

8. Buchanan, R.L. and Klawitter, L.A. 1992b. Effectiveness of *Carnobacterium piscicola* LK5 for controlling the growth of *Listeria monocytogenes* Scott A in refrigerated foods. *J. Food Safety* 12:219–236.
9. Buchanan, R.L. and Klawitter, L.K. 1992c. The effect of incubation temperature, initial pH, and sodium chloride on the growth kinetics of *Escherichia coli* 0157:H7. *Food Microbiol.* 9:185–196.
10. Dickson, J.S. 1990. Survival and growth of *Listeria monocytogenes* on beef tissue surfaces as affected by simulated processing conditions. *J. Food Safety* 10:165–174.
11. Doyle, M.P. and Schoeni, J.L. 1987. Isolation of *Escherichia coli* 0157:H7 from retail fresh meats and poultry. *Appl. Environ. Microbiol.* 53:2394–2396.
12. Felsenfeld, O., Young, V.M. and Yoshimura, T. 1950. A survey of *Salmonella* organisms in market meat, eggs, and milk. *J. Amer. Vet. Med. Assoc.* 116:17–21.
13. Genigeorgis, C.A. 1985. Microbial and safety implications of the use of modified atmospheres to extend the storage life of fresh meat and fish. *Int. J. Food Microbiol.* 1:237–251.
14. Gill, C.O. and Delacy, K.M. 1991. Growth of *Escherichia coli* and *Salmonella typhimurium* on high-pH beef packaged under vacuum or carbon dioxide. *Int. J. Food Microbiol.* 13:21–30.
15. Gill, C.O. and Reichel, M.P. 1989. Growth of the cold-tolerant pathogens *Yersinia enterocolitica*, *Aeromonas hydrophila*, and *Listeria monocytogenes* on high-pH beef packaged under vacuum or carbon dioxide. *Food Microbiol.* 6:223–230.
16. Gilliland, S.E. and Speck, M.L. 1977. Antagonistic action of *Lactobacillus acidophilus* toward intestinal and foodborne pathogens in associative cultures. *J. Food Protection* 40:820–823.
17. Glass, K.A. and Doyle, M.P. 1989. Fate of *Listeria monocytogenes* in processed meat products during refrigerated storage. *Appl. Environ. Microbiol.* 55:1565–1569.
18. Glass, K.A., Loeffelholz, J.M., Ford, J.P., and Doyle, M.P. 1992. Fate of *Escherichia coli* 0157:H7 as affected by pH or sodium chloride and in fermented, dry sausage. *Appl. Environ. Microbiol.* 58:2513–2516.
19. Grau, F.H. 1981. Role of pH, lactate and anaerobiosis in controlling the growth of some fermentative Gram-negative bacteria on beef. *Appl. Environ. Microbiol.* 42:1043–1050.
20. Grau, F.H. and Vanderlinde, P.B. 1990. Growth of *Listeria monocytogenes* on vacuum-packaged beef. *J. Food Protection* 53:739–741, 746.
21. Hintlian, C.B. and Hotchkiss, J.H. 1986. The safety of modified atmosphere packaging: a review. *Food Technol.* 40(12):70–76.
22. Hughes, A.H. and McDermott, J.C. 1989. The effect of phosphate, sodium chloride, sodium nitrite, storage temperature and pH on the growth of enteropathogenic *Escherichia coli* in a laboratory medium. *Int. J. Food Microbiol.* 9:215–223.
23. Ingram, S. C., Escude, J. M., and McCown, P. 1990. Comparative growth rates of *Listeria monocytogenes* and *Pseudomonas fragi* on cooked chicken loaf stored under air and two modified atmospheres. *J. Food Protection* 53:289–291.
24. Johnson, J.L., Doyle, M.P., Cassens, R.G. and Schoeni, J.L. 1988a. Fate of *Listeria monocytogenes* in tissues of experimentally infected cattle and in hard salami. *Appl. Environ. Microbiol.* 54:497–501.
25. Johnson, J.L., Doyle, M.P. and Cassens, R.G. 1988b. Survival of *Listeria monocytogenes* in ground beef. *Int. J. Food Microbiol.* 6:243–247.
26. Johnston, R.W. and R.B. Tompkin. 1992. Meat and poultry products. In: "Compendium of Methods for the Microbiological Examination of Foods." 3rd Ed. C. Vanderzant and D.F. Splitstoesser, eds. Washington, D.C., American Public Health Association.
27. Kaya, M. and Schmidt, U. 1989. Verhältnis von *Listeria monocytogenes* im Hackfleisch bei Kuhl- und Gefrierlagerung. *Fleischwirtschaft* 69:617–620.
28. Kaya, M. and Schmidt, U. 1991. Behavior of *Listeria monocytogenes* on vacuum-packed beef. *Fleischwirtschaft* 71:424–426.
