

2018

Using the Public Nuisance Doctrine to Combat Antibiotic Resistance

Amanda Purcell

American University Washington College of Law

Follow this and additional works at: <https://digitalcommons.wcl.american.edu/aulr>



Part of the [Food and Drug Law Commons](#), and the [Health Law and Policy Commons](#)

Recommended Citation

Purcell, Amanda (2018) "Using the Public Nuisance Doctrine to Combat Antibiotic Resistance," *American University Law Review*: Vol. 68 : Iss. 1 , Article 7.

Available at: <https://digitalcommons.wcl.american.edu/aulr/vol68/iss1/7>

This Comment is brought to you for free and open access by the Washington College of Law Journals & Law Reviews at Digital Commons @ American University Washington College of Law. It has been accepted for inclusion in American University Law Review by an authorized editor of Digital Commons @ American University Washington College of Law. For more information, please contact kclay@wcl.american.edu.

Using the Public Nuisance Doctrine to Combat Antibiotic Resistance

USING THE PUBLIC NUISANCE DOCTRINE TO COMBAT ANTIBIOTIC RESISTANCE

AMANDA PURCELL*

Antibiotics are vital for modern medicine. Without them, people could die from mere scratches that become infected, and important medical procedures such as caesarean sections, cancer treatments, hip replacements, and organ transplants would not be feasible. Unfortunately, though, bacteria are becoming increasingly more resistant to antibiotics, posing one of the most serious health threats in the United States and abroad. In fact, a single strain of bacteria, methicillin-resistant S. aureus (MRSA), kills more Americans annually “than emphysema, HIV/AIDS, Parkinson’s disease, and homicide combined.” The subtherapeutic use of antibiotics in agricultural settings contributes to the rise of antibiotic resistance, while not providing enough benefits to outweigh the harms. Despite this, the U.S. government has failed to adequately address antibiotic misuse.

The public nuisance doctrine provides a novel strategy for combating the improper use of antibiotics in livestock. A public nuisance is based on an unreasonable interference with a right common to the public, which has traditionally included public health. Improper subtherapeutic antibiotic use is a threat to public health because it increases the risk and incidence of antibiotic-resistant infections and threatens continued availability of effective antibiotics. Unlike in the past, the relationship between subtherapeutic antibiotic use and increased antimicrobial resistance is now undeniable, and viable alternatives

* Senior Staff Member, *American University Law Review*, Volume 68; J.D. Candidate, May 2019, *American University Washington College of Law*; B.A., Public Policy, 2015, *The College of William & Mary*. I would like to thank Professor Lindsay Wiley, an exceptional human, professor, and faculty advisor, whose guidance transformed my vague topic idea into the kind of niche commentary befitting a journal contribution. I am deeply grateful to my *Law Review* colleagues for their tremendous help in preparing this piece for publication, and to my family and friends for their willingness to continue liking me in spite of my long, law-school-induced absences. Above all, I thank my husband, Bobby Kogan, who has provided me with love and support enough to warrant at least 1,000 more footnote acknowledgements.

exist for producers to keep their livestock healthy. Although some have bemoaned the public nuisance doctrine as an “impenetrable jungle” and a “wilderness of law,” it is capable of “adapt[ing] to changing scientific and factual circumstances” and providing an alternative avenue for protecting the public.

TABLE OF CONTENTS

Introduction.....	341
I. Scientific Background.....	344
A. The Importance of Antibiotics.....	344
B. The Use of Antibiotics in Farm Animals.....	346
C. U.S. Government Action on Antibiotic Misuse.....	348
II. Legal Background.....	349
A. Source of the Public Nuisance Doctrine.....	351
B. Bringing a Public Nuisance Claim.....	352
1. Standing.....	353
2. Elements of public nuisance.....	356
a. A right common to the public.....	356
b. An unreasonable interference.....	359
c. Proximate causation.....	360
C. Right-to-Farm Laws: Complications for State Nuisance Claims.....	364
III. Analysis.....	366
A. Improper Antibiotic Use Interferes with Public Health.....	366
B. Improper Antibiotic Use is an Unreasonable Interference.....	368
C. Enough Scientific Data Exist to Support Proximate Causation.....	370
D. Both Private and Public Plaintiffs Could Bring an Antibiotic Misuse Public Nuisance Action.....	373
E. Right-to-Farm Laws Are Not Insurmountable.....	376
Conclusion.....	377

INTRODUCTION

“Most evolving lineages, human or otherwise, when threatened with extinction, don’t do anything special to avoid it.”

—George C. Williams, evolutionary biologist¹

Obscured by a barrage of meticulously reported modern horrors—the specter of nuclear war, climate change, cyberterrorism, etc.—unglamorous threats such as antimicrobial resistance (AMR)² brew quietly and menacingly in the background. For example, whereas even highly insulated Americans were terrified by the Ebola outbreak of 2014, far fewer appreciate the local and ongoing public health threat of AMR.³ Yet, unknown to most, Ebola claimed 11,310 lives worldwide from 2014 to 2016, with only one death in the United States,⁴ while AMR is responsible for 23,000 deaths in the United States *each year*.⁵ Globally, 700,000 people die annually of resistant infections, and this figure is expected to balloon to ten million deaths annually by 2050, costing \$100 trillion in economic output.⁶

1. Frans Roes, *A Conversation with George C. Williams*, 107 NAT. HIST. 10, 10 (Feb. 1998).

2. The term *antimicrobials* encompasses antibacterials (commonly known as *antibiotics*), antivirals, antiprotazoals, and antifungals, all of which should be used judiciously. See *Pharmacology*, UNIV. MINN.: ANTIMICROBIAL RESISTANCE LEARNING SITE, <https://amrls.umn.edu/antimicrobial-resistance-learning-site/pharmacology> (last visited Oct. 17, 2018).

3. An October 2014 Pew Research Center survey found that ninety-eight percent of those polled had heard at least a little about the Ebola virus with forty-nine percent tracking news about Ebola “very closely,” and forty-one percent worried they would be exposed to the virus. *Ebola Worries Rise, but Most Are ‘Fairly’ Confident in Government, Hospitals to Deal with Disease*, PEW RES. CTR.: U.S. POL. & POL’Y (Oct. 21, 2014), <http://www.people-press.org/2014/10/21/ebola-worries-rise-but-most-are-fairly-confident-in-government-hospitals-to-deal-with-disease>. In comparison, a 2012 report found that forty-one percent of those polled had heard “just some or nothing about” AMR, and participants “were apt to consider the resistance problem to be a lower-tier one—it did not rise to the importance of issues such as cancer, obesity, or heart disease.” Hart Research Associates and Public Opinion Strategies, *Americans’ Knowledge of and Attitudes Toward Antibiotic Resistance* 5, 7 (2012), http://www.pewtrusts.org/~media/legacy/uploadedfiles/phg/content_level_pages/in_the_news/abxpollsummary.pdf.

4. *2014–2016 Ebola Outbreak in West Africa*, CDC, <https://www.cdc.gov/vhf/ebola/history/2014-2016-outbreak> (last visited Oct. 17, 2018).

5. See CDC, ANTIBIOTIC RESISTANCE THREATS IN THE UNITED STATES, 2013 6 (2013), <https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>.

6. THE REVIEW ON ANTIMICROBIAL RESISTANCE, TACKLING DRUG-RESISTANT INFECTIONS GLOBALLY: FINAL REPORT AND RECOMMENDATIONS 1 (2016), https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf.

More troubling still, AMR is difficult to combat because it emerges from many sources, each of which might alone be insignificant, but which combined create a serious public health threat.⁷ Antimicrobials are ubiquitous—they are administered *by* various methods, *for* various purposes, *in* various settings. As a result, AMR is the type of problem that humans are notoriously ill-equipped to address—chronically germinating, causally complex, enormous in scale, and temporally distant.⁸

While the natural response to an overwhelming threat is inaction, the more productive response is to target the manageable elements of the complex issue. In that spirit, this Comment will address a particularized, but important, source of AMR in the United States: the improper use of antibiotics in livestock. For decades, antibiotic use in livestock has gone relatively unchecked by regulators and legislators, yet it continues to endanger Americans by fostering resistant bacteria that infect humans and other animals, while also threatening the continued availability of antibiotics to the public.⁹

Since the 1950s, antibiotics have been administered to livestock at subtherapeutic levels, meaning at levels too low for an antibiotic to act as a therapy for a disease.¹⁰ At subtherapeutic levels, antibiotics are used not just to treat disease, but also sometimes in the absence of any disease for purposes like increasing animal growth and preventing

7. See *id.* at 10 (explaining that increased use of antibiotics causes antimicrobial resistance to develop more quickly than it would naturally); Rajesh R. Uchil et al., *Strategies to Combat Antimicrobial Resistance*, 8 J. CLINICAL & DIAGNOSTIC RES. 1, 3 (July 2014) (recommending that antimicrobial resistance be combatted through multiple channels because the widespread use of antibiotics in many settings contributes to the accelerated development of antimicrobial resistance).

8. See Andy Murdock, *Why Humans Are so Bad at Thinking About Climate Change*, VOX (Apr. 19, 2017, 9:10 AM), <https://www.vox.com/videos/2017/4/19/15346442/humans-climate-change-psychology> (discussing how temporal and spatial distance of problems and feelings of hopelessness make it difficult for humans to care about issues like climate change and highlighting the need to make climate change more “personal”); see also *Humans Wired to Respond to Short-Term Problems*, NPR (July 3, 2006, 2:15 PM), <https://www.npr.org/templates/story/story.php?storyId=5530483> (“[T]he human brain evolved to respond to immediate threats but may completely miss more gradual warning signs.”).

9. See Beth Gardiner, *Taking on the Superbugs*, N.Y. TIMES (Oct. 19, 2015), <https://www.nytimes.com/2015/10/20/business/energy-environment/taking-on-the-superbugs-antibiotics.html>; Giorgia Guglielmi, *Are Antibiotics Turning Livestock into Superbug Factories?*, SCIENCEMAG (Sept. 28, 2017), <http://www.sciencemag.org/news/2017/09/are-antibiotics-turning-livestock-superbug-factories>.

10. See 21 C.F.R. § 558.15(a) (2016); Bonnie M. Marshall & Stuart B. Levy, *Food Animals and Antimicrobials: Impacts on Human Health*, 24 CLINICAL MICROBIOLOGY REVS. 718, 718 (2011).

disease.¹¹ In 2011, the Natural Resources Defense Council, the Center for Science in the Public Interest, Public Citizen, and the Union of Concerned Scientists filed a complaint to compel the Food and Drug Administration (FDA) to withdraw approval for subtherapeutic uses in animal feed of two important antibiotics.¹² Unfortunately, the plaintiffs were ultimately unsuccessful, amounting to yet another failed attempt to address antibiotic misuse.¹³ These persistent failures to satisfactorily address antibiotic misuse signal the need for a novel legal approach for curtailing improper antibiotic use in livestock that does not rely on the FDA or the legislatures.

