健康豬肉與病死豬肉生化特性之探討比較

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摘 要

本研究主要探討利用生化特性判斷健康豬與病死豬背最長肌置於不同條件貯存後的差異。結果顯示，不論是健康豬或病死豬，放置於4℃或25℃的環境下，其pH值變化沒有明顯差異。健康豬之電導度值在貯存期間隨時間增加而有明顯增加。然而不管健康豬或病死豬，在25℃的貯存條件其電導度值均比4℃貯存時要高。健康豬之L值均比病死豬低，而a值比病死豬高。健康豬之肌紅蛋白濃度均比病死豬高，且肌紅蛋白濃度會隨著時間增加有明顯減少。健康豬的腐屍胺含量均低於病死豬，但長時間貯存後導致健康豬最終腐屍胺含量與病死豬相似。健康豬的屍胺含量均低於病死豬。當屍胺含量大於7μg/g以上時可以判斷其豬肉為病死豬肉。健康豬於屠宰初期沒有檢測出組織胺，病死豬則有檢測出。組織胺含量大於0.38μg/g以上，可以判斷其豬肉為病死豬。健康豬或病死豬在早期不能檢測出酪胺，貯存時間增加酪胺則會被檢測出，且酪胺含量相差5倍以上。酪胺含量大於0.23μg/g以上時，可以判斷其豬肉為病死豬。根據實驗結果顯示，當屍胺含量大於7μg/g以上，組織胺含量大於0.38μg/g以上，酪胺含量大於0.23μg/g以上時，可以判斷為病死豬肉。

