TESTIMONY ON RAW MILK BENEFITS AND RISKS FOR IOWA SUBCOMMITTEE HEARING ON SENATE STUDY BILL 3126

Peg Coleman, Medical Microbiologist/Risk Analyst

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EXPERIENCE AND CREDENTIAL HIGHLIGHTS

Margaret E. (Peg) Coleman, MS[2]

➢Medical microbiologist with 30+ years risk analyst experience with USDA and consulting companies, two graduate degrees

- Medical Microbiology (U.Georgia,College of Veterinary Medicine)
- Biology/Biochemistry (Utah State University)

➢Resume documents extensive publications in peer-reviewed literature on microbial benefits and risks (1998-2022)

➢Expert certified in microbial ecology and microbial risk assessment for multiple court proceedings

➢Fellow of Society for Risk Analysis, Advisory Board member of the Raw Milk Institute

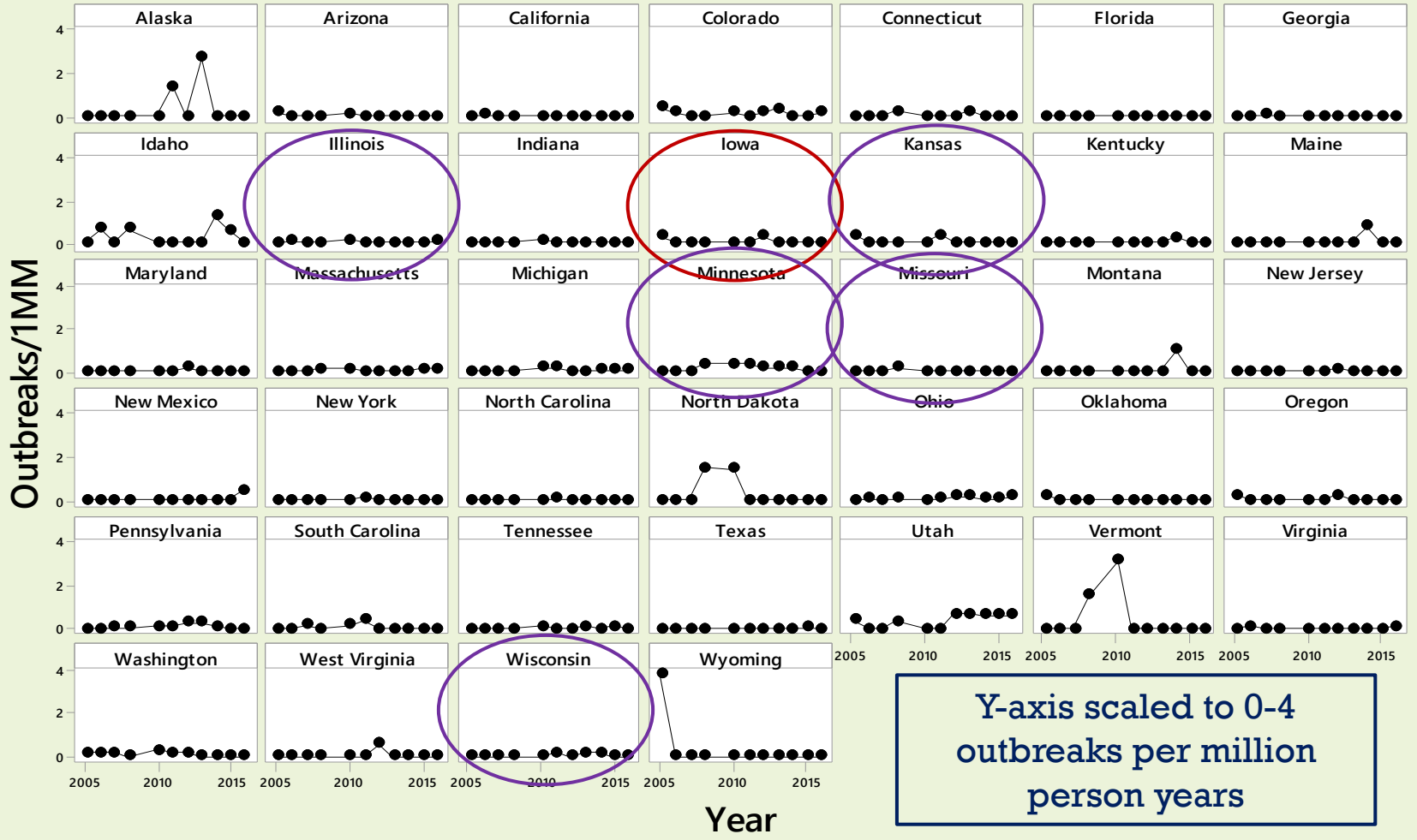
peg@colemanscientific.org; http://www.colemanscientific.org/