This Comment proposes that, given the inadequacy of regulatory and legislative solutions, public nuisance lawsuits provide an alternative means for combatting improper antibiotic use in livestock as an unreasonable interference with public health, despite potential state-law impediments to nuisance lawsuits. Part I will discuss how the use of antibiotics in livestock increases AMR for both humans and other animals.¹⁴ Part II will provide an overview of the public nuisance doctrine's historical and modern applications, in addition to elucidating the elements required for a public nuisance claim.¹⁵ Part II will also discuss state right-to-farm laws, which sometimes pose barriers

11. *Id.*

12. See Compl. for Declaratory and Injunctive Relief at 2, Nat. Res. Def. Council, Inc. v. FDA, 760 F.3d 151 (2d Cir. 2014) (No. 11 CV 3562) (basing their requested order compelling the FDA to withdraw approval for two antibiotics on an FDA finding in 1977 that the antibiotics were unsafe for use in animal feeds because they “were contributing to the development of antibiotic-resistant bacteria that could be transferred to humans,” which the agency never pursued further).

13. See *Nat. Res. Def. Council*, 760 F.3d at 175 (concluding that the FDA had discretion to terminate a hearing process that could lead to withdrawing approval for the antibiotics). See generally Sidney A. Shapiro, *Overuse of Antibiotics in Concentrated Animal Feeding Operations: Regulation and Tort Law*, 47 ENVTL L. 557 (2017) (discussing “the potential role of the tort system to plug the regulatory gap created by the reluctance of the Food and Drug Administration . . . to reduce the use of antibiotics in animal food production”); Christine Donovan, Note, *If FDA Does Not Regulate Food, Who Will? A Study of Hormones and Antibiotics in Meat Production*, 41 AM. J.L. & MED. 459, 467–71, 475–77 (2015) (discussing the agencies involved in regulating food safety and the under-regulation of antibiotics as a result of industry influence over Congress and the FDA); Sarah R. Haag, Note, *FDA Industry Guidance Targeting Antibiotics Used in Livestock Will Not Result in Judicious Use or Reduction in Antibiotic-Resistant Bacteria*, 26 FORDHAM ENVTL. L. REV. 313, 321–24 (2015) (discussing the various agencies involved in regulating antibiotics and failed attempts over the last forty years to reduce use of antibiotics in livestock).

14. See *infra* Part I.

15. See *infra* Part II.

to nuisance claims.¹⁶ Part III will argue that both private and public plaintiffs can use public nuisance claims to curb the improper use of antibiotics, despite right-to-farm laws, and that improper antibiotic use is a much more suitable target for the public nuisance doctrine than many of its other modern applications.¹⁷

I. SCIENTIFIC BACKGROUND

In concert with other public health improvements, antibiotics have extended the average American's life expectancy from 56.4 years in 1920 to 80 years as of 2005, through control or eradication of bacterial infections.¹⁸ Unfortunately, bacterial resistance has invariably emerged alongside the development and use of each antibiotic, rendering them less effective.¹⁹ Use of antibiotics in livestock for disease treatment, control, and prevention as well as for growth promotion contributes significantly to antibiotic resistance, with negative implications for human health.²⁰ Despite scientists' concern over antibiotic use in livestock since the mid-1950s, various U.S. government actors have failed to adequately address antibiotic misuse in agricultural settings.²¹

A. *The Importance of Antibiotics*

Antibiotics are vital to modern medicine, but society has forgotten the extent of their importance. Americans most often use antibiotics to cure common, typically non-life-threatening maladies like strep throat, bronchitis, sexually transmitted diseases, and ear, sinus, and urinary tract infections.²² Thus, it is hardly surprising that most do not appreciate, or even realize, that antibiotics have transformed the specter of death historically accompanying these maladies into the

16. See *infra* Part II.

17. See *infra* Part III.

18. C. Lee Ventola, *The Antibiotic Resistance Crisis Part 1: Causes and Threats*, 40 PHARMACY & THERAPEUTICS 277, 278 (2015).

19. See *id.* at 277–78 (providing a timeline of the introduction of new antibiotics and the years in which antibiotic resistance to those same drugs was first identified).

20. See Marshall & Levy, *supra* note 10, at 729.

21. See Sabrina R. Rearick, Comment, *Eliminating Antibiotic Use in Animal Production: Responding to Scientific Evidence of an Impending Global Health Crisis*, 54 DUQ. L. REV. 537, 544–45, 547, 549, 557 (2016) (detailing failed federal legislation, imperfect executive efforts under President Obama, and unrelenting FDA intransigence beginning in the 1960s).

22. See Michael A. Steinman et al., *Changing Use of Antibiotics in Community-Based Outpatient Practice, 1991–1999*, 138 ANNALS INTERNAL MED. 525, 528 (2003) (analyzing trends in antibiotic use for common infections).

specter of an annoying days- to weeks-long pill regimen.²³ Beyond treating infections, antibiotics are integral to medical procedures now taken for granted, such as caesarean sections, cancer treatments, hip replacements, and organ and tissue transplants.²⁴ If society is left without effective antibiotics, even minor infections and surgeries will again be deadly.²⁵ After all, the first man treated with penicillin ultimately succumbed to a horrendous *Staphylococcus* (*S.*) and *Streptococcus* infection once the scientists' supply of penicillin ran out; his infection had been caused by a mere scratch from working in his rose garden.²⁶

The Centers for Disease Control and Prevention (CDC) considers antibiotic resistance one of the most serious health threats in the United States, especially since it is steadily growing.²⁷ Multidrug resistance is especially concerning because it signals the demise of effective antibiotics.²⁸ Ominously, in August 2016, the CDC reported the death of the first American with an infection resistant to *all twenty-six* antibiotics available in the United States.²⁹ Per 2013 estimates, at least two million Americans acquire serious infections from antibiotic-resistant bacteria

23. *Pharyngitis (Strep Throat)*, CDC, <https://www.cdc.gov/groupastrep/diseases-hcp/strep-throat.html> (last visited Oct. 17, 2018) (explaining that antibiotic treatment drastically shortens the duration of strep throat and reduces the probability of spreading viruses and bacteria to others).

24. See Press Association, *Antibiotic Resistance Could Spell End of Modern Medicine, Says Chief Medic*, GUARDIAN (Oct. 13, 2017, 3:41 AM), <https://www.theguardian.com/society/2017/oct/13/antibiotic-resistance-could-spell-end-of-modern-medicine-says-chief-medical-officer> (reporting on a warning from the chief medical officer of England of a “post-antibiotic apocalypse”).

25. See News Release, World Health Org., *The World Is Running Out of Antibiotics, WHO Report Confirms* (Sept. 20, 2017), <http://www.who.int/news-room/detail/20-09-2017-the-world-is-running-out-of-antibiotics-who-report-confirms> (warning that “[a]ntimicrobial resistance is a global health emergency that will seriously jeopardize progress in modern medicine”).

26. Howard Markel, *The Real Story Behind Penicillin*, PBS NEWS HOUR (Sept. 27, 2013, 2:06 PM), <https://www.pbs.org/newshour/health/the-real-story-behind-the-worlds-first-antibiotic>.

27. See CDC, *supra* note 5, at 5. See generally ANTIMICROBIAL RESISTANCE GLOBAL REPORT ON SURVEILLANCE, WHO (2014), http://apps.who.int/iris/bitstream/handle/10665/112642/9789241564748_eng.pdf (reporting on AMR resistance in different regions of the world and in specific pathogens); NATIONAL ANTIMICROBIAL RESISTANCE MONITORING SYSTEM (NARMS) 2014 HUMAN ISOLATES SURVEILLANCE REPORT, CDC (2014), <https://www.cdc.gov/narms/pdf/2014Annual-Report-narms-508c.pdf> (reporting changes in AMR resistance in the United States by pathogen and antimicrobial).

28. CDC, *supra* note 5, at 5.

29. Lei Chen et al., *Notes from the Field: Pan-Resistant New Delhi Metallo-Beta-Lactamase-Producing Klebsiella pneumoniae—Washoe County, Nevada, 2016*, CDC (Jan. 13, 2017), <https://www.cdc.gov/mmwr/volumes/66/wr/mm6601a7.htm>.

annually, and at least 23,000 die from their infections.³⁰ A single strain of bacteria, methicillin-resistant *S. aureus* (MRSA), kills more Americans annually “than emphysema, HIV/AIDS, Parkinson’s disease, and homicide combined.”³¹ An additional 14,000 people die annually from *Clostridium difficile* (*C. diff.*) infections, many preventable, which develop in part from antibiotic use.³² The annual national cost associated with antibiotic resistance is estimated to be \$55 billion, with \$20 billion in direct costs and \$35 billion from lost productivity.³³

B. *The Use of Antibiotics in Farm Animals*

Eighty percent of antibiotic sales in the United States are of antibiotics bought for use in animal agriculture.³⁴ Antibiotics are administered to livestock for disease treatment, control, and prevention, and, until recently, for growth promotion.³⁵ To cut costs, many producers house livestock in cramped, unsanitary, and stressful conditions, incidentally allowing pathogens to transfer easily, and making each animal “a ‘factory’ for the propagation of multidrug resistance . . . including resistance against drugs that were never used on the farm.”³⁶ In order to sustain deleterious conditions, producers stave off disease by using livestock feed laced with small, subtherapeutic amounts of antibiotics.³⁷

30. CDC, *supra* note 5, at 6.

31. Zhabiz Golkar et al., *Bacteriophage Therapy: A Potential Solution for the Antibiotic Resistance Crisis*, 8 J. INFECTION DEVELOPING COUNTRIES 129, 130 (2014).

32. CDC, *supra* note 5, at 11.

33. *Id.*

34. Joan A. Casey et al., *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection in Pennsylvania*, 173 JAMA INTERNAL MED. 1980, 1981 (2013).

35. Marshall & Levy, *supra* note 10, at 718. Producers began using antibiotics for growth promotion in the 1950s upon discovering that adding small amounts of antibiotics to animal feed enhanced weight gain. *Id.* Only since 2017 has the use of antibiotics for growth promotion been prohibited. *See infra* note 48 and accompanying text.

36. *See id.* at 719; Ellen K. Silbergeld et al., *Industrial Food Animal Production, Antimicrobial Resistance, and Human Health*, 29 ANN. REV. PUB. HEALTH 151, 153 (2008).

37. *See* Ryan Gunderson, *Meat and Inequality: Environmental Health Consequences of Livestock Agribusiness*, in POL. ECOLOGIES OF MEAT 101, 104 (Jody Emel & Harvey Neo eds., 2015) (“The massive amount of veterinary pharmaceuticals used in intensive livestock production is to keep food animals ‘healthy’ in the extremely crowded and filthy conditions where they grow . . .”); *see also* Timothy F. Landers et al., *A Review of Antibiotic Use in Food Animals: Perspective, Policy, and Potential*, 127 PUB. HEALTH REP. 4, 6 (2012) (providing an example of therapeutic versus subtherapeutic use: “16% of all lactating dairy cows in the U.S. receive antibiotic therapy for clinical mastitis each year,

Scientists have found that subtherapeutic antibiotic use propagates AMR, including multidrug resistance.³⁸ Subtherapeutic use entails continuously exposing bacteria to sub-lethal levels of antibiotics, which is “particularly effective” in increasing AMR.³⁹ To some extent, the development of AMR is evolutionarily inevitable, but constant use of antibiotics accelerates the process by killing susceptible bacteria until eventually only resistant bacteria remain, and also by increasing horizontal transfer of resistance genes from bacterium to bacterium.⁴⁰ Horizontal transfer occurs when bacteria that have developed resistance to a certain antibiotic, or to several antibiotics, transfer their resistance genes to other bacteria that have never been exposed to the antibiotic.⁴¹ Resistant bacteria can be transferred from animals to humans via direct contact with the animals, transmission through the food chain, or environmental transfer (e.g., transfer by water or by manure).⁴² Indeed, a recent study found that multidrug-resistant *S. aureus* contaminated thirty-seven to seventy-seven percent of meat samples from grocery stores, with fifty-two percent of the bacterial strains drug-resistant.⁴³

Subtherapeutic antibiotic use is unreasonable because many alternatives to antibiotics for preventing disease exist. By employing better animal husbandry practices, for instance, “equivalent improvements in growth and feed consumption can be achieved by improved hygiene.”⁴⁴ Denmark, for example, successfully banned all subtherapeutic use of antibiotics in pigs by 1999 with little negative effect

but nearly all dairy cows receive intra-mammary infusions of prophylactic doses of antibiotics following each lactation to prevent and control future mastitis”).