關鍵詞 : 豬肉、屍胺、組織胺、酪胺

目錄

參考文獻

中文部份 1.朱幸男。2001。台灣畜牧產業未來經營策略與發展方向。中畜會誌30（4）:67-79。 2.林高塚。1992。肉品加工之基礎與技術。華香園出版社。台北。 3.林亮全、陳志銘、顏國欽。1995。不同儲存溫度豬後腿肉所製中式香腸其瘦肉中之生物胺含量與品質之相關性。食品科學22（4）:448-460。 4.林淑妮。2000。調節氣體包裝與添加物對減脂中式香腸品質影響之探討。靜宜大學碩士論文。台中。 5.林岩。2001。屠宰衛生與查緝私宰。畜產月刊9月份。 6.陳志銘。1991。不同儲存溫度的原料肉及其肉製品中生物胺變化之研究。中興大學碩士論文。台中。 7.張為憲。1995。食品化學。第256頁。華香園出版社。台北。 8.陳明造。2000。肉品加工理論與應用（修訂版），第310頁。藝軒出版社。台北。 9.黃瑞呈。1999。正常豬肉和病死豬肉之生化特性、電泳行為和組織構造之比較。中興大學碩士論文。台中。 10.程中江。2001。為因應加入WTO之養豬生產-‘養豬產業因應對策簡介。中畜會誌30（4）60-66。 11.萬添春。1994。有機酸處理對原料肉及及中式香腸內微生物及生物胺形成之研究。中興大學碩士論文。台中。 12.顏國欽。1986。食品中生物胺之研究。中國農化會誌24:211-227。 英文部份 1.Arihara, K., Cassens, R. G., Greaser, M. L., Luchansky, J. B. and Mozdziak, P. E. 1995a. Localization of metmyoglobin-reductase enzyme (NADH-cytochrome b5 reductase) system components in bovine skeletal muscle. Meat Sci. 39:205-213. 2.Arihara, K., Cassens, R. G., Greaser, M. L., Luchansky, J. B. and Mozdziak, P. E. 1995b. Significance of metmyoglobin reducing enzyme system in myocytes. Proc. 41st Ammual Int. Cong. Meat Sci. technol. 11:378-379. 3.Antonin, E. and Brunori, M. 1971. The derivatives of ferrous hemoglobin and myoglobin. In: Hemoglobin and Myoglobin in their Reactions with Ligands (edited by A. Neuberger and E. L. Tatum). pp.13-37. Amsterdam: North Holland Publishers. 4.Al-Shaibani, K. A., Prince, R. J. and Brown, W. D. 1977. Purification of metmyoglobin reductase from blue fin tuna. J. Food Sci. 42:1013-1015. 5.Arihara, K., Itoh, M. and Kondo, Y. 1989a. Identification of bovine skeletal muscle metmyoglobin reductase as an NADHcytochrome b5 reductase. Jap. J. Zootech. Sci. 60:46. 6.Arihara, K., Itoh, M. and Kondo, Y. 1989b. Detection of cytochrome b5 in bovine skeletal muscle by electrophoretic immunoblotting technique. Jap. J. Zootech. Sci. 60:97. 7.Bendall, J. R., and Swatland, H. J., 1988. A review of the relationship of pH with physical aspect of pork quality. Meat Sci. 24:85-126. 8.Coutts, R. T., Baker, G. B. and Pasutto, F. M. 1986. Foodstuffs as sources of psychoactive amines and their precursors:Content, significance and identification. In Psychoactive amines in Foods, p.169-232. Academic press Inc. (London)Ltd. 9.Cross, H. R., Durland, P. R. and Seideman, S. C. 1986. Sensory quality of meat. In “Muscle as Food”, Ed. By Bechtel, P. J., Pub. by Academic Press, Inc. New York, Sydney, pp.279-288. 10.Clydesdale, F. M. and Francis, F. J. 1971. The Chemistry of meat color. Food Prod. Devel. 5:81-84. 11.Edwards, R. A., Dainty, R. H. and Hibbard, C. M., 1983. The relationship of bacterial numbers and types to diamine concentration in fresh and aerohically stored beef, pork and lamb. J. Food Technol. 18:777-788. 12.Echevarne, C., Renerre, M. and Labas, R. 1990. Metmyoglobin reductase activity in bovine muscles. Meat Sci. 24:161-172. 13.Fernandez, X., Forslid, A. and Tornberg, Eva, 1994. The effect of high post-mortem temperature on the development of pale, soft and exudative pork:Interaction with ultimate pH. Meat Sci. 37:133-147. 14.Gidding, G. G. 1974. Reduction of ferrimyoglobin on meat. CRT Critical Rev. Food Techno. 5:143-173. 15.Georges, P. and Stratman, C. J. 1952. The oxidation of myoglobin to metmyoglobin by oxygen. 2. The relation between the first order rate constant and the partial pressure of oxygen. Biochem. J. 51:418-422. 16.Hofmann, K., 1987. Der pH-Wert. ein qualitatskriterium fur fleisch. Fleischwirtsch. 67(5):557-562. 