

# 麵粉與澱粉之種類及混合比例對速食麵品質之影響

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## 摘要

中文摘要 速食麵的生產過程依序包括，混合、壓延、切條並形成波狀、蒸煮、切斷、淋味、油炸、冷卻、包裝。本研究針對製作麵糰時所添加之麵粉和澱粉，依添加比例之不同（88：12、76：24）及種類之不同（高筋麵粉、中筋麵粉、馬鈴薯澱粉、樹薯澱粉）對速食麵品質之影響進行探討。測其組成份（水份、粗蛋白質、灰份）和麵條之物理性質（泡煮增重率、泡煮增容率、色澤分析、Tensile strength），並進行品質試驗（感官品評），進而找出八種麵條其最適之加工條件。結果顯示最適條件為使用高筋麵粉和馬鈴薯澱粉依76：24比例混合，其泡煮增重率為162%、泡煮增容率為100%、Tensile strength為33.33 g/mm<sup>2</sup>、感官品評整體口感最好。八種麵糰基本組成與速食麵麵條之泡煮增重率、泡煮增容率進行相關性分析，結果顯示麵糰水份與增重率呈現顯著正相關，麵糰粗蛋白質與增重率呈現顯著正相關。八種麵糰基本組成與速食麵麵條品質（Tensile strength、色澤試驗、感官品評）進行相關性分析，結果顯示麵糰水份與Hunter L值呈現顯著正相關，與Hunter b值呈現顯著負相關，麵糰粗蛋白質與Hunter b值呈現顯著負相關。

關鍵詞：0

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## 參考文獻

- 參考文獻 1.CNS。1979。總號 550，類號 N5007。總號 551，類號 N6002。2.工業局。1990。麵製品業現況調查計畫成果報告。經濟部工業局及中華麵麥食品工業技術研究所。3.小田闖多。1991。食品產業。食品產業新聞社。東京。4.吳元欽。1992a。酵素在烘焙產品的應用。麵粉技術及品管研習（A）班資料彙編。中華麵麥食品工業技術研究所編印。5.吳宗沛。1992b。Farinograph 與 Extensograph 的分析原理與二次加工利用。麵粉技術及品管研習（A）班資料彙編。中華麵麥食品工業技術研究所編印。6.吳景陽。1981。小麥麵粉組成分之麵包製造及生化特性。食品工業13（7）:17-21。7.徐華強、黃登訓、謝健一、顧德材。1974。實用麵包製作技術，p.139-140，p.142-143。中華麵麥食品工業研究所編印。台北。8.郭文怡。1991。麵粉的分級及成分特性。烘焙工業35:45-51。9.陳賢哲。1983。各種食品加工用化工澱粉的利用特性。食品工業15（7）:24-31。-58-10.陳賢哲。1989。小麥澱粉的特性與利用。烘焙工業27:14-18。11.陳賢哲。1990。破損澱粉對麵粉加工品的影響。烘焙工業 29:60-64。12.陳勉之。1975。小麥蛋白質之組成及發酵麵食的製作功能。食品工業7（8）:15-18。13.黃登訓。1988。硬質白麥。烘焙工業22:35-45。14.黃宏隆、郭文怡、徐華強。1995。麵條加工技術，p.3-19。中華穀類食品工業技術研究所。台北。15.賴滋漢、金安兒。1991。食品加工學（製品篇），p.14-18。精華出版社。台中。16.盧榮錦。1992。麵粉的品質與分析方法。美國小麥協會發行。17.續光清。1989。食品工業，p.62。徐氏基金會出版。台北。18.AACC. American Association of Cereal Chemist. 1983. Approved methods. AACC. St. Paul, MN. 19.Belfast, J. H. 1974. Starch damage. Die Starke. 26(5): 85-88. 20.Belitz, H. D. and Grosch, W. 1987. Cereal and Cereal Products. Food Chemistry, Chap. 15. Springer — Verlag, NY, U.S.A. -59-21.Bietz, J. A. and Huebner, F. R. 1980. Structure of gluten: achievements at the Northern Regional Research Center. Ann. Technol. Agric. 29: 249. 22.Bietz, J. A. and Wall, T. S. 1980. Identity of high molecular weight gliadin and ethanol-soluble glutenin subunits of wheat: relation to gluten structure. Cereal Chem. 57(6): 415-421. 23.Biliaderis, C. G., Mauric, T. J. and Vose, J. R. 1980. Starch gelatinization phenomena studied by differential scanning calorimetry. J. Food Sci. 45: 1669-1674, 1680. 24.Bohlin, L. and Garlson, T. L., 1980. Dynamic viscoelastic properties of wheat flour dough:dependence on mixing time. Cereal Chem. 48:448-445. 25.Cheftel, J. C., Cug, J. L. and Lorient, D. 1985. Amino acids, peptides, and proteins. In " Food Chemistry " ed.by Fennema, O. R., p.296-298. Marcel Dekker, Inc., U.S.A. 26.Dexter, J. E., Preston, K. R., Tweed, A. R., Kilborn, R. H. and Tipples, K. H. 1985. Relationship of flour starch damage and flour protein to the quality of Brazilian-style hearth bread and remix pan bread produced from hard red spring wheat. Cereal Foods World. 30:511-514. 27.Dexter, J. E., Matsuo, R. R. and Morgan, B. C. 1981. High temperature drying:Effect on spaghetti properties. J. Food Sci. 46:1741-1746. -60- 28.Doekes, G. J. and Wennekes, L. M. J. 1982. Effect of nitrogen fertilization on quantity and composition of wheat flour protein. Cereal Chem. 59(4): 276-278. 29.Dong, H., Seares, R. G., Cox, T. S., Hosoney, R. C., Lookhartt, G. L. and Shogren, M. D. 1992. Relationships between protein composition and mixograph and loaf characteristics in wheat. Cereal Chem. 69(2): 132-136. 30.Evers, A. D. and Stevens, D. J. 1985. Starch damage. in: "Advances in Cereal Sci. and Technol." Vol. VII. p.321-350. Ed. by Y. Pomeranz, AACC, MN, U.S.A. 31.Farrand, E. A. 1964. Flour properties in relation to the modern bread processes in the United Kingdom with special reference to alpha-amylase and starch damage. Cereal Chem. 41:98-111. 32.Fennema, O. R. 1985. Food chemistry, p.116. Marcel Dekker. 33.Hosoney, R. C. 1990. Principles of Cereal Science and Technology, p.136-137. American Association of Cereal Chemists, Inc. St. Paul, MN, U.S.A. 34.Hosoney, R. C. and Faubion, J. M. 1989. The viscoelastic properties of wheat flour doughs. In Dough Rheology & Baked Product Texture, ed. H. Faridi & J. M. Faubion, p. 29-66. Van Nostrand Reinhold, New York. 35.Huebner, F. R. 1977. Wheat flour proteins and their functionality in baking. Baker's Dig. 51(5): 25, 154. -61- 36.Jackson, A. 1976. The Manufacture of Wheat Starch in "Starch Production Technology". p.155-187. Ed. by J. A. Radley. Appl. Sci. Pub. Ltd. 37.Kasarda, D. D., Bernardun, J. E. and Nimmom, C. C. , 1976. Wheat Proteins. Adv Cereal Sci. & Technol. 1:158-236. 38.Koink, C. M., Miskelly, D. M. and Gras, P. W., 1992. Contribution of starch and nonstarch parameters to the eating quality of Japanese white salted noodles. J. Sci. Food Agric. 58:403-406. 39.Kulp, K. 1973. Characteristics of small granule starch of flour and wheat. Cereal Chem. 50: 666-672. 40.L`aszity, R., Nedelkovits, J. and Varga, J. 1970. The structure of the high molecular weight protein component of gluten. Paper present at the IUPAC Symposium, Riga. 41.L`aszity, R. 1972. Recent result in cereal protein research. Period. Polytech. ( Tech. Univ. Budapest ) 16:331. 42.MacRitchie, F. 1992. Physicochemical properties of wheat proteins in relation to functionality. Adv. Food Nutr. Res. 36: 1-87. 43.MacRitchie, F. 1994. Role of polymeric proteins in flour functionality. In Wheat Kernel Proteins: Molecular and Functional Aspects. p.145-150, Pergamon Press, New York. -62- 44.Nagao, S., Ishibashi, S., Imai, S., Sato, T., Kenbe, T., Kaneko Y. and Otsubo H. 1977. Quality characteristics of soft wheat and their utilization in Japan. III. Effect of crop year and