38. Marshall & Levy, *supra* note 10, at 719.

39. See Silbergeld, *supra* note 36, at 155 (noting that subtherapeutic use “driv[es] the selection of resistant strains, and under conditions of continued antimicrobial pressure, resistant strains are advantaged in terms of reproduction and spread”).

40. See *id.* at 155–56 (listing the main scientific principles of AMR).

41. See Qiuzhi Chang et al., *Antibiotics in Agriculture and the Risk to Human Health: How Worried Should We Be?*, 8 EVOLUTIONARY APPLICATIONS 240, 243 (2015) (explaining horizontal transfer of resistance genes in greater detail).

42. See Marshall & Levy, *supra* note 10, at 723, 725, 729 (explaining that resistant bacteria spreads through contact with animals, animal products, or animal environments).

43. Andrew E. Waters et al., *Multidrug-Resistant Staphylococcus aureus in U.S. Meat and Poultry*, 52 CLINICAL INFECTIOUS DISEASES 1227, 1229 (2011).

44. Silbergeld, *supra* note 36, at 162 (explaining that crowding animals increases stress, which weakens their immune systems, and increases incidence of injuries); see also Heather K. Allen et al., *Finding Alternatives to Antibiotics*, 1323 ANNALS N.Y. ACAD. SCI. 91, 91–93 (2014) (discussing additional alternatives to antibiotics, including probiotics and prebiotics).

on the pork industry and with a significant decrease in resistant microbes in animals and meat.⁴⁵ More significantly, there are already profitable livestock operations in the United States that have stopped using antibiotics at subtherapeutic levels.⁴⁶

C. U.S. Government Action on Antibiotic Misuse

In January 2017, the FDA finally forbade the use of medically important antimicrobials⁴⁷ in farm animals for growth promotion and, in addition, required that farmers obtain authorization from a veterinarian for other uses of medically important antimicrobials.⁴⁸ While this might seem promising, the Expert Commission on Addressing the Contribution of Livestock to the Antibiotic Resistance Crisis found the measure insufficient.⁴⁹ Most troublingly, subtherapeutic use for disease prevention remains a viable practice, especially since prescribing veterinarians are often employed by large meat production companies.⁵⁰ In addition, growth promotion use constituted only ten to fifteen percent of overall antibiotic use in animals, and many of the antibiotics previously labeled for growth are also labeled for disease prevention—meaning a farmer could continue to use the same antibiotics

45. Sharon Levy, *Reduced Antibiotic Use in Livestock: How Denmark Tackled Resistance*, 122 ENVTL. HEALTH PERSP. A160, A162 (2014).

46. PEW CHARITABLE TR., ANTIBIOTIC-FREE FOOD ANIMAL PRODUCTION: A PROFITABLE PATH FROM THE FARM TO THE TABLE 1–2 (2010) http://www.pewtrusts.org/~media/legacy/uploadedfiles/phg/content_level_pages/issue_briefs/hhifibantibioticfreeproductionpdf.pdf.

47. The FDA uses *medically important antimicrobials* to mean “antimicrobial drugs that are important for therapeutic use in humans.” FDA, Guidance for Industry #209: The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals 3 (2012), <https://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM216936.pdf>.

48. News Release, FDA, FDA Announces Implementation of GFI #213, Outlines Continuing Efforts to Address Antimicrobial Resistance (January 3, 2017); see also Lisa Heinzerling, *The FDA’s Continuing Incapacity on Livestock Antibiotics*, 33 STAN. ENVTL. L.J. 325, 327, 329 (2014) (discussing the FDA’s history of inaction and impotence regarding antibiotics); Christine Donovan, Note, *If FDA Does Not Regulate Food, Who Will? A Study of Hormones and Antibiotics in Meat Production*, 41 AM. J.L. & MED. 459, 470–71, 475–76 (2015) (discussing the role of industry resistance in the FDA’s and the United States Department of Agriculture’s (USDA) failure to regulate antibiotics, as well as comparing U.S. regulation to European regulation).

49. EXPERT COMM’N ON ADDRESSING THE CONTRIBUTION OF LIVESTOCK TO THE ANTIBIOTIC RESISTANCE CRISIS, COMBATING ANTIBIOTIC RESISTANCE 16 (2017), <http://battlesuperbugs.com/sites/battlesuperbugs.com/files/Final%20Report%208.25.17.pdf>.

50. See *id.* at 16–17.

for growth promotion but claim it was for disease prevention.⁵¹ Federal legislative measures to further restrict agricultural antibiotic use have failed, although two states, California and Maryland, have passed more stringent laws that not only prohibit administration of antibiotics for growth promotion, but also curb long-term administration of antibiotics for disease prevention.⁵² Overall though, given the inadequate regulation of antibiotic use, public health proponents ought to consider novel approaches, such as public nuisance lawsuits.

II. LEGAL BACKGROUND

Public nuisance is an old, amorphous common law doctrine with two basic forms. The first form, like private nuisance, arises when a property owner uses his land in a way that interferes with another's right to enjoy her property; if the interference affects a large enough number of people, what would otherwise be a private nuisance is promoted to the status of public nuisance.⁵³ The second, more widely accepted form stems from an "unreasonable interference with a right common to the general public."⁵⁴ Historically, public nuisance actions were brought to remedy the social ills of pre-industrial and industrializing society, including problems like obstructed public highways or waterways and threats to public health.⁵⁵ More recently, parties have attempted to use

51. *Id.* at 16.

52. *See* CAL. FOOD & AGRIC. CODE §§ 14400–08 (West 2015); MD. CODE ANN., AGRIC. §§ 3-1001–06 (West 2017); Press Release, Congresswoman Louise M. Slaughter, Rep. Slaughter, Only Microbiologist in Congress, Introduces Legislation to Save Antibiotics (Mar. 15, 2017) (noting that Congresswoman Slaughter was a cosponsor of the original Preservation of Antibiotics for Medical Treatment Act of 1999 and reintroduced the bill during each of her last four terms in office).

53. *See, e.g.,* Clark v. London & Lancashire Indem. Co. of Am., 124 N.W.2d 29, 33–34 (Wis. 1963) (referring to a public nuisance action in which 194 nearby residents sued the defendant for poor management of a dump, which attracted many rats and flies and caused noxious hydrogen sulfide gas to permeate the neighborhood). *But see* Ganim v. Smith & Wesson Corp., 780 A.2d 98, 131–32 (Conn. 2001) (“Nuisances are public where they violate public rights, and produce a common injury, and where they constitute an obstruction to public rights The test is not the number of persons annoyed, but the possibility of annoyance to the public by the invasion of its rights.” (quoting Higgins v. Conn. Light & Power Co., 30 A.2d 388, 391 (1943))); *infra* note 61 (discussing the evolution of the public nuisance theory).

54. RESTATEMENT (SECOND) OF TORTS § 821B(1) (AM. LAW INST. 1979).

55. *See, e.g.,* Carver v. San Pedro, L.A. & S.L.R. Co., 151 F. 334, 334–35 (C.C.S.D. Cal. 1906) (holding that the defendants' bridge created a public nuisance because it obstructed navigation of a waterway); Seigle v. Bromley, 124 P. 191, 193, 195 (Colo. App. 1912) (finding that a hog farmer's practice of feeding garbage to his pigs was a

public nuisance actions to remedy modern social ills like lead paint, asbestos, guns, genetically modified rice, trans-fats, and opioids.⁵⁶

Because the public nuisance doctrine developed interwoven with the state's police power, a plaintiff may be able to establish causation at a population level rather than at the more onerous individual level.⁵⁷ A private citizen who asserts a public nuisance claim, however, must establish special harm to have standing, which often necessitates something like proof of causation at the individual level.⁵⁸ In general, courts are more likely to require private citizens to prove elements transposed from private nuisance, a tort action.⁵⁹ Because nuisance actions historically had been so successful, all fifty state legislatures have passed right-to-farm laws, limiting nuisance actions against farms

public nuisance because it threatened public health by promoting infectious disease); *Eble v. State ex rel. Leavenworth Cty. Att'y*, 93 P. 803, 804 (Kan. 1908) (concluding that the defendant's fence was a public nuisance because it obstructed a public highway); *Mills v. Hall & Richards*, 9 Wend. 315, 315–17 (N.Y. Sup. Ct. 1832) (determining that overflow created by the defendants' dam was a public nuisance because it fostered malaria).

56. See, e.g., *County of Falls v. Purdue Pharma, LP*, No. 6:18-cv-47-RP-JCM, 2018 WL 1518849, at *1, *4 (W.D. Tex. Mar. 28, 2018) (remanding to state court a case in which Falls County brought a public nuisance claim against pharmaceutical companies that distributed or manufactured opioids); *New Hampshire v. Purdue Pharma*, No. 17-cv-427-PB, 2018 WL 333824, at *1, *4 (D.N.H. Jan. 9, 2018) (remanding to state court a case in which the state of New Hampshire brought a public nuisance claim against a pharmaceutical company that sold and marketed opioids); *Guttmann v. Nissin Foods (U.S.A.) Co.*, No. C 15-00567 WHA, 2015 WL 4309427, at *5–6 (N.D. Cal. July 15, 2015) (rejecting an argument that artificial trans fats are a public nuisance); *In re Genetically Modified Rice Litig.*, 666 F. Supp. 2d 1004, 1018 (E.D. Mo. 2009) (holding that genetically modified rice was not a public nuisance); *Corp. of Mercer Univ. v. Nat'l Gypsum Co.*, No. 85-126-3-MAC, 1986 WL 12447, at *1, *5–7 (M.D. Ga. Mar. 9, 1986) (refusing to hold an asbestos manufacturer responsible in a public nuisance action); *In re Lead Paint Litig.*, 924 A.2d 484, 505 (N.J. 2007) (rejecting an argument that defendants' production and distribution of lead paint was a public nuisance); *City of Chicago v. Beretta U.S.A. Corp.*, 821 N.E.2d 1099, 1147–48 (Ill. 2004) (rejecting a public nuisance claim against a gun manufacturer).

57. See Lindsay F. Wiley, *Rethinking the New Public Health*, 69 WASH. & LEE L. REV. 207, 231 n.95, 237, 266 (2012) (explaining that establishing causation at an individual level requires showing that an identifiable plaintiff's injury is traceable to an identifiable defendant's action or inaction); see also *infra* Section II.B.2.c (explaining that state actors must prove an unreasonable interference with a public right and the interference is caused or maintained by defendants).

