SUPPLEMENTARY MATERIAL

Supplementary Table S1. Frequencies of *rpoB* allelic types (AT) used in the baseline model and associated growth parameters[1] (at 6°C) used in the base model and model validations[1]

AT	Frequency[2] in New York milk[3]	Frequency in Texas milk[4]	Lag phase duration (d)	Maximum growth rate (ln CFU/mL per day)	N_{max} (log_{10}CFU/mL)
3	0.302	0.040	6.6	1.1	5.8
100	0.088	0	10.4	1.0	6.5
15	0.308	0.256	1.9	0.6	6.5
513	0	0.149	5.7	0.7	6.4
61	0.019	0.182	13.4	1.5	6.4
45	0.094	0.041	18.2	1.0	7.7
179	0.138	0.165	5.0	0.8	7.7
340	0.013	0.017	3.5	0.8	7.4
17	0.038	0.149	3.0	1.3	7.4

[1] All growth parameters shown had previously been reported by Buehler et al. (2018)

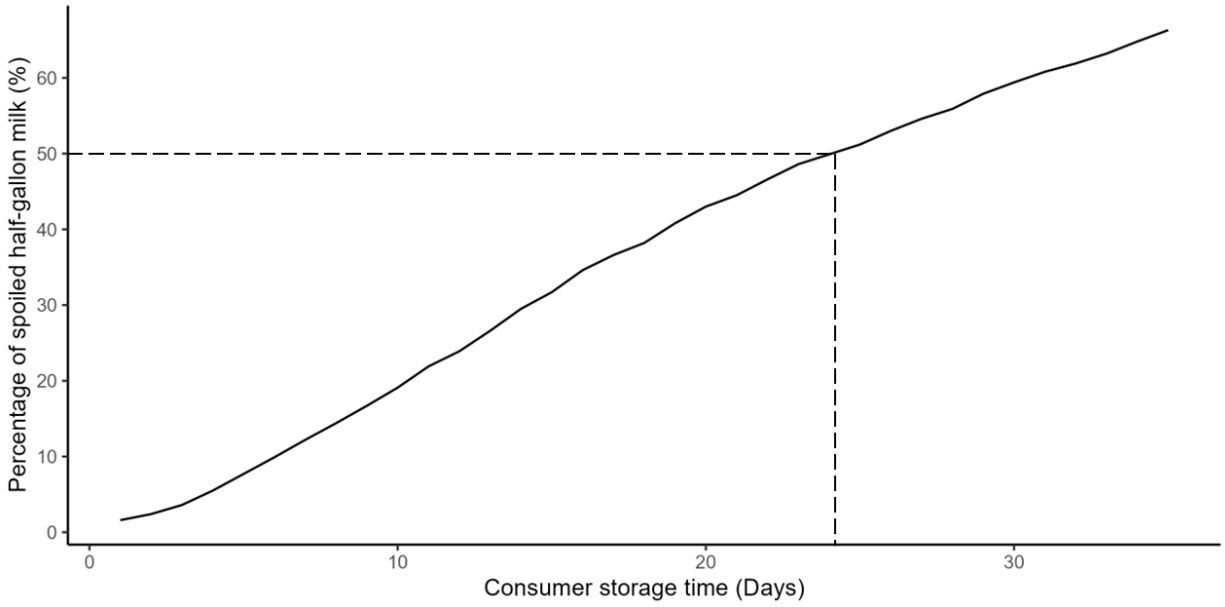
[2] Frequencies reported represent the overall "assigned" AT frequencies, which were used as model inputs; "assigned" AT frequencies represent the sum of the frequencies for a given AT (e.g., AT3) and all closely related ATs that were assigned with the same growth parameters as that given AT.

[3] This frequency distribution is based on data from raw milk samples collected in New York (Buehler et al., 2018) and was used for validation 1 and 3 as well as baseline model, sensitivity analyses, and what-if scenarios

[4] This frequency distribution is based on data of ATs representing 121 isolates (that can grow in skim milk broth at 6°C) from raw milk samples collected in Texas, including (i) 91 isolates from Lott et al. (2023) and (ii) 30 isolates from an unpublished study (Kent, unpublished); this distribution was used for validation 2.

Supplementary Table S2. The product temperature (measured using an infrared thermometer at the exterior of the packaging) and turnover time recorded in 2013 for fluid milk samples stored in 26 retail stores located in Rochester, Syracuse, and Ithaca New York (one sample per store).

Location	Product package temperature (°C)	Product turnover time (day)
Rochester	4.6	1.00
Rochester	4	1.00
Rochester	2	1.00
Rochester	1.2	1.00
Syracuse	3.6	0.08
Syracuse	2.4	0.50
Syracuse	2.4	0.17
Ithaca	3.6	3.00
Ithaca	5.4	2.00
Ithaca	4.4	1.00
Ithaca	2.6	0.04
Rochester	2.4	2.00
Rochester	2.2	3.50
Rochester	2.4	3.00
Rochester	3.6	1.00
Rochester	4.4	10.00
Syracuse	-0.6	5.00
Syracuse	1	2.00
Syracuse	2.8	2.00
Syracuse	3	1.00
Syracuse	0.2	1.00
Ithaca	0	1.00
Ithaca	2.4	3.00
Ithaca	-0.2	1.00
Ithaca	0.4	1.00
Rochester	-1.4	0.08



Supplementary Figure S1. Baseline model result: The predicted percentage of spoiled half-gallon milk containers (i.e., with bacterial concentration > 20,000 CFU/mL) over consumer storage time. The predicted percentages on day 14 and 21 were 28.6 and 44.3 % respectively. The vertical dashed line extending to the x-axis pinpoints the expected shelf life, which is defined as the date at which no more than 50% (shown by the horizontal dashed line) of containers of milk were spoiled.

Buehler, A.J., N.H. Martin, K.J. Boor, and M. Wiedmann. 2018. Psychrotolerant spore-former growth characterization for the development of a dairy spoilage predictive model. J. Dairy Sci. 101:6964–6981. doi:10.3168/JDS.2018-14501.

Lott, T.T., M. Wiedmann, and N.H. Martin. 2023. Shelf-life storage temperature has a considerably larger impact than HTST pasteurization temperature on the growth of spore-forming bacteria in fluid milk. J. Dairy Sci.