17.Hood, D. E. 1980. Factors affecting the rate of metmyoglobin accumulation in prepackaged beef. Meat Sci. 4:247-265. 18.Hood, D. E. 1984. The chemistry of vacuum and gas packaging meat. In “Recent Advances in the Chemistry of Meat” Ed. By Bailey, A. J., pp.213-230, Pub. By the royal society of Chemistry, London. 19.Hagler, L., Coppes, R. I. and Herman, R. H. 1979. Metmyoglobin reductase. Identification and purification of a reduced nicotinamide adenine dinucleotide-deppendent enzyme from bovine heart which reduces metmyoglobin. J. Biol. Chem. 254(14):6505-6504. 20.Hutchins, B. K., Liu, T. H. P. and Watts, B. M. 1967. Effect of additives and refrigeration on reducing activity, metmyoglobin, and malonaldehyde of raw ground beef. J. Food Sci. 32:214. 21.Hagler, L., Coppes, R. I. and Herman, R. H. 1979. Metmyoglobin reductase. Identification and purification of a reduced nicotinamide adenine dinucleotide-deppendent enzyme from bovine heart which reduces metmyoglobin. J. Biol. Chem. 254(14):6505-6504. 22.Kastenschmidt, L. L., E. J. Briskey and W. G. Hoekstra, 1964. Prevention of pale,soft,exudative porcine muscle through regulation of ante-mortem environmental temperature. J. Food Sci. 29:210. 23.Livingston, D. J. and Brown, W. D. 1981. The chemistry of myoglobin and its reactions. Food Technol.244-251. 24.Ledward, D. A. 1983. Haemoprotein in meat and meat products. In: Developments in Food Proteins, III (edited by B. J. F. Hudson). pp.33-68. London: Elsevier Applied Science. 25.Lawire, R. A. 1985. Chemical and biochemical constitution of muscle. In :Meat Science (edited by R. A. Lawire). pp.43-73. Oxford: Pergamon Press. 26.Ledward, D. A. 1985. Post-slaughter influences on the formation of metmyoglobin in beef muscle. Meat Sci. 15:149-171. 27.Lawrie, R. A. 1991. The eating quality of meat-color. In Meat Science, Fifth Edition, p.184-190. Pergamon Press Inc., New York. 28.Lin, T. S. and Hultin, H. O. 1977. Oxidation of myoglobin on vitro mediated by lipid oxidation in microsomal fractions of muscle. J. Food Sci. 42:136-140. 29.Livingston, D. J., Watts, D. A. and Brown, W. D. 1986. Myoglobin oxidation interspecies structural differences. Effect on autoxidation and oxygenation. Arch. Biochem. 249:106-115. 30.Levy, M. J., Livingston, D. J., Criddle, R. S. and Brown, W. D. 1985. Isolation and characterization of metmyoglobin reductase from yellowfin tuna. Comp. Biochem. Physiol. 81:89. 31.Monin, G., Sellier, P., Ollivier, L., Goutefongea, R. and Girard, J. P. 1980-1981. Carcass Characteristics and meat quality of halothane negative and halothane positive pietrain pigs. Meat Sci. 5:413. 32.Macdougall, D. B. 1982. Change in the colour and opacity of meat. Food Chem. 9:75-88. 33.Matsui, T., Shimizu, C. and Matsuura, F. 1975. Studies on metmyoglobin reducing enzyme system in the muscle of blue white dolphin II. Purification and some physico-chemical properties of ferrimyoglobin reductase, Bull. Jap. Soc. Fish. 41:771. 34.Nakamura, M., Wada, Y., Saway, H. and Kawabata, T., 1979. Polyamine content in fresh and processed pork. J. Food Sci. 44(2):515-523 35.Nortje, G. L., Naumann, E. and Grobler, I. 1986. Effecct of preslaughter exercise, electrical stimulation, type of packaging tray, display temperature, and time on acceptance and shelf life of beef steaks. J. Food Sci. 52:12. 36.O’Keefe, M. and Hood, D. E. 1980-1981. Anoxic storage of flesh beef. 2: Colour stability and weight loss. Meat Sci. 5:267-281. 37.O’Keefe, M. and Hood, D.