58. See *infra* Section II.B.2.c (asserting that plaintiffs required to prove special harm may find it difficult to prove that a certain source caused a harm that accumulated over time).

59. See Karol Boudreaux & Bruce Yandle, *Public Bads and Public Nuisance: Common Law Remedies for Environmental Decline*, 14 FORDHAM ENVTL. L.J. 55, 62–63 (2002) (claiming that private citizens bringing public nuisance cases must base liability on the defendant's negligence).

and farm activities; nevertheless, most of these laws do not preclude nuisance actions concerning public health.⁶⁰

A. *Source of the Public Nuisance Doctrine*

The nebulous legal theory of public nuisance arose in English common law.⁶¹ In a public nuisance action, the King, through his attorney general, could enjoin any action that infringed on rights common to the public.⁶² Unsurprisingly, U.S. common law imported public nuisance theory, substituting individual states in the King's place as protectors of the public.⁶³ In the United States, public nuisance cases have fallen into the general categories of interference with use of a public thoroughfare, public health, public safety, public morals, or public comfort.

Many have recognized that society's need to constrain negative externalities underlies the doctrine of public nuisance.⁶⁴ In explaining the doctrine's history, one court opined, "[T]he community's right to security and protection must be reconciled with the individual's right to expressive and associative freedom By entering society, individuals give up the unrestrained right to act as they think fit; in return, each has a positive right to society's protection."⁶⁵ Similarly, another court described the court's power to issue injunctions to abate public nuisances as based on the "obligations which [government] is under to

60. See *infra* notes 156–162 and accompanying text (discussing right-to-farm laws).

61. See Victor E. Schwartz & Phil Goldberg, *The Law of Public Nuisance: Maintaining Rational Boundaries on a Rational Tort*, 45 WASHBURN L.J. 541, 543 (2006) (explaining the origin and evolution of public nuisance theory in England).

62. *Id.*

63. See *Nw. Fertilizing Co. v. Hyde Park*, 97 U.S. 659, 667 (1878) ("We cannot doubt that the police power of the State was applicable and adequate to give an effectual remedy [to the nuisance] It rests upon the fundamental principle that every one [sic] shall so use his own as not to wrong and injure another. To regulate and abate nuisances is one of its ordinary functions.").

64. See Lisa Grow Sun & Brigham Daniels, *Externality Entrepreneurism*, 50 U.C. DAVIS L. REV. 321, 348 (2016) ("Judge Guido Calabresi and Douglas Melamed, in a landmark article, recognized early that the goal of internalizing externalities is a major driver of nuisance law. Indeed . . . one might define nuisance in terms of the externalities suffered by property owners and by the public more generally While externality entrepreneurship permeates nuisance law, its role is clearest when we examine cases in which courts must confront whether new activities or evolving technologies alter what counts as a nuisance."); Wiley, *supra* note 57, at 265–67 ("[T]he plaintiff [in a public nuisance action] may be able to establish that the defendant's actions have contributed to unhealthy living conditions This concept of public bads as indivisible negative externalities is intimately linked to the economic concept of public goods that has played a prominent role in public health law and public nuisance law.").

65. *People ex rel. Gallo v. Acuna*, 929 P.2d 596, 603 (Cal. 1997).

promote the interest of all, and to prevent the wrongdoing of one resulting in injury to the general welfare,” i.e., an obligation to internalize negative externalities.⁶⁶ For this reason, a “nuisance” is a term for all practices, avocations, erections, establishments, etc., against which courts will give relief, *although they are not intrinsically criminal, because of their tendency to create annoyance, ill health, or inconvenience.*⁶⁷

B. Bringing a Public Nuisance Claim

Most states have adopted statutes that provide criminal penalties for public nuisances, but many statutes either do not define public nuisance whatsoever or offer only a vague definition.⁶⁸ Nonetheless, courts have presumed that these statutes include interferences with public rights that historically constituted common-law public nuisances.⁶⁹ In addition, courts have explicitly acknowledged that new types of harms can be recognized as public nuisances.⁷⁰

The Second Restatement of Torts defines *public nuisance* as “an unreasonable interference with a right common to the general public.”⁷¹ Although nuisance law differs from state to state, a plaintiff will generally have to establish (1) a right common to the public, (2) an unreasonable interference with that common right, and (3) proximate causation.⁷² In addition, a private citizen who seeks to bring a public nuisance claim must first establish standing by alleging a special harm.⁷³ A government actor, on the other hand, is not required to establish that it has suffered a special harm.⁷⁴

66. *Id.* (alteration in original) (quoting *In re Debs*, 158 U.S. 564, 584 (1895)).

67. *Kilts v. Bd. of Supervisors*, 127 N.W. 821, 823 (Mich. 1910) (emphasis added) (citations omitted).

68. RESTATEMENT (SECOND) OF TORTS § 821B cmt. c. (AM. LAW INST. 1979).

69. *Id.*

70. *See, e.g., City of Chicago v. Beretta U.S.A. Corp.*, 821 N.E.2d 1099, 1120–21 (Ill. 2004) (“[P]ublic nuisance statute does not displace common law actions; common law right to action to abate public nuisance exists independently of any statutory right.” (citing *Gilmore v. Stanmar, Inc.*, 633 N.E.2d 985, 993 (Ill. App. Ct. 1994))).

71. RESTATEMENT (SECOND) OF TORTS § 821B.

72. *See infra* Section II.B.2.a.

73. *See infra* Section II.B.2.b.

74. *See infra* Section II.B.2.c.

1. *Standing*

A state's attorney general can bring a public nuisance claim on behalf of the state as *parens patriae*.⁷⁵ As long as the state is protecting a sovereign or semi-sovereign interest, like the health or welfare of its citizens or the economy of the state, it need not establish that it suffered a special injury.⁷⁶ Early *parens patriae* public nuisance lawsuits permitted states to address industrial problems of the twentieth century like air and water pollution.⁷⁷ By the middle of the century, these lawsuits extended to the new issues of price-fixing and market manipulation and to injuries to the state's economy.⁷⁸ Most recently, state attorneys general and municipalities have attempted to "address[] public health crises such as global warming, lead paint, handguns, tobacco, environmental pollution, and climate change" via public nuisance lawsuits.⁷⁹

Especially when involving consumer products, a *parens patriae* lawsuit can allege damages to the state itself, given that the state ultimately assumes the financial responsibility for injuries sustained by its citizens

75. The Latin phrase *parens patriae* means "parent of the country." See *Parens Patriae*, THE OXFORD ENGLISH DICTIONARY (2d ed. 1989). In addition to a state's attorney general, the representative of a political subdivision of a state may also have standing to bring a public nuisance action on behalf of the public. See RESTATEMENT (SECOND) OF TORTS § 821C(2).

76. See RESTATEMENT (SECOND) OF TORTS § 821C; Thomas H. Koenig & Michael L. Rustad, *Reconceptualizing the BP Oil Spill as Parens Patriae Products Liability*, 49 HOUS. L. REV. 291, 313–14 (2012) (noting that the state cannot merely be litigating its citizens' personal claims). Some courts, however, have held that a public plaintiff either may seek *only* abatement of a nuisance or may seek damages only upon proving that the public entity had suffered some type of special injury, just as a private plaintiff would have to. See, e.g., *Louisiana v. Rowan Co.*, 728 F. Supp. 2d 896, 905 (S.D. Tex. 2010) (holding that to recover damages, a plaintiff must prove a "significant harm different in kind from that suffered by the general public," and that the State's assertion of harmful pollution "fail[ed] to establish that it suffered significant harm different in kind from the general public"); *In re Lead Paint Litig.*, 924 A.2d 484, 502 (N.J. 2007) (finding that the city could "only proceed in the manner of private plaintiffs," thus requiring the city to identify a special injury, because, instead of abatement, the city sought money damages, which fell "outside the scope of remedies available to a public entity plaintiff").

77. See Margaret S. Thomas, *Parens Patriae and the States' Historic Police Power*, 69 SMU L. REV. 759, 791 (2016) (discussing how the *parens patriae* power of England's sovereign has morphed into the states' public guardianship powers under the "quasi-sovereignty theory").

78. See *id.* at 791–92.

79. See Koenig & Rustad, *supra* note 76, at 305–07 (explaining that *parens patriae* public nuisance lawsuits have become popular for cities and states "to achieve collective solutions for mass injuries in the absence of effective action from the legislative branch").

from the product or practice at issue.⁸⁰ Nonetheless, simply because a state has expended money to pay for its citizens' injuries does not suffice for the city to have a legitimate *parens patriae* public nuisance lawsuit.⁸¹ Consistent with this principle, many state courts have ruled that "a state or municipality does not have standing to sue as *parens patriae* against a product manufacturer, because the damages sustained by the government are 'derivative' or 'too remote.'"⁸² Instead, the state must be able to articulate a quasi-sovereign interest apart from the interests of its citizens.⁸³ According to the Supreme Court in *Alfred L. Snapp & Son, Inc. v. Puerto Rico ex rel., Barez*,⁸⁴ "a [s]tate has a quasi-sovereign interest in the health and well-being—both physical and economic—of its residents in general."⁸⁵ Notably, a mere increased risk of future injury can satisfy standing requirements as long as the risk of harm rises above mere conjecture.⁸⁶

If a private citizen, on the other hand, wishes to bring a public nuisance lawsuit, the person must prove she has suffered "harm of a kind different from that suffered by other members of the public exercising" the common right.⁸⁷ Many of the novel public nuisance actions have been brought by private citizens, including cases

80. See GIFFORD, *infra* note 134, at 123 (providing, as an example, Rhode Island's lawsuit to recover, from lead pigment manufacturers, the costs of educating its residents about the dangers of lead); see also WILEY, *supra* note 57, at 212 ("If a state or city government bringing suit in *parens patriae* successfully establishes interference with a public right, the door is opened to flexible doctrines of causation and fault that make liability more likely.").

81. GIFFORD, *infra* note 134, at 125.

82. *Id.*; see also *Massachusetts v. EPA*, 549 U.S. 497, 538 (2007) (Roberts, C.J., dissenting) ("[P]arens patriae actions raise an additional hurdle for a state litigant: the articulation of a 'quasi-sovereign interest' 'apart from the interests of particular private parties.'" (quoting *Alfred L. Snapp & Son, Inc. v. Puerto Rico ex rel. Barez*, 458 U.S. 592, 607 (1982))); GIFFORD, *infra* note 134, at 135–36 (providing the example of *Ganim v. Smith & Wesson Corp.*, in which the Connecticut Supreme Court held a city lacked standing to bring a lawsuit against gun manufacturers because the city's harms of increased police costs from illegal use of guns were too remote from the manufacturers' conduct of simply manufacturing guns).

83. *Alfred L. Snapp & Son, Inc.*, 458 U.S. at 607; see also *id.* at 602 (defining *quasi-sovereign interests* as "a set of interests that the State has in the well-being of its populace").

84. 458 U.S. 592 (1982).

85. See *id.* at 607.

86. See *Baur v. Veneman*, 352 F.3d 625, 634 (2d Cir. 2003) (noting that "the potential harm from exposure to dangerous food products or drugs 'is by nature probabilistic,' yet an unreasonable exposure to risk may itself cause cognizable injury" sufficient to satisfy the standing requirements (quoting *Friends of the Earth, Inc. v. Gaston Copper Recycling Corp.*, 204 F.3d 149, 160 (4th Cir. 2000))).