protein content on product quality. *Cereal Chem.* 54(2):300-306. 45. Nikumi, Z. 1978. Studies on Starch Granules. *Starch/Starke* 30:105-111.

46. Novaro, P., D'Agostino, M.G., Mariani, B.M. and Naridi, S. 1993. Combined effect of protein content and high-temperature drying systems on pasta cooking quality. *Cereal Chem.* 70(6):716-719. 47. Oh, N. H., Seib, P. A., Deyoe, C. W. and Word, A. B. 1983. Noodle. I. Measuring the textural characteristics of cooked noodles. *Cereal Chem.* 60:433-438. 48. Oh, N. H., Seib, P. A., Deyoe, C. W. and Word, A. B. 1985a. Noodle. II. The surface firmness of cooked noodles from soft and hard wheat flours. *Cereal Chem.* 62(2):431-436. 49. Oh, N. H., Seib, P. A. and Chung, D. S. 1985b. Noodles. III. Effect of processing variables on quality characteristic of dry noodles. *Cereal Chem.* 62(2):437-440. 50. Pomeranz, Y. 1987. *Modern Cereal Science and Technology*, p.26-29. VCH Publishers, Inc, U.S.A. 51. Pomeranz, Y. 1988. *Wheat: Chemistry and Technology Volume II*, p.11. American Association of Cereal Chemists, Inc. St. Paul, MN, U.S.A. -63- 52. Schoch, T. J. and French, D. 1947. Studies on bread staling. I. The role of starch. *Cereal Chem.* 24: 231-249. 53. Shewry, P. R. 1995. Plant Storage Proteins. *Biol. Rev.* 70: 375- 426. 54. Shewry, P. R. and Tatham, A. S. 1997. Disulfide bonds in wheat gluten proteins. *J. Cereal Sci.* 25: 207-227. 55. Shewry, P. R., Miles, M. J. and Tatham, A. S. 1994. The prolamin storage proteins of wheat and related cereals. *Prog. Biophys. Mol. Biol.* 61: 37-59. 56. Stevens, H. H. 1992. Control of product quality in the mill. 麵粉場之良好作業規範研討會專輯。中華麵麥食品工業技術研究所編印。 57. Swanson, C. O. 1938. *Wheat and Flour Quality*. Burgess Publishing Co., Minneapolis, MN. 58. Tatham, A. S. and P. R. Shewry 1985. The conformation of wheat gluten protein. The second structure and thermal stabilities of  $\alpha$ -,  $\beta$ -, and  $\gamma$ -gliadins. *J. Cereal Sci.* 3:103-113. 59. Whistler, R. L., Bemiller, J. N. and Paschall, E. F. 1984. *Starch: Chemistry and Technology*. p.583-584, Academic Press. 60. Wall, J. S. 1979. The Role of Wheat Protein in Determining Baking Quality. In *Recent Advance in the Biochemistry of Cereals*, ed, Laidman, D. L. and Jonse, R. G. W. Academic Press, New York. -64-