E. 1982. Biochemical factors influencing metmyoglobin formation on beef from muscles of differing colour stability. Meat Sci. 7:209-228. 38.Ockerman, H. W. 1985. Quality Control of Post-mortem Muscle Tissue. Animal Science Dept., The Ohio State Univ., Columbus,OH. 39.Ockerman, H. W. 1985. Quality Control of Post-mortem Muscle Tissue. Vol. 1, Meat and Additive Analysis (12th Ed.) Ohio State University, Columbus, Ohio.Oliver. 40.Rossi-Fanelli, A., Antonini, E. and Mondovi, B. 1957. Enzymic reduction of ferrimyoglobin. Arch. Biochem. And Biophys.68:355-361. 41.Rice, S., Eitenmiller, R. R. and Koenler, P. E., 1976. Biologically active amines in goods A review. J. Milk Food Technol. 5:108-109. 42.Rashid, N. H., Henrickson, R. L., Asghar, A. and Claypool, P. L. 1983. Biochemical and quality characteristics of ovine muscles as effected by electrical stimulateon, hot borning, and mode of chilling. J. Food Sci. 48:136. 43.Rehee, K. S., Seideman, S. C. and Cross, H. R. 1986. Enzymic and nonenzymic factors affecting lipid peroxidation in raw beef muscles. J. Food Sci. 34:308-312. 44.Renerre, M. and Labas, R. 1987. Biochemical factors influencing metmyoglobin formation in beef muscle. Meat Sci. 19:341-344. 45.Renerre, M. and Labas, R. 1987. Biochemical factors influencing metmyoglobin formation in beef muscle. Meat Sci. 19:341-344. 46.Renerre, M. 1990. Review: Factors involved in the discoloration of beef meat. Intl J. Food. Sci. & Technol. 25:613-630. 47.Sayre, R. N., Briskey, E. J., Hoekstra, W. G. and Bray, R. W. 1961. Effect of preslaughter change to a cold environment on characteristics of pork muscle. J. Anim. Sci. 20:487. 48.Sayre, R. N., Briskey, E. J. and Hoekstra, W. G. 1963a. Alteration of post-mortem changes in procine muscle by preslaughter heat treatment and dried modification. J. Food Sci. 28:292. 49.Sayre, R. N., Kiernat, B. and Briskey, E. J. 1963b. Processing characteristics of porcine muscle related to pH and temperature during rigor mortis development and to gross morphology 24 hr. post-mortem. J. Food Sci.28:175. 50.Spinelli, A. M., Lakritz, L. and Wasserman, A. E. 1974. Effects of processing on the amine content of pork bellies. J. Agr. Food Chem. 22(6):1026-1029 51.Suck, E., 1988:Zur messung der fleishch hes chaffenheit von scherinehalften am schlachtband bundesanstalt fur fleishch forschung. Mitteilungsblatt Nr. 101:8037-8044. 52.Taylor, A. A. 1985. Packaging fresh meat. In “ Developments in Meat Science, 3 ” Ed. By Lawrie, R. A. pp.89-113. Pub. By Elsenierapplied Science, London. 53.Topel, D. G., Bicknell, E. J., Preston, K. S., Christian, L. L. and Matsushima, C. Y. 1968. Porcine stress syndrome. Mod. Vet. Prac. 49:40. 54.Ten Brink, B., Damink, C., Joosten, H. M. L. J. and Huis in ’ t veld, J. H. J., 1990.Occurence and formation of biologically active amines in foods. Int.. J. Food. Microbiolog. 11:73-84. 55.Van Boekel, M. A. J. N S. and Arentsen-Stasse, A. P. 1987. Determination of aromatic biogenic amines and their precursors in cheese by high-performance liquid chromatography. J. Chrom. 389:267-272. 56.Van den Oord, A. H. A. 1974. The biochemical reduction of metmyoglobin and the colour stability of pre-packaged beef. Feischwirts 54: 1803. 57.Wismer-Pedersen, J. and Briskey, E. J. 1961. Relationship of post-mortem acidity and temperature. Food Tech. 15:232. 58.Warriss, P. D., Kestin, S. C., Brown, S. N. and Wilklins, L. J. 1984. The time required for recovery from mixing stress in young bulls and the prevention of dark cutting beef. Meat Sci. 10:53. 59.Watts, B. M., Kendrick, J. Z., Ziper, M. W., Hutchins, B. and Saleh, B. 1966. Enzymic reducing pathways in meat. J. Food Sci. 32 : 855-861. 60.Yano, Y., Shibutani, Y., Suzuki, F., Hada, T. and Nakamura, T. 1990. Diamines as potential indices for freshness of both aerobically packed and vacuum packed meat. Jpn. J. Zootech. Sci. 60（1）:16-21