87. RESTATEMENT (SECOND) OF TORTS § 821C(1) (AM. LAW INST. 1979).

addressing pollution, guns, and crops.⁸⁸ Alas, it is not uncommon for courts to find that the harm suffered by a plaintiff is not unique enough to warrant standing.⁸⁹

One type of harm that will typically qualify as a “kind different from that suffered by other members of the public” is physical harm suffered by the plaintiff.⁹⁰ However, the plaintiff must prove that a “detrimental effect to [her] health . . . actually has occurred or is reasonably certain to occur due to a present harm.”⁹¹

Some courts have exhibited fairly low standards for harm of a different kind; for example, in *Comer v. Murphy Oil USA, Inc.*,⁹² residents and owners of Mississippi coastal land brought a public nuisance claim against energy, fossil fuel, and chemical companies.⁹³ The plaintiffs argued that the companies had “caused the emission of greenhouse gasses,” contributing to global warming, which then altered sea levels and thus “added to the ferocity of Hurricane Katrina.”⁹⁴ The court held that the plaintiffs had satisfied their standing requirement because the hurricane had destroyed their private property and public property that they used.⁹⁵

88. See, e.g., *infra* note 198 and accompanying text.

89. See, e.g., *NAACP v. AcuSport, Inc.*, 271 F. Supp. 2d 435, 446–47, 455, 499 (E.D.N.Y. 2003) (finding that the plaintiffs, even though they suffered great risk from illegal handguns in the market, did not meet the standing requirement because they did not demonstrate that their injury was “different in kind” and greater than the harm experienced by all others in the state); *Ganim v. Smith & Wesson Corp.*, 780 A.2d 98, 108–10, 117–18 (Conn. 2001) (holding that the plaintiffs lacked standing to bring a lawsuit against gun manufacturers because the claimed harms of high levels of violent crime, suicides, and homicides; reduced property value and economic productivity; and detrimental effect on the public welfare, were too remote from the manufacturers’ conduct).

90. RESTATEMENT (SECOND) OF TORTS § 821C(1); see also *City of Evansville v. Rinehart*, 233 N.E.2d 495, 497 (Ind. Ct. App. 1968) (upholding a public nuisance judgment in favor of the plaintiff, who sustained a badly infected cut from falling into a natural ditch where germ-laden effluent from a city-maintained sewage tank drained); RESTATEMENT (SECOND) OF TORTS § 821C(2) cmt. d. (requiring a private citizen to have suffered harm of a kind different from the harm to the general public).

91. See *Rhodes v. E.I. du Pont de Nemours & Co.*, 636 F.3d 88, 95 (4th Cir. 2011) (finding that the plaintiffs failed to satisfy the injury requirement with their argument that they were injured because PFOA (a chemical) accumulated in their blood, significantly increasing their risk of developing certain diseases as compared to the general population’s risk).

92. 585 F.3d 855 (5th Cir. 2009), *reh’g granted*, 598 F.3d 208 (5th Cir. 2010) (per curiam).

93. *Id.* at 859.

94. See *id.* (connecting in turn the ferocity of Hurricane Katrina to the property damage of the plaintiff’s private property and useful public property).

95. See *id.* at 859, 863, 867 (finding the standing requirement satisfied by the plaintiffs’ allegations of property damage in addition to their claim that the defendants’ emissions “unreasonably interfered with a common right of the general

2. *Elements of public nuisance*

a. A right common to the public

A public nuisance interferes with a right “common to all members of the general public[,] . . . collective in nature and not like the individual right that everyone has not to be assaulted . . . or negligently injured.”⁹⁶ Accordingly, one court has approved of the description of a public right as one involving “an indivisible resource shared by the public at large, like air, water, or public rights-of-way.”⁹⁷

A public nuisance need not affect an entire community, “so long as the nuisance will interfere with those who come in contact with it in the exercise of a public right or [if] it otherwise affects the interests of the community at large.”⁹⁸ However, a danger to a single person may alone constitute a public nuisance; for example, “the threat of communication of smallpox to a single person may be enough to constitute a public nuisance because of the possibility of an epidemic.”⁹⁹

Many public nuisance claims throughout the years have been premised upon unreasonable interferences with public health, which

public by causing the loss of use and enjoyment of public property through erosion of beaches, rising sea levels, saltwater intrusion, habitat destruction, and storm damage”).

96. *In re Lead Paint Litig.*, 924 A.2d 484, 497 (N.J. 2007) (quoting RESTATEMENT (SECOND) OF TORTS § 821B cmt. g (AM. LAW INST. 1979)) (“Thus the pollution of a stream that merely deprives fifty or a hundred lower riparian owners of the use of the water for purposes connected with their land does not for that reason alone become a public nuisance. If, however, the pollution prevents the use of a public bathing beach or kills the fish in a navigable stream and so deprives all members of the community of the right to fish, it becomes a public nuisance.”).

97. *See City of Chicago v. Am. Cyanamid Co.*, 823 N.E.2d 126, 131–33 (Ill. App. Ct. 2005) (noting the defendants’ persuasive arguments that the plaintiff city did not successfully “allege that the presence of paint containing lead pigment harms individuals in the exercise of their public rights” because the city’s claim “implicate[d] an assortment of claimed private individual rights that do not belong to the public at large because the alleged conditions exist within private homes, which the general public has no right to enter, and therefore do not interfere with any ‘public right,’” but ultimately passing on public right issues).

98. RESTATEMENT (SECOND) OF TORTS § 821B cmt. g.

99. *Id.*; *see also Ajanian v. Twp. of N. Bergen*, 246 A.2d 521, 526 (N.J. Super. Ct. Law Div. 1968), *aff’d*, 257 A.2d 726 (N.J. Super. Ct. App. Div. 1969) (per curiam) (holding that a single filthy, vermin-infested building was a public nuisance because the “building was clearly detrimental to the health and safety of its occupants and to anyone who would come in contact with it, or might be within the area of exposure to its unsanitary condition”).

is a right common to the general public.¹⁰⁰ In a Colorado case from 1912, *Seigle v. Bromley*,¹⁰¹ the court held that a hog farmer's practice of feeding garbage to his pigs—including "rotten meat, offal from slaughterhouses, and stuff from hospitals, rags and poultices"—constituted a public nuisance.¹⁰² The court noted that diseases like typhus, typhoid fever, scarlet fever, and malaria could be contracted from the garbage and carried from the farm by house flies.¹⁰³ Thus, the court reasoned that the potential danger of contagious disease amounted to an unreasonable interference with public health.¹⁰⁴ *Seigle* also serves as a good example of a nuisance that did not actively affect the entire community, but did threaten "the interests of the entire community" because of the possibility of disease generation and transmission.¹⁰⁵ Similarly, in *Durand v. Dyson*,¹⁰⁶ the court said that cattle with a dangerous, contagious disease are a public nuisance and that "[p]revention of the spreading of dangerous diseases among cattle is now universally recognized in this country as within the domain of the police power, as it is so essential to the public safety and health."¹⁰⁷

100. See, e.g., *Lawton v. Steele*, 152 U.S. 133, 136 (1894) ("[The police power] is universally conceded to include everything essential to the public safety, health, and morals, and to justify the destruction or abatement, by summary proceedings, of whatever may be regarded as a public nuisance. Under this power . . . the [s]tate may order . . . the slaughter of diseased cattle; the destruction of decayed or unwholesome food; . . . the compulsory vaccination of children; the confinement of the insane or those afflicted with contagious diseases . . ."); *Town of Nags Head v. Toloczko*, No. 2:11-CV-1-D, 2014 WL 4219516, at *16 (E.D.N.C. Aug. 18, 2014) ("Whatever tends to endanger life, or generate disease, and affects the health of the community . . . is generally, at common law, a public nuisance, and a crime." (quoting *State v. Everhardt*, 166 S.E. 738, 741–42 (N.C. 1932))).

101. 124 P. 191 (Colo. App. 1912).

102. See *id.* at 193–94 (finding the hog farmer's practices "so repulsive and so inimical to the public health as to prompt the inquiry as to how, in a civilized community, such things are permitted to exist, and why the offenders are not both restrained and criminally prosecuted").

103. *Id.* at 193.

104. *Id.* at 193, 195; see also RESTATEMENT (SECOND) OF TORTS § 821B(1) (AM. LAW INST. 1979).

105. See *Seigle*, 124 P. at 193; RESTATEMENT (SECOND) OF TORTS § 821B cmt. g.

106. 111 N.E. 143 (Ill. 1915).

107. *Id.* at 145; see also *State ex rel. Lamm v. City of Sedalia*, 241 S.W. 656, 657 (Mo. Ct. App. 1922) (holding that a city created a public nuisance by leaving animal carcasses unburied for days at the designated burial site because the malodorous atmosphere there was "injurious and uncomfortable" to people traveling nearby and to people living and farming nearby, and because the practice furthered disease, given that dogs fed upon animals killed by infectious diseases and "blood and obnoxious matters" spread into underground streams, polluting the water).

Examples of cases involving non-infectious-disease interferences with public health also abound.¹⁰⁸ For example, in *New York v. Shore Realty Corp.*,¹⁰⁹ the State of New York sued a realty company under, inter alia, New York public nuisance law to abate a hazardous waste disposal site.¹¹⁰ The company had acquired the land knowing that hazardous waste had been stored on the site without government approval, yet the company did not attempt to clean up the site.¹¹¹ The court held that the site constituted a public nuisance since the court had “no doubt that the release or threat of release of hazardous waste into the environment unreasonably infringes upon a public right.”¹¹² Specifically, public health was endangered by toxic, carcinogenic substances held in tanks on the property that were dangerous if touched, inhaled, or ingested.¹¹³

More recently, plaintiffs attempting to protect public health have brought public nuisance actions against manufacturers of products—though not without drawing criticism from scholars and skepticism from courts.¹¹⁴ Actions against gun manufacturers and distributors have been some of the most successful cases employing public nuisance theory. For example, in *Ileto v. Glock, Inc.*,¹¹⁵ shooting victims and their family members argued that the defendants’ intentional creation of an illegal secondary gun market via their distribution scheme constituted an unreasonable interference with public health and safety.¹¹⁶ The court agreed, finding the interference substantial, unreasonable, and “definitely offensive.”¹¹⁷ Likewise, in *NAACP v. AcuSport, Inc.*,¹¹⁸ the plaintiffs argued that the defendants caused an unreasonable interference with the public health through “imprudent sales and distribution practices throughout the United States; and . . .

108. See, e.g., *State ex rel. Marron v. Compere*, 103 P.2d 273, 275, 277–79 (N.M. 1940) (holding that a man’s unlicensed practice of medicine was a public nuisance because the man endangered public health by prescribing drugs and treating physical and mental ailments without any skill, training, or moral or professional qualifications).

109. 759 F.2d 1032 (2d Cir. 1985).

110. *Id.* at 1037.

111. *Id.* at 1037, 1051.

112. See *id.* at 1051 (noting that proof of a threatened harm from the nuisance sufficed for the State to obtain abatement—the State did not need to have proved actual harm).

113. *Id.* at 1038.

114. See, e.g., *infra* notes 122–125 and accompanying text.

115. 349 F.3d 1191 (9th Cir. 2003).