29. Khan, M.A., Palmas, C.V., Seaman, A. and Woodbine, M. 1972. Survival versus growth of a facultative psychrotroph. *Acta Microbiol. Acad. Sci. Hung.* 19:357–362.
30. Khan, M.A., Palmas, C.V., Seaman, A. and Woodbine, M. 1973. Survival versus growth of a facultative psychrotroph: Meat and products of meat. *Zbl. Bakteriol. Hyg. Abt. Orig. B.* 157:277–282.
31. Lewis, C.B., Kaiser, A. and Montville, T.J. 1991. Inhibition of food-borne bacterial pathogens by bacteriocins from lactic acid bacteria isolated from meat. *Appl. Environ. Microbiol.* 57:1683–1688.
32. Mackey, B.M., Roberts, T.A., Mansfield, J. and Farkas, G. 1980. Growth of *Salmonella* on chilled meat. *J. Hyg., Camb.* 85:115–124.
33. Mackey, B.M. and Kerridge, A.L. 1988. The effect of incubation temperature and inoculum size on growth of salmonellae in minced beef. *Int. J. Food Microbiol.* 6:57–65.
34. Mattila-Sandholm, T. and Skytta, E. 1991. The effect of spoilage flora on the growth of food pathogens in minced meat stored at chilled temperature. *Lebensm. Wiss. U.-Technol.* 24:116–120.
35. Mortvedt, C.I. and Nes, I.F. 1990. Plasmid-associated bacteriocin production by a *Lactobacillus sake* strain. *J. Gen. Microbiol.* 136:1601–1607.
36. Nazer, A.H.K. and Osborne, A.D. 1976. *Salmonella* infection and contamination of veal calves: a slaughterhouse survey. *Brit. Vet. J.* 132:192–201.
37. Palumbo, S.A., Bencivengo, M.M., Del Corral, F., Williams, A.C. and Buchanan, R.L. 1989. Characterization of the *Aeromonas hydrophila* group isolated from retail foods of animal origin. *J. Clin. Microbiol.* 27:854–859.
38. Ryser, E.T. and Marth, E.H. 1991. "Listeria, Listeriosis, and Food Safety." Marcel Dekker, Inc. New York. pp.405–462.
39. Sanderson, K., Thomas, C.J. and McMeekin, T.A. 1991. Molecular basis of the adhesion of *Salmonella* serotypes to chicken muscle fascia. *Biofouling* 5:89–101.
40. Schillinger, U. and Lucke, F.K. 1989. Antibacterial activity of *Lactobacillus sake* isolated from meat. *Appl. Environ. Microbiol.* 55:1901–1906.
41. Shelef, L.A. 1989. Survival of *Listeria monocytogenes* in ground beef or liver during storage at 4 and 25°C. *J. Food Protection* 52:379–383.
42. Smith, M.G. 1985. The generation time, lag time, and minimum temperature of growth of coliform organisms on meat, and the implications for codes of practice in abattoirs. *J. Hyg., Camb.* 94:289–300.
43. Smith, M.G. 1987. Calculation of the expected increases of coliform organisms, *Escherichia coli* and *Salmonella typhimurium*, in raw blended mutton tissue. *Epidem. Inf.* 99:323–331.
44. Stolle, A. 1981. Spreading of salmonellas during cattle slaughtering. *J. Appl. Bacteriol.* 50:239–245.
45. Tran, T.T., Stephenson, P. and Hitchins, A.D. 1990. The effect of aerobic microfloral levels on the isolation of inoculated *Listeria monocytogenes* strain LM82 from selected foods. *J. Food Safety* 10:267–275.
46. Von Holy, A. and Holzapfel, W.H. 1988. The influence of extrinsic factors on the microbiological spoilage pattern of ground beef. *Int. J. Food Microbiol.* 6:269–280.
47. Wells, J.G., Shipman, L.D., Greene, K.D., Sowers, E.G., Green, J.H., Cameron, D.N., Downes, F.P., Martin, M.L., Griffin, P.M., Ostroff, S.M., Potter, M.E., Tauxe, R.V. and Wachsmuth, I.K. 1991. Isolation of *Escherichia coli* serotype 0157:H7 and other shiga-like-toxin-producing *E. coli* from dairy cattle. *J. Clin. Microbiol.* 29:985–989.
48. Weissmann, M.A. and Carpenter, J.A. 1969. Incidence of salmonellae in meat and meat products. *Appl. Microbiol.* 7:899–902.

IV. Hazard Analysis

Epidemiological data (section II, A–E) indicate that three microorganisms have accounted for 94% of the outbreaks in which beef has been implicated. Raw beef has been a major source for salmonellae in the outbreaks. Raw beef has been one of many potential sources