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Penetration of aerobic bacteria into meat: A mechanistic understanding

Hiroaki Shirai, Ashim K. Datta, Seiichi Oshita, Yoshio Makino

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1 Penetration of aerobic bacteria into meat: a mechanistic understanding

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3 Hiroaki Shirai^a, Ashim K. Datta^{b*}, Seiichi Oshita^a, Yoshio Makino^a4
5 ^a Department of Biological and Environmental Engineering, Graduate School of Agricultural
6 and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan7 ^b Department of Biological and Environmental Engineering, Cornell University, 208
8 Riley-Robb Hall, Ithaca, NY 14853-5701, USA9
10 *Corresponding author

11 Ashim K. Datta

12 Tel: +1 607 255 2482

13 Fax: +1 607 255 4449

14 Email: akd1@cornell.edu

15 Address: Cornell University, 208 Riley-Robb Hall, Ithaca, NY 14853-5701, USA

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17 **Abstract**18 Understanding bacterial penetration into meat is critical to make it safe for consumption. A
19 mathematical model for transport of aerobic bacteria into meat was developed that
20 includes bacterial motility, chemotaxis driven by oxygen concentration, and growth. The
21 effect of proteolysis was also included in the model and the proteolytic kinetic parameters
22 of *Pseudomonas* spp. on sarcoplasmic protein from poultry were measured. Deeper
23 penetration into the meat due to motility is counteracted by chemotaxis toward the
24 surface where oxygen concentration is higher and by a reduction in motility at deeper
25 locations due to oxygen starvation. More rapid bacterial penetration during proteolysis is
26 due to both high motility and increased oxygen diffusion (reduced starvation and
27 chemotaxis) in a reduced viscosity fluid caused by the degradation of the sarcoplasmic
28 protein. Penetration rates in both *proteolytic* and *non-proteolytic* bacteria are affected
29 more by oxygen starvation than by chemotaxis toward oxygen.
3031 **1. Introduction**32 World meat consumption continues to increase (FAO, 2003). When inspecting meat for
33 bacteriological safety, the degree of contamination is checked using, e.g., the swab

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