RECENT EVIDENCE CONTRADICTS MISCONCEPTIONS ABOUT RAW MILKS

- The assumption of 20th century thinking that breastmilk and cow milk are sterile is a MYTH replaced by 21st century science on milk microbiota
- Milk microbiota now known to contribute to healthy gut, immune, neural, and respiratory systems (Coleman et al., 2021a,b; Dietert et al., 2022)
- *Pathogens* grows faster in milk **AFTER** pasteurization kills competing natural microbes; increased rates with increasing temperature (Stasiewicz et al., 2014)
- Recent body of scientific evidence including outbreak rates, predictive microbiology experiments, and human clinical studies informs estimates of benefits and risks

INDEPENDENT STATISTICAL ANALYSIS BY STATE:

No Increasing Trend for Raw Milk Outbreak Rates



Y-axis scaled to 0-4 outbreaks per million person years

Similarly, no increasing trend for rates of illness and hospitalization, figures appended

Zero raw milk outbreaks reported for NE, SD (data CDC, US Census 2005-2016)

SOME PATHOGEN-SPECIFIC DATA FROM CDC DATASET (2005-2017)

	# 'campy' outbreaks	# 'campy' illnesses	# 'listeriosis' outbreaks	# 'listeriosis' illnesses
Raw Milk	99	1266	1	2 (2 deaths)
Pasteurized Milk	2	1844	1	5 (3 deaths)

QUANTITATIVE MICROBIAL RISK ASSESSMENTS
Estimated Risks for Listeriosis in Milks

FDA/FSIS (2003); update by independent researchers (Latorre et al., 2011)

Pasteurized Milk

- 90.8 deaths per year (high risk)
- 10^{-9} per serving or 1 case in **1,000,000,000 exposures** (moderate risk)

Unpasteurized Milk

- 3.1 deaths per year (moderate risk)
- 7×10^{-9} per serving or **7 cases in 1,000,000,000 exposures** (high risk)

FDA/FSIS

- ~2×10^{-15} per serving or **2 cases in 1,000,000,000,000,000 exposures** (very low risk)

Latorre

EXTREMELY LOW PERCENTAGE POSITIVES FROM RAW MILK MONITORING PROGRAMS IN US AND AROUND THE WORLD

Recent Results from Pathogen Testing for Raw Milk from 6 Countries	*Campylobacter*	*E. coli* O157:H7 or EHECs	*L. monocytogenes*	*Salmonella*
PERCENTAGE POSITIVE	**93/9,740 (0.01%)**	**26/10,934 (<0.01%)**	**40/9,118 (<0.01%)**	**14/7,976 (<0.01%)**

From Table 1 in peer-reviewed publication by Dietert and colleagues (2022; full table appended)

NO GROWTH OF MAJOR PATHOGENS IN REFRIGERATED RAW MILK

- Pathogen growth study conducted by an independent certified laboratory (FSNS, 2022) documents **no growth** of four major pathogens (*Campylobacter*, *E. coli* O157:H7, *L. monocytogenes*, *Salmonella*) in refrigerated raw milk (4.4 C or 40 F)
- Preparation of a manuscript based on this FSNS study is underway for submission to a peer review journal later this year

REASONING FROM AVAILABLE EVIDENCE

- One CA dairy produced ~1,352,000 gallons of fluid raw milk for retail markets from 2018 to 2020, representing about 20,480,000 servings of 250 mL

- No outbreaks of illness associated with raw milk reported in CA for this period

- Available data consistent with a risk of illness **less than 1 in over 20 million servings** for retail raw milk consumers in CA

SOME RECENT PEER-REVIEWED STUDIES

- **2021a**: Coleman, M.E., Dietert, R.R., North, D.W., Stephenson, M.M. Enhancing Human Superorganism Ecosystem Resilience by Holistically 'Managing Our Microbes'. *Applied Microbiology* 1(3): 471-497. https://doi.org/10.3390/applmicrobiol1030031.