116. *Id.* at 1195, 1198, 1211.

117. *Id.* at 1211.

118. 271 F. Supp. 2d 435 (E.D.N.Y. 2003).

negligently and intentionally fail[ing] to take practicable marketing steps that would have avoided or alleviated the nuisance.”¹¹⁹

b. An unreasonable interference

Not all suggested interferences with public health have been successful, though, because “not every interference with collective social interests constitutes a public nuisance [T]he interference must be both *substantial* and *unreasonable*.”¹²⁰ Perhaps recognizing that the term *unreasonable* is rather vague, the Second Restatement of Torts provides the following guidance:

(2) Circumstances that may sustain a holding that an interference with a public right is unreasonable include the following:

- (a) Whether the conduct involves a significant interference with the public health, the public safety, the public peace, the public comfort or the public convenience, or
- (b) whether the conduct is proscribed by a statute, ordinance or administrative regulation, or
- (c) whether the conduct is of a continuing nature or has produced a permanent or long-lasting effect, and, as the actor knows or has reason to know, has a significant effect upon the public right.¹²¹

Even with the Second Restatement’s elaboration, what constitutes a “significant” interference with the public health seems largely left to a court’s discretion. For example, in the California case *Guttmann v. Nissin Foods (U.S.A.) Co.*,¹²² a man sought to eradicate artificial trans-fat in Nissin Food’s instant noodle products.¹²³ The plaintiff cited studies linking trans-fat consumption with increased risk of medical conditions like heart disease, diabetes, cancer, etc. and alleged that there was “‘no safe level’ of artificial trans[-]fat[s]” in support of his public nuisance claim.¹²⁴ The court dismissed his claim, commenting that “[n]o decision applying California law has found that interference with the general public’s right to a safe food supply by selling products with unhealthy ingredients constituted a public nuisance.”¹²⁵ As

119. *See id.* at 446–47, 455, 499 (ruling ultimately, however, that plaintiffs could not succeed on their public nuisance claim because they did not meet the standing requirement).

120. *People ex rel. Gallo v. Acuna*, 929 P.2d 596, 604 (Cal. 1997).

121. Restatement (Second) of Torts § 821B (AM. LAW INST. 1979).

122. No. C 15-00567 WHA, 2015 WL 4309427 (N.D. Cal. July 15, 2015).

123. *Id.* at *1.

124. *Id.* at *1, *5.

125. *Id.* at *5–6; *see also* *Red v. Gen. Mills, Inc.*, No. 2:15-CV-02232-ODW(JPR), 2015 WL 9484398, at *1, *5–6 (C.D. Cal. Dec. 29, 2015) (holding that the defendants’ use of

another example, a federal district court rejected a claim in 2009 that genetically modified rice constituted an interference with a public right because the plaintiffs did not present evidence sufficient to raise a question of danger to public health and safety.¹²⁶

c. Proximate causation

Plaintiffs find public nuisance actions particularly attractive because they might not have to establish proximate causation as precisely as in other tort actions. This is because, “[a]t least in theory, public nuisance plaintiffs, who are alleging harm to the public at large rather than to any particular individual or class of individuals, need only prove causation at the population level.”¹²⁷ Thus, state actors typically must prove simply that an unreasonable interference with a public right exists and that “the defendants caused or are maintaining the condition constituting the nuisance.”¹²⁸

For example, in *In re Methyl Tertiary Butyl Ether (MBTE) Products Liability Litigation*,¹²⁹ New York City sued Exxon and fifty-four other petroleum companies upon finding that a chemical, MBTE, had contaminated groundwater because of underground tanks spilling and leaking gasoline.¹³⁰ MBTE can render water undrinkable and is a known non-human animal carcinogen and a suspected human carcinogen.¹³¹ Although Exxon argued that its supplying gasoline was “too remote” from a particular contaminated aquifer, the court upheld the jury’s verdict holding Exxon responsible for having created a

partially hydrogenated oils in their products did not qualify as an interference with a public right).

126. *In re Genetically Modified Rice Litig.*, 666 F. Supp. 2d 1004, 1018 (E.D. Mo. 2009).

127. *See* Wiley, *supra* note 57, at 237 (footnotes omitted); *see also* NAACP v. Acusport, Inc. 271 F. Supp. 2d 435, 497 (E.D.N.Y. 2003) (“[W]here the welfare and safety of an entire community is at stake, the cause need not be so proximate as in individual negligence cases.”).

128. *See* New Mexico v. General Elec. Co., 335 F. Supp. 2d 1185, 1258–59 (D.N.M. 2004); *City of Seattle v. Monsanto Co.*, 237 F. Supp. 3d 1096, 1107 (W.D. Wash. 2017) (“Monsanto urges the Court to find that other PCB producers caused the contamination of Seattle’s water, and/or that the intervening acts of third parties . . . cut off proximate causation. The Court is not persuaded. Monsanto does not argue that it is responsible for none of the PCBs in Seattle’s water; the existence of other PCB sources merely creates a question of fact regarding the amount of damages for which Monsanto is responsible.”).

129. 725 F.3d 65 (2d Cir. 2013).

130. *See id.* at 78, 82 (commenting that all companies except for Exxon settled before trial).

131. *Id.* at 92.

public nuisance.¹³² The court explained that, under state law, “[e]very one who creates a nuisance or participates in the creation or maintenance thereof is liable for it.”¹³³

Because the cause of action is no different between private and public plaintiffs, private plaintiffs likewise must establish the presence of an unreasonable interference with a public right and that the defendants caused or maintained the interference. Unfortunately, however, the private plaintiff’s need to establish special harm for standing will often negate the potentially less stringent standard of proof for proximate causation in a public nuisance action. Namely, to establish standing, some private plaintiffs may face the difficult task of proving that a specific source caused a particular harm that accumulated somehow over a long period of time.¹³⁴

Further, private nuisance has corroded public nuisance, so that courts increasingly have required private plaintiffs especially to prove elements, such as specific proximate causation and control, that historically were unnecessary for successful public nuisance cases.¹³⁵ In fact, many of the recent attempts to apply the public nuisance doctrine

132. *See id.* at 82, 120 (noting also that Exxon allegedly knew that station owners would store gasoline in leaky underground tanks and knew that MBTE spreads quickly once released into groundwater).

133. *See id.* at 121 (alteration in original) (quoting *Penn Cent. Transp. Co. v. Singer Warehouse & Trucking Corp.*, 447 N.Y.S. 265, 267 (N.Y. App. Div. 1982)).

134. *See* DONALD G. GIFFORD, *SUING THE TOBACCO AND LEAD PIGMENT INDUSTRIES: GOVERNMENT LITIGATION AS PUBLIC HEALTH PRESCRIPTION* 121–22 (2010) (noting that statutes of limitations and assumption of the risk theories are also barriers to successful individual tort claims).

135. *See* *Whaley v. Park City Mun. Corp.*, 190 P.3d 1, 6 (Utah Ct. App. 2008) (stating that private plaintiffs in public nuisance lawsuits “must establish additional elements beyond those required to be proven by a public entity,” including that the defendants “caused or are responsible for the nuisance”). Section 821B, comment e of the Second Restatement of Torts explains how these additional requirements came to be, stating:

The common law criminal offense of public nuisance involved an interference with a right common to the general public. Little more than this in the way of a standard for determining what kinds of interferences constitute the crime of public nuisance was to be found in the cases. But as the tort action came into the picture, the use of the single word “nuisance” to describe both the public and the private nuisance, led to the application in public nuisance cases . . . of an analysis substantially similar to that employed for the tort action for private nuisance. . . . Thus, by analogy . . . the defendant is held liable for a public nuisance if his interference with the public right was intentional or was unintentional and otherwise actionable under the principles controlling liability for negligent or reckless conduct or for abnormally dangerous activities.

RESTATEMENT (SECOND) OF TORTS § 821B cmt. e (AM. LAW INST. 1979).

to novel issues have been thwarted by courts requiring plaintiffs to prove that the defendants were in control of the nuisance.¹³⁶ For instance, litigation of lead paint as a public nuisance has been largely unsuccessful because of the problem of control. In *In re Lead Paint Litigation*,¹³⁷ local governments tried to sue manufacturers and distributors of lead paint to recover the costs of detecting and removing lead paint from homes and buildings, providing medical care to residents affected by lead paint, and developing programs to educate residents about the dangers of lead paint.¹³⁸ The court held that the plaintiffs had no public nuisance claim because the defendants did not exercise any control over the application of lead paint in buildings.¹³⁹

Proximate causation in a public nuisance case, like in other tort cases, is determined by “whether the injury is of a type that a reasonable person would see as a likely result of his conduct.”¹⁴⁰ Proximate causation typically does not require that the nuisance actually injure or inconvenience all members of the public so long as the nuisance injures members “of the public who may come in contact with it.”¹⁴¹ In tort actions, courts employ the “more likely than not” standard (as opposed to the “beyond a reasonable doubt” standard applicable to criminal actions) to assess whether a defendant proximately caused a plaintiff’s injury.

136. *See Corp. of Mercer Univ. v. Nat’l Gypsum Co.*, No. 85-126-3-MAC, 1986 WL 12447, at *6 (M.D. Ga. Mar. 9, 1986) (holding an asbestos manufacturer not responsible for the nuisance of toxic asbestos-containing products placed in the plaintiff university’s buildings because the manufacturer did not have the legal right to abate the nuisance); *see also Friends of the Sakonnet v. Dutra*, 738 F. Supp. 623, 633–34 (D.R.I. 1990) (“The paramount question is whether the defendant was in control of the instrumentality alleged to have created the nuisance when the damage occurred.”).

137. 924 A.2d 484 (N.J. 2007).

138. *Id.* at 486–87.

139. *See id.* at 501–02, 505 (reasoning that “the presence of lead paint in buildings is only a hazard if it is deteriorating, flaking, or otherwise disturbed Viewed in this light . . . the Legislature, consistent with traditional public nuisance concepts, recognized that the appropriate target of the abatement and enforcement scheme must be the premises owner whose conduct has, effectively, created the nuisance”); *see also City of Manchester v. Nat’l Gypsum Co.*, 637 F. Supp. 646, 656 (D.R.I. 1986) (holding that the manufacturers of asbestos could not be liable in a public nuisance claim because they had no control over their product after the plaintiff city bought it to use in public buildings). *But see In re StarLink Corn Prods. Liab. Litig.*, 212 F. Supp. 2d 828 (N.D. Ill. 2002) (rejecting a claim by the creator and manufacturer of genetically modified corn seed that they could not be responsible for any nuisance caused by the pollen of their genetically modified corn seed transferring and contaminating nearby farmers’ corn because they were not in control of the seeds once other farmers bought them).

140. *City of Chicago v. Beretta U.S.A. Corp.*, 821 N.E.2d 1099, 1127 (Ill. 2004).

141. *Dean v. State*, 106 S.E. 792, 793 (Ga. 1921).

