應用溫度/時間控制系統在及添加菌

吳家菱、陳明造

E-mail: 363559@mail.dyu.edu.tw

摘 要

酸肉為泰國地方性之生食發酵肉製品，呈現凝膠狀粉紅色酸肉，其作法是生豬肉配上糯米飯與調味料，以增加酸肉的特殊風味與口感。在本實驗研究中，為增加酸肉之安全性以及食物中毒菌的滋生，添加Lactobacillus plantarum作為菌?進行發酵使pH值短時間內降至5.3以下後進行冷藏。酸肉的製備將採取四種配方分別以三種不同的發酵溫度及不同的發酵時間製成產品並有助於提升產品安全性。比較不同發酵溫度及發酵時間的變化，進而檢測一般成分、機能性成分。結果顯示不同發酵溫度之酸肉的滴定酸度以35℃> 30℃> 25℃，隨發酵溫度升高其滴定酸度最高約為0.7%($p < 0.05$)，且發現隨pH值下降乳酸含量也跟著上升；揮發性鹽基態氮（VBN）含量變化在無添加乳酸菌?組VBN含量隨溫度升高；有添加乳酸菌?組的VBN含量增加緩慢；乳酸菌數以添加Lactobacillus plantarum最高，隨著發酵的進行乳酸菌大量增殖成為優勢菌，且由於乳酸菌數增加，造成pH值下降；胜?含量以35℃>30℃>25℃，隨著溫度升高發酵時間愈長，胜?含量也愈高，最高可達到26 (mg/mL)($p < 0.05$)；分析蛋白質分解情況所測得之總游離胺基酸以35℃含量為最高，有機酸的含量隨著溫度、發酵時間之增加而提高。在此，將藉由乳酸菌的添加以提升酸肉在製程上的附加價值與微生物性質之評估。

關鍵詞 : 酸肉，溫度/時間控制系統

目錄

參考文獻

1.小野淨治，工藤力，小此木成夫，1987。乳酸菌?代謝?增殖收率。New Food Industry, 29(5):59-76. 2.王有忠，1990。食品添加物。第193-210.華香園出版社，台北。 3.行政院衛生署，2010。98年食物中毒防治與宣導手冊。 4.李秀、賴茲漢，1992。食品分析與檢驗。富林出版社，第161、178、216頁。 5.岡田早苗，2008。亞洲傳統發酵食品中植物性乳酸菌之新應用。植物性乳酸菌研討會。 6.吳勇初，2008。茄紅素於畜產加工品之應用。食品資訊225:28-31。 7.林楊山，1993。應用乳酸菌製造肉酉圭及其產品特性之研究。國立中興大學畜產學研究所碩士論文。 8.林芝?，2010。植物性乳酸菌發酵豆渣之研究。國立嘉義大學碩士論文。 9.林楊山、陳明造、郭秀蘭、劉登城， 2002。接種乳酸菌 Lactobacillus plantarum 之肉酉圭中核?酸關聯物和有機酸之變化。中國畜牧學會會誌第三十一卷第三期。 10.侯信獻，2008。Bacillus subtilis YJ-3 生產蛋白之條件探討及開發機能性大豆胜?乳酸菌發酵產品。國立海洋大學食品科學系碩士論文。 11.林慧如，2003。本土山藥塊莖水萃取物之脂質及腸道生理功能評估。私立中山醫學大學營養科學研究所碩士論文。 12.林松筠，1986。菌元在發酵香腸扮演的角色。食品工業。18(4):37-42。 13.陳慶源，2008，綜論乳酸菌之多元化應用，食品工業，40(9):1-3。 14.陳俞伶，2005。發酵豆乳中活性胜?之生產。國立海洋大學食品科學系碩士論文。 15.陳明造編著。2007。機能性食品。第170-255、395-410