- **2021b**: Coleman, M.E., North, D.W., Dietert, R.R., Stephenson, M.M. Examining Evidence of Benefits and Risks for Pasteurizing Donor Breastmilk. *Applied Microbiology* 1(3):408-425. https://doi.org/10.3390/applmicrobiol1030027.

- **2022**. Dietert, R.R., Coleman, M.E., North, D.W., Stephenson, M.M. Nourishing the Human Holobiont to Reduce the Risk of Non-Communicable Diseases: A Cow's Milk Evidence Map Example. *Applied Microbiology* 2(1):25-52. https://doi.org/10.3390/applmicrobiol2010003.

- **2022**. North, D.W., Coleman, M.E., Hull, R.R. Need for International Workshops to Deliberate Evidence of Benefits and Risks of Raw Milks. Accepted in *Corpus Journal of Dairy and Veterinary Science*.

- 2022. Azzolina, N.A. and Coleman, M.E. Detailed Statistical Analysis of CDC Outbreaks Associated with Raw and Pasteurized Dairy (2005-2019). In preparation.

BACKUP SLIDES

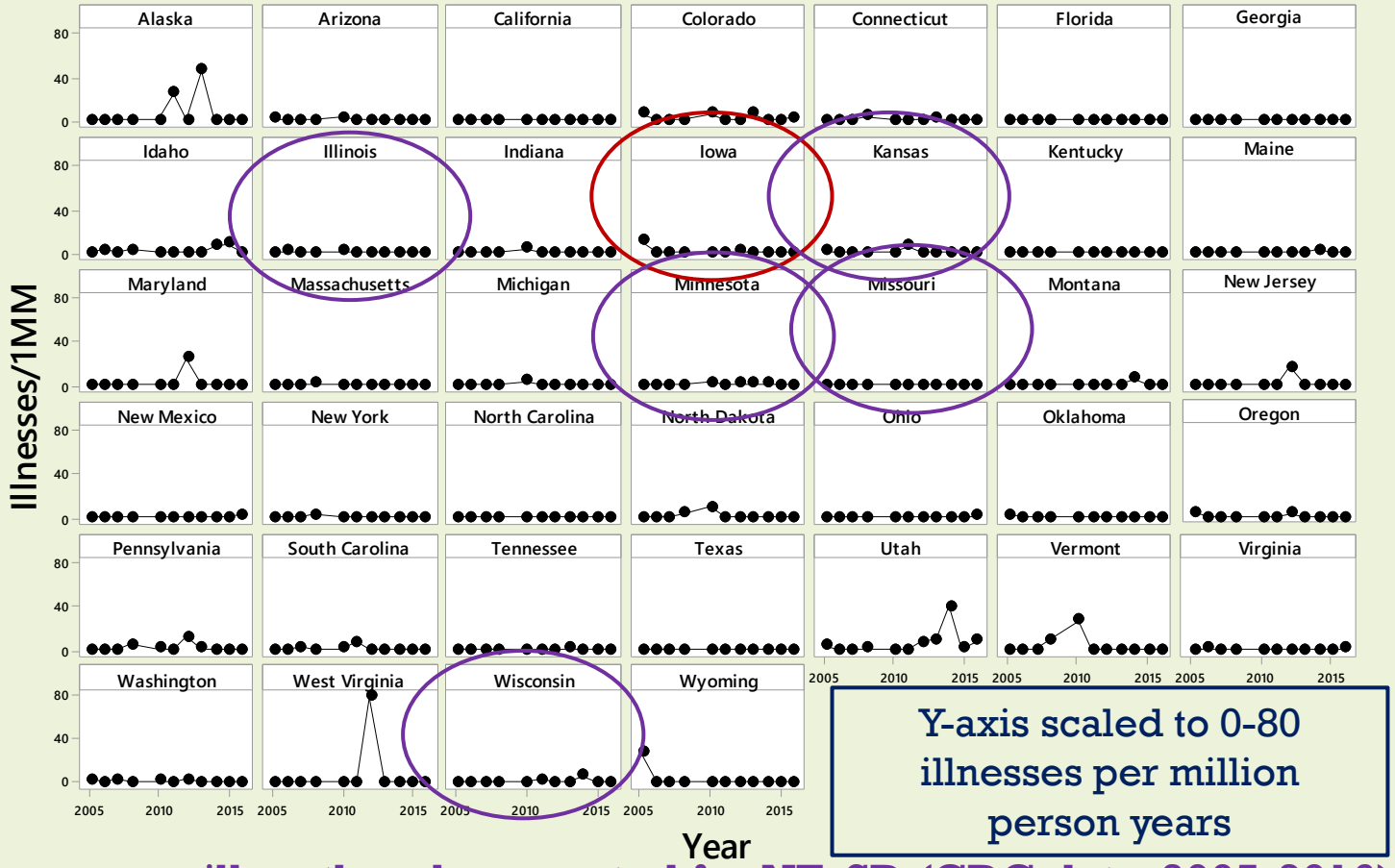
TABLE 1, DIETERT ET AL., 2022

Country (Reference)	Dates (State if US)	*Campylobacter*	*E. coli* O157:H7 or EHECs	*L. monocytogenes*	*Salmonella*
Canada (BCHA, 2021; website listed above)	2015-2021	**0**/192	**0**/192	**0**/192	**0**/192
Poland (Andrzejewska et al., 2019, [91])	2014-2018	**0**/113 vending machines; 26/221 (12%) *C. jejuni*, directly from farmers	Not Tested	Not Tested	Not Tested
UK (McLauchlin et al, 2020, [92])	2017-2019	18/635 (2.8%)	**0**/58 O157; 3/304 EHEC (0%, 1%)	1/642 (0.2%)	3/622 (0.5%)
UK (Willis et al., 2018, [93])	2014 – 2016 (routine monitoring)	2/770 (<0.01%)	2/770 (<0.01%)	2/770 >100 cfu/mL (<0.01%)	**0**/770
US State Monitoring (database of FOIA source data from licensed farms; Stephenson and Coleman, 2021, [90])	2009-2014 (CA)	**0**/61	**0**/61	**0**/61	**0**/61
	2009-2014 (NY)	6/783 (0.7%)	**0**/782	1/781 (0.1%)	**0**/780
	2009-2014 (TX)	4/601 (0.7%)	**0**/596	4/596 (0.7%)	11/606 (1.8%)
	2012-2015 (WA)	**0**/497	**0**/502 2/501 (0.4%)	**0**/502	**0**/494
Germany (Berge & Baars, 2020, [84])	2001-2015 (VZM)	7/2,352 (0.3%)	17/2,737 (0.7%)	30/2,999 (1%)	**0**/3,367
Germany (Berge & Baars, 2020, [84])	2001-2015 (not for direct consumption raw, pre-pasteurized)	17/2,258 (0.8%)	82/5,433 (1.5%)	52/2,355 (2.2%)	**0**/1,084
Finland (Castro et al., 2017, [94])	2013-2015	Not Tested	Not Tested	5/105 retail bottles (4.8%) 2/115 bulk tanks (1.7%)	Not Tested
Finland (Jaakkonen et al., 2019, [95])	2014-2015	**0**/789	**0**/789 O157:H7; 2/789 O121:H19 (<1%)	Not Tested	Not Tested
US (Del Collo et al., 2017, [96])	2014 (17 states)	13/234 culture; 27/234 PCR (6%; 12%)	Not Tested	Not Tested	Not Tested
OVERALL PERCENTAGE POSITIVE		**93/9,740 (0.01%)**	**26/10,934 (<0.01%)**	**40/9,118 (<0.01%)**	**14/7,976 (<0.01%)**

INDEPENDENT STATISTICAL ANALYSIS BY STATE:

No Increasing Trend for Illness Rates

Verified by Mann-Kendall Test for Trend



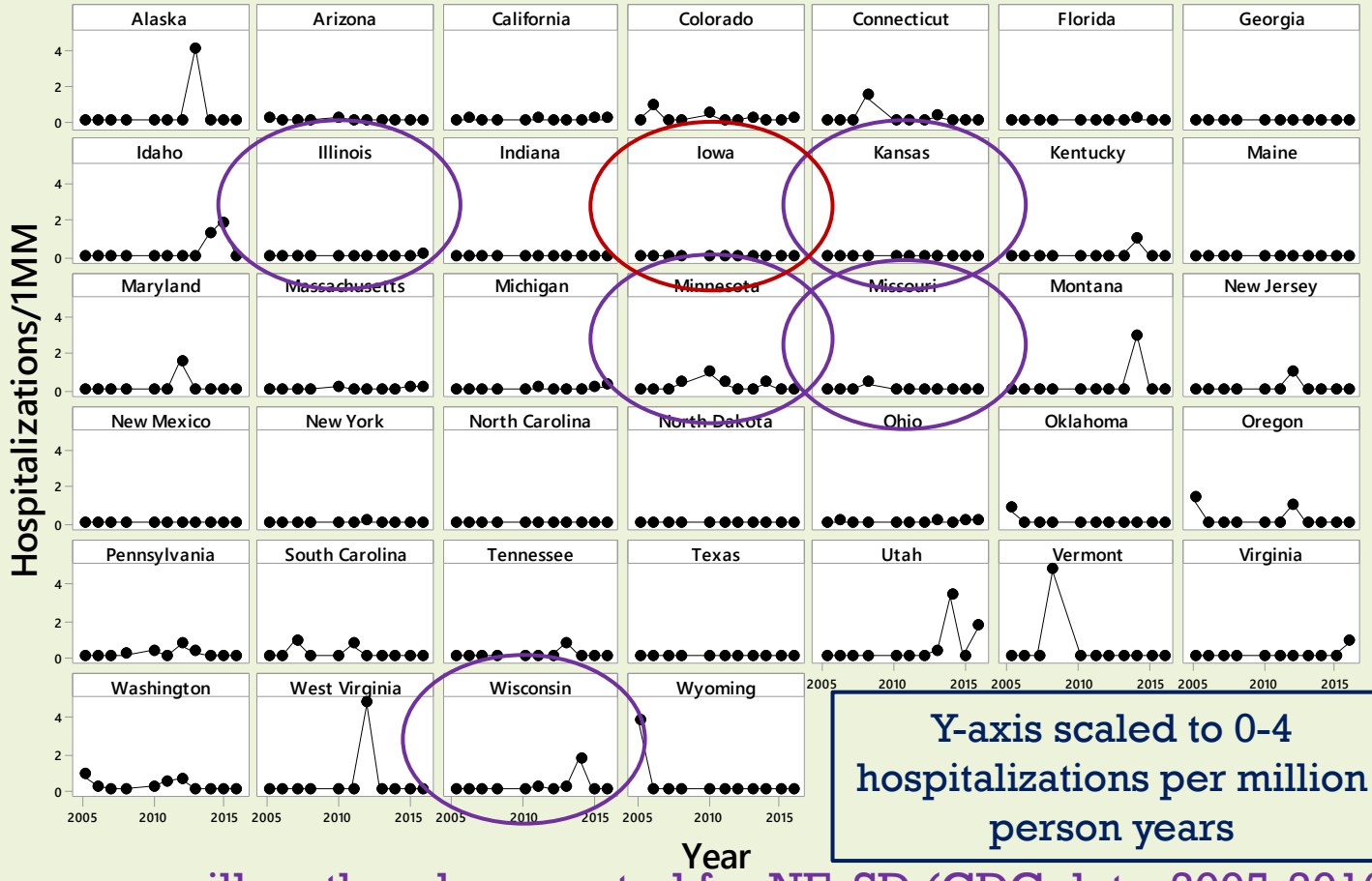
Y-axis scaled to 0-80 illnesses per million person years

Zero raw milk outbreaks reported for NE, SD (CDC data, 2005-2016)

INDEPENDENT STATISTICAL ANALYSIS BY STATE:

No Increasing Trend for Hospitalization Rates

Verified by Mann-Kendall Test for Trend



Y-axis scaled to 0-4 hospitalizations per million person years

Zero raw milk outbreaks reported for NE, SD (CDC data, 2005-2016)