In the context of a hypothetical antibiotic-resistance-related public nuisance action, cases involving infectious diseases are instructive. In *Craten v. Foster Poultry Farms, Inc.*,¹⁴² for example, the parents of an infant killed by a salmonella infection sued Foster Poultry Farms, Inc. (Foster Farms), as the source of the salmonella outbreak.¹⁴³ The company argued that the parents could not prove causation because they did not know whether, in the week before his illness, their son had eaten Foster Farms chicken specifically; because the son might have eaten other brands of chicken; and because the son had eaten other types of foods that also could have carried Salmonella.¹⁴⁴ Despite this, the jury found sufficient evidence showing causation based on two expert reports that Foster Farms chicken more likely than not was the source of the infant's infection.¹⁴⁵ The company appealed, and the reviewing court found for the parents, noting that the plaintiffs did not need to prove conclusively that the infant's illness was caused by Foster Farms chicken.¹⁴⁶ Similarly, in *Stinson v. State*,¹⁴⁷ an employee of Washington State's Department of Corrections acquired a MRSA infection, which she alleged she obtained during her employment as a ferry worker due to the State's failure to maintain a safe ferry.¹⁴⁸ In reversing a grant of summary judgment, the court held that a reasonable jury could find that the State more likely than not caused the plaintiff's infection.¹⁴⁹

142. 305 F. Supp. 3d 1051 (D. Ariz. 2018).

143. *Craten*, 305 F. Supp. 3d at 1054.

144. *Id.* at 1061.

145. *See id.* at 1061–62 (listing the bases of the experts' reports as "(1) the relatively rare strain of Salmonella . . . contracted, (2) the fact that [the infant] contracted the illness in Arizona, . . . the state with the second highest number of people affected by the Foster Farms outbreak, (3) the fact that [the infant] became ill during the peak of the outbreak, and (4) the fact that the [parents] claimed to have purchased and consumed Foster Farms products in the past, even though they could not recall whether they did so in the week leading up to [the infant's] illness").

146. *See id.* at 1062 ("[U]nder the preponderance of the evidence standard, the [plaintiffs] need only convince a jury that it is more likely than not that Foster Farms was the source [A] jury reasonably could draw that inference based on the circumstantial evidence in the record and the opinions of the . . . expert witnesses.").

147. No. 44004-1-II, 2014 WL 315134 (Wash. Ct. App. Jan. 28, 2014).

148. *Id.* at *1.

149. *See id.* at *6 (referencing circumstantial evidence like the State's ban on use of bleach and gloves on the ferries, the lack of running water or soap on the ferries, the plaintiff's involvement in a profession with much higher rates of MRSA than other professions, and a medical expert's testimony that the plaintiff "on a more probable than not basis" was infected with MRSA while at work); *see also* *Birke v. Oakwood*

In another negligence action involving infectious disease, *Bussey v. E.S.C. Restaurants, Inc.*,¹⁵⁰ a woman ate beef tips at a restaurant around 10:30 a.m. and later that day became ill, which resulted in her hospitalization for four days.¹⁵¹ At trial, the woman testified about when she had eaten the meat and about her symptoms, and a manager at the restaurant testified that the woman had complained to him that the meat smelled and tasted bad.¹⁵² In addition, the woman's treating physician testified that he diagnosed her with staphylococcal food poisoning, based on "the history provided by [the woman], review of her medical record from the emergency room, direct observation and evaluation of her symptoms" as well as "lab testing that excluded other causes of gastrointestinal distress."¹⁵³ The physician testified in addition that "her symptoms could not have been caused by a casual contact with bacteria such as having dirty hands."¹⁵⁴ Ultimately, the court held that "the testimony of the plaintiff, indirect medical evidence, and the reasonable inferences derived therefrom" sufficed to establish proximate causation, despite "the lack of laboratory tests showing the existence of staphylococcal bacteria."¹⁵⁵

C. *Right-to-Farm Laws: Complications for State Nuisance Claims*

Right-to-farm laws are typically thought to pose major obstacles to nuisance claims under state law. All fifty states currently have right-to-farm statutes, which were created in the 1970s with the intention of protecting family farms from nuisance lawsuits brought by the inhabitants of neighboring properties bothered by, for example, animal odors or contaminated water.¹⁵⁶ Legislatures enacted right-to-farm laws to protect farms specifically from lawsuits by those who "came

Worldwide, 87 Cal. Rptr. 3d 602, 608 (Cal. Ct. App. 2009) (involving a similar causation standard in a public nuisance case that considered whether the defendant's conduct was a substantial factor in causing the plaintiff's harm).

150. 620 S.E.2d 764 (Va. 2005).

151. *Id.* at 766.

152. *Id.* at 766–67.

153. *Id.* at 767.

154. *Id.*

155. *See id.* at 767–68 (noting that "[c]ases involving food poisoning present unique circumstances because the primary source of evidence is usually consumed and transmuted in the ordinary course of its use," which means most food poisoning cases "will necessarily rely upon circumstantial evidence").

156. Carrie Hribar, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities*, NAT'L ASS'N OF LOC. BOARDS OF HEALTH 11 (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

to the nuisance,” (i.e., purchased or altered property *after* a nearby nuisance had been established), which was then a growing concern due to urban sprawl.¹⁵⁷ Later on, in the 1990s, large industrial farms became more prevalent, and the agribusiness lobby extracted even stricter right-to-farm laws from legislatures.¹⁵⁸

Nevertheless, right-to-farm laws do not provide impenetrable shields to liability. Most statutes, for instance, explicitly state that negligent conduct is not protected, and many include related provisions about what management practices a farm must employ to benefit from the right-to-farm law.¹⁵⁹ For example, under Minnesota’s right-to-farm statute, an agricultural operation is not a nuisance if, among other requirements, it “operates according to generally accepted agricultural practices.”¹⁶⁰ Additionally, many right-to-farm statutes include an exception that allows the state to protect against dangers to public

157. See *Buchanan v. Simplot Feeders L.P.*, 952 P.2d 610, 612, 616 (Wash. 1998) (en banc) (holding, after analyzing legislative intent, that the right-to-farm law’s protection should be applied only when the nuisance arises because of urban encroachment upon an agricultural area, and declaring that the right-to-farm protections “should not be read to insulate agricultural enterprises from nuisance actions brought by an agricultural or other rural plaintiff, especially if the plaintiff occupied the land before the nuisance activity was established”). As an example of the scenario from which legislatures wanted to protect farms, consider the prominent case *Spur Indus., Inc. v. Del E. Webb Dev. Co.*, wherein the court held that the owner of a livestock feedlot predating a neighboring retirement community had to relocate after his feedlot became a nuisance to the community, which had sprawled closer to it over the years. See 494 P.2d 700, 701–05, 707–08 (Ariz. 1972) (en banc). Even though the retirement community had “come to the nuisance,” that principle did not protect the feedlot owner because it was necessary to protect public health. *Id.* at 706.

158. See Hribar, *supra* note 156, at 11; see also Vanessa Zborek, “Yes, in Your Backyard!” *Model Legislative Efforts to Prevent Communities from Excluding CAFOs*, 5 WAKE FOREST J.L. & POL’Y 147, 149 (2015) (explaining that “a small number of massive agribusinesses . . . can influence federal and state legislatures and regulatory agencies to make policies promoting CAFOs and limiting restrictions on CAFO practices”). For an example of an extremely restrictive right-to-farm law, see IOWA CODE §§ 352.1–352.12 (2017).

159. See Terence J. Centner, *Governments and Unconstitutional Takings: When Do Right-to-Farm Laws Go Too Far?*, 33 B.C. ENVTL. AFF. L. REV. 87, 107 (2006) (explaining that states use terms like “sound agricultural practices,” “generally accepted agricultural practices,” and “best management practices” in their right-to-farm statutes).

160. MINN. STAT. § 561.19.2(a)(3) (2016).

health,¹⁶¹ though the statutes in a minority of states create seemingly comprehensive immunity to nuisance lawsuits.¹⁶²

III. ANALYSIS

Subtherapeutic antibiotic use in livestock is a promising basis for public nuisance claims brought by private citizens or state actors. By fostering AMR, improper antibiotic use threatens public health, a traditionally accepted right common to the public, as well as the continued availability of effective antibiotics. Based on the deaths, serious illnesses, and enormous economic burdens associated with AMR, this interference is substantial and unreasonable. In addition, enough studies associating AMR with farms exist to prove proximate causation, which might also be easier in a *parens patriae* lawsuit. Finally, right-to-farm laws do not completely bar all nuisance actions because right-to-farm laws are premised upon property-based public nuisances, not public-right-based public nuisances, which many statutes seem to recognize by explicitly providing exceptions for threats to public health.

A. *Improper Antibiotic Use Interferes with Public Health*

Improper antibiotic use is a public nuisance because it threatens public health. According to the Second Restatement, “[a] public nuisance is an unreasonable interference with a right common to the general public,” including “a significant interference with public health.”¹⁶³ Antibiotic misuse threatens a right common to the general public in the truest sense of a threat to a right that is “collective in nature.”¹⁶⁴ Because bacteria are ubiquitous, the danger posed by AMR is indiscriminate—no one can completely avoid exposure to bacteria

161. See, e.g., KAN. STAT. ANN. § 2-3202(a) (2016) (“Agricultural activities . . . are presumed to be reasonable and do not constitute a nuisance, public or private, unless the activity has a substantial adverse effect on the public health and safety.”); TEX. AGRIC. CODE ANN. § 251.004(a) (2015) (“No nuisance action may be brought against an agricultural operation that has lawfully been in operation for one year or more prior to the date on which the action is brought This subsection does not restrict or impede the authority of this state to protect the public health, safety, and welfare”).

162. E.g., KY. REV. STAT. ANN. § 413.072(2) (2010) (“No agricultural or silvicultural operation . . . shall be or become a nuisance or trespass, private or public, . . . or be subject to any ordinance that would restrict the right of the operator . . . to utilize normal and accepted practices . . . when the operation was not a nuisance at the time the operation began. The provisions of this subsection shall not apply whenever a nuisance . . . results from the negligent operation.”).

163. RESTATEMENT (SECOND) OF TORTS § 821B(1)–(2)(a) (AM. LAW. INST. 1979).

164. See *supra* note 96 and accompanying text.

in the environment or transmission of bacteria among fellow humans. For this same reason, medicine's arsenal of effective antibiotics can be considered an "indivisible resource shared by the public at large."¹⁶⁵

Although eager consumer advocates have failed to establish more novel applications of the public nuisance doctrine, many of those failed attempts addressed harmful products.¹⁶⁶ Some believe that the manufacture and distribution of products rarely violates a public right because such manufacture and distribution usually entail merely a conglomeration of separate violations of private rights, since products are typically purchased and used by individual consumers.¹⁶⁷

By contrast, a public nuisance action against improper antibiotic use addresses a harmful *practice*.¹⁶⁸ Practices posing some risk of infectious disease have historically been bases of public nuisance claims.¹⁶⁹ Indeed, improper antibiotic use is reminiscent of the traditional public health threats in *Seigle v. Bromley* and *Durand v. Dyson*.¹⁷⁰

The practice of using subtherapeutic levels of antibiotics is similar to the hog farmer's practice in *Seigle v. Bromley* of feeding his pigs garbage, which the court found to be a public nuisance.¹⁷¹ Feeding garbage to the pigs facilitated the formation and transfer of diseases like typhoid fever, scarlet fever, and malaria, which was "inimical to the public health."¹⁷² Subtherapeutic antibiotic use in livestock likewise "tends to . . . generate disease" because it allows bacteria to develop antibiotic

165. See *supra* note 97 and accompanying text.

166. See *supra* note 56.

167. See Donald G. Gifford, *Public Nuisance as a Mass Products Liability Tort*, 71 U. CIN. L. REV. 741, 816–17 (2003); see also *supra* note 53.

168. See, e.g., *In re Lead Paint Litig.*, 924 A.2d 484, 501 (N.J. 2007) (rejecting the plaintiffs' attempt to hold lead paint manufacturers liable for creating a public nuisance because "the Legislature, consistent with traditional public nuisance concepts, recognized that the appropriate target of the abatement and enforcement scheme must be the premises owner whose conduct [of poorly maintaining the premises] has, effectively, created the nuisance").

169. See e.g., *Durand v. Dyson*, 111 N.E. 143, 145–46 (Ill. 1915) (holding that cattle with a dangerous, contagious disease were a public nuisance and that preventing diseases from spreading is essential to public health); *S.D. Dep't of Health v. Owen*, 350 N.W.2d 48, 51 (S.D. 1984) (stating that elk with bovine tuberculosis were a public nuisance that might warrant destruction to protect public health).

170. See *Seigle v. Bromley*, 124 P. 191, 193 (Colo. App. 1912); *Durand v. Dyson*, 111 N.E. 143, 145–46 (Ill. 1915).

171. See 124 P. at 193.

172. *Id.*

resistance at much faster rates than would occur naturally;¹⁷³ these resistant bacteria can then infect people with illnesses that, consequently, are more difficult to treat.¹⁷⁴ Further, one person harboring resistant bacteria may transfer the bacteria to other humans, leading to more illnesses.¹⁷⁵ Thus, both feeding garbage to hogs and improper administration of antibiotics to livestock are harmful practices that facilitate the formation of serious, contagious bacterial diseases. These diseases are also conveyed via similar mechanisms: through contact with livestock; with contaminated meat; or with a vector (such as a fly), which itself has somehow picked up the bacteria.¹⁷⁶ Improper antibiotic use therefore should similarly be considered an unreasonable interference with public health that gives rise to a public nuisance.

B. Improper Antibiotic Use is an Unreasonable Interference

Subtherapeutic antibiotic use is a more substantial unreasonable interference with public health than traditional contagious disease threats. Not only does subtherapeutic antibiotic use proliferate illness, but it also increases the virulence of various bacterial infections.¹⁷⁷ Otherwise non-fatal and easily-treatable infections can become so much more difficult to treat that they prove deadly. As more and more bacteria become resistant to more and more antibiotics, health care providers are forced to proceed down the line of effective antibiotics until they reach the “last resort” antibiotics, and even these now do not

173. See *Town of Nags Head v. Toloczko*, No. 2:11-CV-1-D, 2014 WL 4219516, at *16 (E.D.N.C. Aug. 18, 2014) (“Whatever tends to endanger life, or generate disease, and affects the health of the community . . . is generally, at common law, a public nuisance, and a crime.” (citing *State v. Everhardt*, 166 S.E. 738, 742 (N.C. 1932))); see also Silbergeld, et al., *supra* note 36, at 162 (“A consistent temporal relationship between the introduction of antimicrobials into agricultural use and increases in the prevalence of resistant organisms has been found in animals, animal-derived food products, and humans . . .”).

174. See *supra* notes 29–32, 38–42 and accompanying text.

175. See Chang et al., *supra* note 41, at 241 (“A human is infected or colonized with a resistant microbe through any of these means, followed by ongoing transmission among humans, with some of these humans becoming ill.”).

176. See *Seigle*, 124 P. at 193 (“[D]isease may be contracted from such garbage, such as typhus and typhoid fever, scarlet fever, probably malaria fever. It may be carried from these places by the house fly.”).

177. See *supra* notes 39–42 and accompanying text (explaining that bacteria subjected to an antibiotic can transfer resistance genes to other bacteria).

always work.¹⁷⁸ Thus, subtherapeutic antibiotic use ultimately hastens depletion of medicine's arsenal of effective antibiotics.

AMR causes roughly 23,000 deaths annually, as compared to, for example, the 12,979 homicides committed with guns.¹⁷⁹ Considering these statistics and the numerous government reports acknowledging the public health threat of AMR, an antibiotic misuse public nuisance claim would not face the same difficulty as the public nuisance claim involving, for instance, genetically modified rice. The court in *In re Genetically Modified Rice Litigation*¹⁸⁰ rejected the public nuisance claim because the plaintiffs could not prove genetically modified rice was actually dangerous to public health, whereas ample scientific evidence supports that antibiotic misuses threatens public health.¹⁸¹

Similarly, the threat posed by antibiotic misuse is significantly larger than the threat posed by products containing minute amounts of trans fats. As the court in the California case, *Guttman*, reported, “[n]o decision applying California law has found that interference with the general public’s right to a safe food supply by selling products with unhealthy ingredients constituted a public nuisance.”¹⁸² Though the court did not elaborate much on its reasoning, it might also have been concerned about the paternalism involved in an attempt to ban unhealthy foods. A public nuisance claim regarding antibiotic overuse would not raise the same concern: no person wants to acquire an antibiotic-resistant infection, whereas some people do decide the benefits of eating foods with trans fats outweigh the harms. There are no benefits to an antibiotic-resistant infection.

Moreover, subtherapeutic use of antibiotics is not only unreasonable because it artificially speeds the development of antibiotic-resistant bacteria, endangering public health, but also because it does so unnecessarily. Reasonable alternatives to using preventive, subtherapeutic amounts of antibiotics exist and are currently being employed successfully. Although it is economical for large producers to keep animals in poor conditions that

178. See CDC, *supra* note 5, at 22–23 (describing how, due to bacterial resistance, certain pathogens are becoming resistant to nearly all drugs that would be considered for treatment, namely carbapenems and polymyxins, presenting significant challenges to healthcare professionals attempting to treat these infections in hospitals).

179. See CDC, *supra* note 5, at 6; CDC, *Assault or Homicide*, NAT’L CTR. FOR HEALTH STATS., <https://www.cdc.gov/nchs/fastats/homicide.htm> (last visited Oct. 17, 2018).

180. ¹⁸⁰ 666 F. Supp. 2d 1004 (E.D. Mo. 2009).

181. See *id.* at 1018.

182. No. C 15-00567 WHA, 2015 WL 4309427, at *5 (N.D. Cal. July 15, 2015).

foster disease and necessitate regular subtherapeutic use of antibiotics, the public should not be forced to bear producers' externalized costs.¹⁸³

C. Enough Scientific Data Exist to Support Proximate Causation

Proof of proximate causation in a public nuisance action will be similar to the proof required in other tort cases.¹⁸⁴ A judge may assess causation based on whether a reasonable person could foresee the injury as a likely result of his conduct.¹⁸⁵ In the past, plaintiffs might have had difficulty establishing causation in an antibiotic misuse public nuisance action, since the agriculture industry denied, essentially from the conception of antibiotic use in livestock, that such use increases resistance.¹⁸⁶ Now, however, it is irrefutably clear that the use, and especially the subtherapeutic use, of antibiotics causes antibiotic

183. See *supra* note 37 and accompanying text.

184. See *Whaley v. Park City Mun. Corp.*, 190 P.3d 1, 6 (Utah Ct. App. 2008) (stating that private plaintiffs in public nuisance lawsuits “must establish additional elements beyond those required to be proven by a public entity,” including that the defendants “caused or are responsible for the nuisance”).

185. See *supra* note 140 and accompanying text.

186. See Fact Sheet, American Meat Institute, Antibiotic Use in Livestock Production: Ensuring Meat Safety, <https://www.meatinstitute.org/index.php?ht=a/GetDocumentAction/i/56994>. The AMI provided a disingenuous and inaccurate answer to the question of whether antibiotic use in livestock causes antibiotic resistance in humans that states:

When antibiotics are used in livestock and poultry production, strict withdrawal periods must be followed before the animals are processed for foods . . . in the unlikely event that antibiotic residues are present, they do not exceed the tolerance levels deemed unsafe by FDA and USDA Most informed scientists and public health professionals acknowledge that the problem of antibiotic resistance in humans is overwhelmingly an issue related to human antibiotic use.

See id.

The American Veterinary Medical Association also provides that:

There are also some who say that antimicrobial resistance is caused by widespread use of antimicrobials in food production systems. Their argument is that the more antimicrobials are used in animals, the more we expose the organisms to the antimicrobials and give them the opportunity to develop resistance. Although that may be true in a very simplified, general sense, the scientific evidence of how, if or to what extent such exposure affects human health remains unclear [R]isk assessments have shown that the use of antimicrobials in food production systems plays an extremely small role [in causing AMR].

See *Antimicrobial Use and Antimicrobial Resistance FAQ*, AMERICAN VETERINARY MEDICAL ASSOCIATION, <https://www.avma.org/KB/Resources/FAQs/Pages/Antimicrobial-Use-and-Antimicrobial-Resistance-FAQs.aspx> (last visited Oct. 17, 2018).

resistance.¹⁸⁷ In fact, this relationship has been evident for quite a long time, going all the way back (at least) to 1945.¹⁸⁸ That year, Alexander Fleming, the inventor of the first antibiotic, penicillin, specifically told his audience he wanted to “sound one note of warning,” and explained:

It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body [T]here is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant. Here is a hypothetical illustration. Mr. X has a sore throat. He buys some penicillin and gives himself, not enough to kill the streptococci but enough to educate them to resist penicillin. He then infects his wife. Mrs. X gets pneumonia and is treated with penicillin. As the streptococci are now resistant to penicillin the treatment fails. Mrs. X dies. *Who is primarily responsible for Mrs. X's death? Why Mr. X whose negligent use of penicillin changed the nature of the microbe.*¹⁸⁹

It is worth noting that Fleming himself assigned responsibility to Mr. X, whose improper use of penicillin caused Mrs. X to die.

Craten is helpful in illustrating how a plaintiff in a public nuisance action might establish causation because it involved a food-borne illness.¹⁹⁰ Usually, it is difficult to identify precisely where an infection came from because humans are presented with many sources of bacteria on a daily basis.¹⁹¹ As a result, the plaintiff usually must rely on

187. See PEW CHARITABLE TRUSTS, FOOD ANIMAL PRODUCTION AND ANTIBIOTIC RESISTANCE: THE SOLUTION (2012), http://www.pewtrusts.org/-/media/legacy/uploadedfiles/phg/supporting_items/ibsantibioticsthesolutionpdf.pdf (citing to 172 studies on “how antibiotic use in food animal production contributes to the growing health crisis of antibiotic resistance” as evidence of the scientific consensus).

188. See Alexander Fleming, *Nobel Lecture: Penicillin* 92–93 (Dec. 11, 1945), <https://assets.nobelprize.org/uploads/2018/06/fleming-lecture.pdf>. In fact, a recent study found that just *one year* after mass production of ampicillin (the antibiotic developed after penicillin) began in 1961, the first outbreak of *Salmonella* resistant to ampicillin occurred because farmers had been putting subtherapeutic penicillin in their livestock feed. See Alicia Tran-Dien et al., *Early Transmissible Ampicillin Resistance in Zoonotic Salmonella enterica Serotype Typhimurium in the Late 1950s: A Retrospective, Whole-Genome Sequencing Study*, 18 LANCET INFECTIOUS DISEASES 207, 207–08 (2018).

189. See *id.* (emphasis added).

190. See 305 F. Supp. 3d 1051, 1053 (D. