

Fleischforschung und Entwicklung

Stabilitätsstudie von asiatischen Fischsoßen auf dem deutschen Markt

Von Ute Schröder, Monika Manthey-Karl, Ines Lehmann und Carsten Meyer

Schlüsselwörter: Fischsoße | Stabilität | sensorische Bewertung | elektronische Nase | Histamin

Literatur

1. Alinorm 10/33/18: Report of the Thirtieth Session of the Codex Committee on Fish and Fishery Products, Agadir, Marocco 28 September - 2 October 2009: www.codexalimentarius.net/web/index_en.jsp.
2. BEDDOWS, C.G. and A.G. ARDESHIR (1979): The production of soluble fish protein solution for use in fish sauce manufacture, I. The use of added enzymes. *J. Food Technol.* 14, 603–612.
3. BRILLANTES, S. (1999): Histamin in fish sauce – health and safety considerations. *Infofish International* 4, 51–56.
4. CHAVEESUK, R., J.P. SMITH and B.K. SIMPSON (1993): Production of fish sauce and acceleration of sauce fermentation using proteolytic enzymes. *J. Aquatic Food Product Technology* 3, 59–77.
5. Commission EU Regulation (EC) No 2074/2005 of 5 December 2005: laying down implementing measures for certain products under Regulation (EC) No 853/2004, Regulation (EC) No 854/2004 and Regulation (EC) No 882/2004 derogating from Regulation (EC) No 852/2004 and amending Regulations (EC) No 853/2004 and (EC) No 854/2004.
6. DA FONSECA-WOLLHEIM, F., H.U. BERGMAYER und I. GUTMANN (1974): Ammoniak. In: *Methoden der enzymatischen Analyse*. Ed. H.U. Bergmann, Band II, 3. Edition, Verlag Chemie, Weinheim (Germany), 1850–1853.
7. DOUGAN, J. und G.E. HAWARD (1975): Some flavouring constituents of fermented fish sauces. *Sci. Food Agric.* 26 (7), 887–894.
8. EKLÖV, T., G. JOHANSSON, F. WINQUIST und I. LUNDSTRÖM (1998): Monitoring sausage fermentation using an electronic nose. *J. Sci. Food Agric.* 76, 525–532.
9. FUKAMI, K., S. ISHIYAMA, H. YAGURAMAKI, T. MASUZAWA, Y. NABETA, K. Endo und M. SHIMODA (2002): Identification of distinctive volatile compounds in fish sauce. *J. Agric. Food Chem.* 50, 5412–5416.
10. GILDBERG, A. und C. THONGTHAI (2001): The effect of reduced salt content and addition of halophilic lactic acid bacteria on quality and composition of fish sauce made of sprat. *J. Aquatic Food Product Technology* 1, 77–88.
11. GILDBERG, A., J. WICHAPHON, S. LERTSIRI, A. ASSAVABIG, N.K. SØRENSEN und C. THONGTHAI (2007): Chemical and organoleptic comparison of fish sauce made from cold water species and typical Thai fish sauce. *J. Aquatic Food Product Technology* 3, 31–42.
12. HUSS, H.H. (1995): Quality and quality changes in fresh fish. *FAO Fisheries Technical Paper* 348, Rome.
13. KARL, H., G. ÅKESSON, M. ETIENNE, A. HUIDOBRO, J. LUTEN, R. MENDES, M. TEJADA und J. OEHLENSCHLÄGER (2002): WEFTA interlaboratory comparison on

- salt determination in fishery products. *J. Aquatic Food Product Technology* 11, 215–228.
14. KENT, M., J. OEHLenschLÄGER, S. MIERKE-Klemeyer, M. MANTHEY-Karl, R. KNÖCHEL, F. DASCHNER und O. Schimmer (2004): A new multivariate approach to the problem of fish quality estimation. *Food Chemistry* 4, 531–535.
 15. KLOMKLAO, S., S. BENJAKUL, W. VISESSANGUAN, H. KISHIQMURA und B.K. SIMPSON (2006): Effects of the addition of spleen of skipjack tuna (*Katsuwonus pelamis*) on the liquefaction and characteristics of fish sauce made from sardine (*Sardinella gibbosa*). *Food Chemistry* 98, 440–452.
 16. LONG, H.F. und B.W. HAMMER (1941): *Pseudomonas Putrefaciens* in Dairy Plant Equipment. Journal Paper No. J-228 of the Iowa, Agricultural Experiment Station, Ames, Iowa.
 17. LOPETCHARAT, K., Y.J. CHOI, J.W. PARK und M.A. DAESCHEL (2001): Fish sauce products and manufacturing. In: A review: *Food Reviews International* 17 (1), 65–88.
 18. Manthey-Karl, M., H. KARL und I. LEHMANN (2010): Quality of organically and conventionally farmed rainbow trout (*Oncorhynchus mykiss*) and smoked products thereof from the German market. *Archiv Lebensmittelhygiene* 61 (2), 40–49.
 19. NIELSEN, M.K. und H.H. NIELSEN (2006): Seafood enzymes. In: *Food Biochemistry & Food Processing*, Hui Y H, Blackwell Publishing, (17) Part III, 379–400.
 20. NOGUCHI, H., M. UCHINO, O. SHIDA, K. TAKANO, L.K. NAKAMURA und K. KOMAGATA (2004): *International Journal of Systematic and Evolutionary Microbiology* 54, 2117–2120.
 21. OETJEN, K. und H. KARL (1999): Improvement of gas chromatographic determination methods of volatile amine in fish and fishery products. *Lebensmittel-Rundschau* 95 (10), 403–407.
 22. Official collection of Methods according to § 64 LFGB, formerly §35 (LMBG), Beuth Verlag GmbH, www.methodensammlung-bvl.de/.
 23. OLAFSDOTTIR, G., H.L. LAUZON und E. MARTINSDOTTIR (2006): Influence of storage temperature on microbial spoilage characteristics of haddock fillets (*Melanogrammus aeglefinus*) evaluated by multivariate quality prediction. *Intern. J. Food Microbiol.* 111 (2), 112–125.
 24. OSTERMEYER, U., C. MEYER und R. SCHUBRING (2009): Production and composition of Asian fish sauces. *Inf. Fischereiforschung* 56, 1–18.
 25. PHAM, A.J., M.W. SCHILLING, Y. YOON, V.V. KAMADIA und D.L. MARSHALL (2008): Characterization of fish sauce aroma-impact compounds using GC-MS, SPME-Osme-GCO, and Stevens' power law exponents. *J. Food Sci.* 73, 268–274.
 26. PARK, J.-N., T. WATANABE, K.-I. ENDOH, K. WATANABE und H. ABE (2002): Taste-active components in a Vietnamese fish sauce. *Fisheries Science* 68, 913–920.
 27. PARK, J.-N., K. ISHIDA, T. WATANABE, K.-I. ENDOH, K. WATANABE, M. MURAKAMI und H. ABE (2002): Taste effects of oligopeptides in a Vietnamese fish sauce. *Fisheries Science* 68, 921–928.
 28. RODTONG, S., S. NAWONG und J. YONGSAWATDIGUL (2005): Histamine accumulation and histamine-forming bacteria in Indian anchovy (*Stolephorus indicus*). *Food Microbiology* 22, 475–482.
 29. SAISITHI, P. (1994): Traditional fermented fish: Fish sauce production. In: *Fisheries processing: Biotechnological applications*, Ed. A.M. Martin, Chapman & Hall Publisher, London, 111–131.

30. SANCEDA, N.G., T. KURATA und N. ARAKAWA (1986): Study on the volatile compounds of fish sauces – Shottsuru, Nam pla and Nouc man. *Agric. Biol. Chem.* *50*, 1201–1208.
31. SANCEDA, N.G., E. SUZUKI und T. KURATA (2003): *Amino Acids* *24*, 81–87.
32. SHIMODA, M., R.R. PERALTA und Y. OSAJIMA (1996): Headspace Gas Analysis of Fish Sauce. *J. Agric. Food Chem.* *44*, 3601–3605.
33. SCHRÖDER, U. (2007): Dem Fischsaucenaroma auf der Spur. *DLG LebensmittelTest* *4*, 16–17.
34. STUTE, R., K. PETRIDIS, H. STEINHART und G. BIERNOTH (2002): Biogenic amines in fish and soy sauces. *Eur. Food Res. Technol.* *215*, 101–107.
35. TAIRA, W., Y. FUNATSU, M. SATOMI, T. TKANO und H. ABE (2007): Changes in extractive components and microbial proliferation during fermentation of fish sauce from underutilized fish species and quality of final products. *Fisheries Science* *73*, 913–923.
36. THONGTHAI, C. und A. GILDBERG (2005): Asian fish sauce as a source of Nutrition. In: Shi, J., C.T. Ho and F. Shahidi (eds) *Asian Functional Foods*. Taylor & Francis, Boca Raton, 215–265.
37. WONGKHALAUNG, C. (2004): Industrialization of Thai Fish Sauce (Nam pla). In: K.H. Steinkraus: *Industrialization of indigenous fermented foods*, Marcel Dekker, Inc. New York, Basel, 647–705.
38. YONGSAWATDIGUL, J., J. CHOI und S. UDOMPORN (2004): Biogenic amines formation in fish sauce prepared from fresh and temperature-abused Indian anchovy (*Stolephorus indicus*). *J. Food Sci.* *69* (4), 312–319.
39. YONGSAWATDIGUL, J., S. RODTONG und N. RAKSAKULTHAI (2007): Acceleration of Thai fish sauce fermentation using proteinases and bacterial starter cultures. *J. Food Sci.* *9*, 382–390.
40. ZAMAN, M.Z., A.S. ABDULAMIR, F. ABU BAKAR, J. SELAMAT und J. BAKAR (2009): A Review: Microbiological, physicochemical and health impact of high level biogenic amines in fish sauce. *Amer. J. Appl. Sci.* *6* (6), 1199–1211.

Anschrift der Verfasser

Ute Schröder, Monika Manthey-Karl, Ines Lehmann und Dr. Carsten Meyer, Max Rubner-Institut, Bundesforschungsinstitut für Ernährung und Lebensmittel, Institut für Sicherheit und Qualität bei Milch und Fisch, Palmaille 9, 22767 Hamburg