、494、497 頁。富林出版社。 16.黃加成、朱賢斌、林慶文， 1992。應用於中式香腸乳酸菌?生長性狀之探討。中國農業化學會誌。30(3):432-440。 17.傅祖慧編著，1992。肉品衛生學。第419、441-442頁。大中國圖書公司。 18.森地敏樹，1986。乳酸菌?特性?利用。New Food Industry, 28(2):1-10。 19.曾浩洋，2008。植物來源功能性乳酸菌之篩選及應用。植物性乳酸菌研討會。 20.蔡英傑，1998。乳酸菌與其應用特輯序。生物產業。9(2):95-97。 21.廖啟成，1998。乳酸菌之分類及應用。食品工業，30（2）:1-10。 22.賴茲漢、柯文慶。1996。食品材料學農產篇。第140、290-307。富林出版社。 23.衛生署，1998。冷凍食品類衛生標準。行政院衛生署。 24.鄭翕宸，2005。探討乳酸菌發酵對芋香豆漿製品之保健功能性。國立臺灣海洋大學食品科學系碩士論文。 25.Arunachalam, K. D. 1999. Role of bifidobacteria in nutrition , medicine and technology. Nutrition Research 19: 1559-1597. 26.A.O.A.C. 1990. Official Methods of Analysis. 15th ed. Association of official Analytical Chemist. Virginia, U.S.A. 27.Boakye, K., and G. S. Mittal. 1993. Changes in pH and water holding properties of Longissimus dorsi muscle during beef aging. Meat Sci. 34: 335-349. 28.Church, F. C., Swaisgood, H. E., Porter, D. H., and Catignani, G L. 1983. Spectrophotometric assay using o-phthaldialdehyde for determination of proteolysis in milk and isolated milk proteins. Journal of Dairy Science. 66:1219-1227. 29.Denter, J. and Bisping, B. 1994. Formation of B-vitamins by bacteria during the soaking process of soybeans for temper fermentation. International Journal of Food Microbiology, 22 (1), 23-31. 30.Desiere, F., Lucchini, S., Canchaya, C., Ventura, M. and Brussow, H. 2002. Comparative genomics of phages and prophages in lactic acid bacteria. Antonie van Leeuwenhoek, 82, 73-91. 31.Duboc, P and Mollet, B. 2001. Application of exopolysaccharides in the dairy industy. International Dairy Journal, 11, 759-768. 32.FDA. 1976. Bacteriological analytical manual for foods. Food and Drug Administration Bureau of Food. U.S.A. 33.Fery, W. 1983. Starter cultures for raw sausage production. Die Fleischerei（translation）2:5-6. 34.Geisen, R., F. K. Lucke ,and L. Krokel. 1992. Stater and protective culture for meatand meat products. Fleischwirtsch. 72:894-898. 35.Gibson, G. R. and Roberfroid, M. B. 1995. Dietary modulation of the human colonic microta: Introducing of the concept of prebiotics. Journal of Nutrition, 125, 1401-1412. 36.Gill, C. O. 1982. Microbial interaction with meats. Meat Microchology. Applied Science Publishers Ltd. England 225-264. 37.Gilliland, S. E. 1989. Acidophilus milk products: a review of potential benefits to consumers. J. Dairy Sci. 72: 2483-2494. 38.Glatman, L., V. Drabkin, and A. Gelman. 2000. Using lactic acid bacteria for developing novel fish food products. Journal of the Science of Food and Agriculture 80: 375-380. 39.Gopal P. K., Prasada J., Gillb H. S. 2003. Effects of consumption of Bifidobacterium lactisHN019（DR10TM）and galacto-oligosaccharides on the microflora of the gastrointestinal tract in human subject. Nutrition Research 23: 1313-1328. 40.Hansen, E. B. 2002. Commerical bacterial starter cultures for fermented food of the future. International Journal of Systematic and Evolutionary Microbiology 78:119-131. 41.Hammes, W. P. and Tichaczek. 1994. The potential of lactic acid bacteria for the production of safe and wholesome food. Z Lebensm Unters Forsch, 198, 193-201. 42.Hammes, W. P. and H. J. Knauf. 1992. Starer in the processing of meat products. Proceedings of 38th ICoMST. 4: 101-110. Clermont-Ferrand France. 43.Holzapfel, W. H., Haberer, P., Johannes, S., Schillinger, U. and Veld, J. H. 1998. Overview of gut flora and probiotics. International Journal of Food Microbiology, 41, 85-101. 44.Hugas, M., M. Garriga, T. Aymerich, and J. M. Monfort. 1992. Biochemical characterization of Lactobacilli from dry fermented sausage. Proseedings of 38th ICoMST. 4:791-794. Clermont-Ferrand, France. 45.Ibrahim, S. A. and Bezkorovainy, A. 1993. Inhibition of Escherichia coli by Bifidobacteria. Journal of Food Protection 56: 713-715. 46.Incze, K. 1987. The technology and microbiology of Hungarian salami. Tradition and current status. Fleischwirtsch. 67:1-3. 47.Incze, K. 1992. Raw fermented and dried meat products. Fleischwirtsch, 72:58-62. 48.Isolauri, E., Juntunen, M., Rautanen, T., Sillanaukee, P. and T. Koivula. 1991: A human Lactobacillus strain (Lactobacillus GG)promotes recovery from acute diarrhea in children. Pediatrics, 88, 90-7. 49.Kasper, H. 1998. Protection against gastrointestinal diseases-present facts and future developments. Int. J. Food Microbiol. 41: 127-131. 50.Kim, C. R., J. O. Hearnserger, A. P. Vickery, C. H. White, and D. L. Marshall. 1995. Sodium acetate and bifidobacteria increase shelf-life of refrigerated catfish fillets. Journal of Food Science 60:25-27. 51.Klein, G., Pack, A., Bonaparte, C. and Reuter, G. 1998. Taxonomy and physiology of probiotic lactic acid bacteria. International Journal of Food Microbiology, 41, 103-125. 52.Kuleasan, H., and M. L. Cakmakci. 2002. Effect of reuterin produced by Lactobacillus reuteri on the surface of sausages to inhibit the growth of Listeria monocytogenes and Salmonella spp. Nahrung/Food 46:408-410. 53.Leroy, F. and Vuyst, L. D. 2004. Lactic acid bacteria as functional starter cultures for the food fermentation industry. Trends in Food Science and Technology, 15 (2), 67-78. 54.Lee, Y. K. and Salminen, S. 1995. The coming of age of probiotics. Trends in Food Science and Technology, 6, 241-245. 55.Magnusson, J., Jonsson, H., Schnurer, J. and Roos, S. 2002. Weissella soli sp. Nov., a lactic bacterium isolated from soil. International Journal of Systematic and Evolutionary Microbiology, 52,831-834. 56.Malina, I., H. Silla, and J. Flores. 1989. Study of the microbial flora in dey-cured ham 3 lactic acid bacteria. Fleischwirtsch. 69:1708-1710. 57.Mandigo, R. 1991. History of meat fermentation. Meat & Poultry. 9:12. 58.Montel, M. C., F. Masson, and R. Talon. 1988. Bacterial role in flavor development. Proceeding of 44th ICoMST. 10 : 224-233. 59.Naidu, A. S., Bidlack, W. R. and Clemes, R. A., 1999. Probiotic spectra of lactic acid bacteria. Food and Nutrition in Health, 38, 13-26. 60.Nassos, P. S., J. E. Schade, A. D. Jr. King, and A. E. Stafford. 1984. Comparison of HPLC and GC measuring lactic acid in groud beef. J. Food Sci. 49:671-674. 61.Niinivaara, F. P. 1991. Starter culture in the processing of meat by fermentation and dehydration. Proceedings 44th Annual Reciprocal meat conference. P.59-63. U.S. 62.Niinivaara, F. P., M. S. Pohja and S. E. Komulainen. 1964. Some aspects abiut using bacterial pure cultures in the manufacture of Fermented Sausages. Food Technol. 18:25-31. 63.Ockerman, H. W. 1972. Quality control of postmortem muscle tissue. p.120. The Ohio State University and the Ohio Agricultural Research and Development center. U.S.A 64.Orrhage, K. and Nord, C. E. 2000. Bifidobacteria and lactobacilli in human health. Drugs Experimental Clinical Research 26: 95-111. 65.Ozawa, K., Yabuuchi, K., Yamanaka, K., Yamashita, Y., Nomura, S., Oku, I. 1983. Effect of Streptococus faecalis BIO-4R in intestinal flora of weanling piglets and calves. Appl. And Environ. Microbiol. 45: 1513-1518. 66.Palumbo, S. A. and J. L. Smith. 1977. Chemical and microbiological changes during sausage fermentation and ripening. American Chemical Society. USA. pp. 59-63. USA.

67.Reuter, G. 1969. Zusammensetzung und Anwendung von Bakterienkulturen fur therapeutische Zwecke. Arzneim-Forsch. Drug. Res. 50, 951-954. 68.Rouseff,R.,and S. Nagy. 1994. Health and nutrition benefits of citrus fruit components. Food Technol. 48:125-139. 69.Saarela, M., Lahteenmaki, L., Crittenden, R., Salminen, S. and Mattila-Sandholm, T. 2002. Gut bacteria and health foods-the European perspective. International Journal of Food Microbiology, 78, 99-117. 70.Salminen, E., Elomaa, I., Minkkinen, J., Vapaatalo, H. and S. Salminen. 1998. Preservation of intestinal integrity during radiotherapy using live Lactobacillus acidophilus culture. Clin Radiol, 39, 435-7. 71.Sharma, N., and R. Mukhopadhyay. 1992. Processing of fermented sausage using starter culture. Proceedings of 38th ICoMST； 4:827-830. Clermont-Ferrand, France. 72.Stiles, M. E. and Holzapfel, W. H. 1997. Lactic acid bacteria of foods and their current taxonomy. International Journal of Food Microbiology, 36, 1-29. 73.Tango, M. S. A. and A. E. Ghaly. 1999. Effect of temperature on lactic acid production from cheese whey using Lactobacillus helveticus under batch conditions. Biomass Bioenergy 16: 61-78. 74.Tavaria, F K., Franco, I., Carballo, F. J., Malcata, X. 2003. Amino acid and soluble nitrogen evolution throughout ripening of Serra da Estrela cheese. International Dairy Journal. 13:537-545. 75.Tripathi, A. K., A. K. Misra, V. K. Batish, and H. Chander. 2002. Perfermance of lactic starter cultures adapted to varied pH in Elliker ’ s broth. Res. Article 55: 17-21. 76.Victor, K. H., P. A. Edith, G. L. Isabal, and G. E. Francisco. 1992. Effect of starch addition in the quality of fermented sausages. Proceedings of 38th ICoMST. 4:795-798. Clermont-Ferrand, France. 77.Yin, L. J., and S. T. Jiang. 2001. Pediococcus pentosaceus L and S utilization in fermentation and storage of mackerel sausage. Journal of Food Science 66:742-746. 78.Yin, L. J., C. L. Pan, and S.T. Jiang. 2002. Effect of lactic acid bacterial fermentation on the characteristics of minced mackerel. Journal of Food Science 67:786-792. 79.Zhang, W., Xiao, S., Samaraweera, H. and Lee, E.J. 2010. Improving functional value of meat products. Meat Science （Accepted Manuscript）:1-77.