley. 1987. Steam heated culled beans: nutritional value and digestibility for swine. *Can. J. Anim. Sci.* 76: 803-810.

Rooke, J. A., H. Fraser, M. Shanks, and A. Morgan. 1996. The potential for improving soya-bean meal in dites for weaned piglets by protease treatment: comparision with other protein source. *British Society of Animal Science Winter Meeting*. Scarborough, UK, p. 136.

Russett, J.C. 1997a. Extruded soy concentrate for weanling pigs. Chemurgy Report from Research, SPC-S-31 (Online). Available: http://www.centralsoya.com/web/nutrition.nsf/ea4a21b9388c4ffb05256c56005b4ede/34849c54e5ced7170525 68b10059762f?OpenDocument [March 2, 2003].

Russett, J.C. 1997b. Soy concentrate for weanling pigs. Chemurgy Report from Research, SPC-S-34 (Online). Available: http://www.central soya.com/web/nutrition.nsf/ea4a21b9388c4ffb05256c56005b4ede/f194b5ec4b92879e052568b10 05b0a99? OpenDocument [March 2, 2003].

Russett, J.C. 1998. Soy Protein Concentrate for Animal Feeds. Chemurgy Report from Research, SPC-S-34 (Online). Available: http://www.centralsoya.com/web/nutrition.nsf/0/708B0E39F543836F052568B100649580 [March 2, 2003].

Samal, B. B., B. Karan and Y. Stabinsky. 1990. Stability of two novel serine proteinases in commercial laundry detergent formulations. *Biotechnol. Bioeng.* 35: 650–652

Schulze, H., H. S. Saini, J. Huisman, M. Hessing, W. van den Berg, and M. W. A. Verstegen. 1995. Increased nitrogen secretion by inclusion of soya lectin in the diets of pigs. *J. Sci. Food Agric*. 69: 501-510.

Sextone P. J., N. C. Paek, R. M. Shibles. 1998. Effect of nitrogen source and timing of sulphur deficiency on seed yield and expression of 11S and 7S seed storage proteins of soybean. *Field Crop. Res*. 59: 1-8.

Shannon, J. D., E. N. Baramova, J. B. Bjarnason, and J. W. Fox. 1989.Amino acid sequence of a *Crotalus atrox* venom metalloprotease which cleaves type IV collagen and gelatin. *J. Biol. Chem*. 264: 11575-11583.

Shimoyada M., S. Ikedo, R. Ootsubo, K. Watanabek. 1998. Effect of soybean saponins on chymotryptic hydrolyses of soybean proteins. *J. Agric. Food Chem*. 46: 4793-4797.

Sikdar, D. P., M. K. Majundar and S. K. Majundar. 1991. Effect of minerals on the production of the δ-endotoxin by *Bacillus thuringiensis*. *Biotechnol. Lett*. 13: 511-514.

Sinha, N and T. Satyanarayana. 1991. Alkaline protease production by thermophilic *Bacillus licheniformis*. *Indian J. Microbiol*. 31: 425-432.

Somiari, R.I and Balogh, E. 1993. Effect of soaking, cooking and crude β-galactosidase treatment on the oligosaccharide content of cowpea flours. *J. Sci. Food Agric*. 61: 339-343.

Steve, D. 2000. Battling Baby Pig Scours. *National Hog Farmer*. (On line). Available: http://nationalhogfarmer.com/ar/farming_battling_baby_pig/. [March 2, 2003].

Strauch, M. A. and J. A.Hoch. 1993. Transition-state regulators: sentinels of *Bacillus subtilis* post-exponential phase gene expression. *Molecular. Microbiol*. 7: 337-342.

Suzuki, C. K., M. Rep, J. M. Van Dijl, K. Suda, L. A. Grivell, and G. Schatz. 1997. ATP-dependent proteases that also chaperone protein biogenesis. *Trends Biochem. Sci*. 22: 118-123.

Tan, N.H., K. C. Wong, B. O. and de Lumen. 1984. Relationship of tannin levels and trypsin inhibitor activity with the *in vitro* protein digestibility of raw and heattreated winged bean (*Psophocarpus tetragonolobus). J. Agric. Food Chem*. 32: 819-822.

Thomson, L.U., Rea, R.L. and Jenkins, D.J.A. 1983. Effect of heat processing on hemagglutinin activities in red kidney beans. *J. Food Sci*. 48: 235-242.

Tsuru, D., H. Kira, T. Yamamota and J. Fukumoto. 1966. Studies on bacterial protease. XVI. Purification, crystallization, and some enzymatic properties of alkaline protease of *Bacillus subtilis* var. *amylosacchariticus*. *Agric. Biol. Chem*. 30: 856-862.

Tunga, R., R. Banerjee, B. C. Bhattacharya. 1999. Some studies on optimization of extraction process for protease production in SSF. *Bioprocess Engineer*. 20: 485-489.

U.S. Environmental Protection Agency. 1993. EPA Region 6 General permit for discharges from concentrated animal feeding operations (CAFOs). U.S. Environmental Protection Agency, Water Division. (Online). Available: http:// www.epa.gov. [March 2, 2003].

Uehara, H., K. Yamane, and B. Maruo. 1979. Thermosensitive, extracellular neutral protease in *Bacillus subtilis*: isolation, characterization and genetics. *J. Bacteriol*. 139: 583-590.

Uehara, H., Y. Yoneda, K. Yamane and B. Murao. 1974. Regulation of neutral protease productivity in *Bacillus subtilis*: Transformation of high protease productivity. *J. Bacteriol.* 119: 82-91.

Uguru1, G. C., D. A. Robb1, J. A. Akinyanju and A. Sani. 1997. Purification, characterisation and mutagenic enhancement of a thermoactive -amylase from *Bacillus subtilis*. *J. Indust. Micro. Biotech*. 19: 273-279.

Valdebouze, P., E. Bergeron, T. Gaborit and Delort-Laval, J. 1980. Content and distribution of trypsin inhibitors and haemagglutinins in some legume seeds. *Can. J. Plant Sci*. 60: 695-701.

Van Barneveld, R.J., E. S. Batterham, and B. W. Norton. 1993. Nutritional implication of heating proteins: The effect of heating protein concentrates on the digestibility and metabolism of lysine in growing pigs. In: Farrell, D. J. (ed.). *Recent Advances in Animal Nutrition in Australia,* pp. 201-212. UNE, Armidale. NSW.

Van der Poel, A.F.B. 1990. Effect of processing on antinutritional factors and proteinnutritional value of dry beans (*Phaseolus vulgaris).* A Review. *Anim. Feed Sci. Technol*. 29: 179-208.

Van der Poel, A.F.B., Dellaert, L. M.W., Van Norel, A. and Helsper, J.P.F.G. 1992. The digestibility in piglets of faba bean (*Vicia faba* L.) as affected by breeding towards the absence of condensed tannins. *Br. J. Nutr*. 68: 793-800.

Watson, R. R. 1976. Substrate specificities of aminopeptidases: a specific method for microbial differentiation. *Methods Microbiol*. 9: 1-14.

Weaver, L. H., W. R. Kester, and B. W. Matthews. 1977. A crystallographic study of the complex of phosphoramidon with thermolysin. A model for the presumed catalytic transition state and for the binding of structures. *J. Mol. Biol*. 114: 119-132.

Wilhelm, S. M., I. E. Collier, A. Kronberger, A. Z. Eisen, B. L. Marmer, G. A. Grant, E. A. Bauer and G. I. Goldberg. 1987. Human skin fibroblast stromelysin: structure, glycosylation, substrate specificity and differential expression in normal and tumorigenic cells. *Proc. Natl. Acad. Sci*. 84: 6725-6729.

Woufrs, T. M. and P. J. Buysman. 1977. Production of some exocellular enzymes by *Bacillus licheniformis* 749/c in chemostat cultures. *FEMS Microbiol. Letters*. 12: 109-112.

Wu, W., W. P. Williams, M. E. Kunkel, J. C. Acton, Y. Huang, F. B. Wardlaw and L. W. Grimes. 1996a. Thermal effects on net protein ratio of red kidney beans (*Phaseolus vulgaris* L.). *J. Sci. Food Agric*. 71: 491-495.

Wu, W., W. P. Williams, M. E. Kunkel, J. C. Acton, Y. Huang, F. B. Wardlaw and L. W. Grimes. 1996b. Amino acid availability and availability-corrected amino acid score of red kidney beans (*Phaseolus vulgaris* L.). *J. Agric. Food Chem*. 44: 1296-1301.

Wybenga, D. R., J. Di Glorgio and V. J. Pileggi. 1971. Manual and automated methods for urea nitrogen measurement in whole serum. *Clin. Chem*. 17: 891-895.

Yang, J. K., I. L. Shih,Y. M. Tzeng and S. L. Wang. 2000. Production and purification of protease from a *Bacillus subtilis* that can deproteinize crustacean wastes. *Enzyme Microb. Technol*. 26: 406-413.

Yang, V. W., Z. Zhuang1, G. Elegir1 and T. W. Jeffries. 1995. Alkaline-active xylanase produced by an alkaliphilic *Bacillus* sp. isolated from kraft pulp. *J. Indust. Micro*. 15: 434-441.

Zouari, N., A. Dhouib, R. Ellouz and S. Jaoua. 1998. Nutritional requirements of a strain of *Bacillus thuringiensis* subsp. *kurstaki* and use of gruel hydrolysate, for the formulation of a new medium for δ-endotoxin production. *Appl Biochem. Biotechnol*. 69: 41-52.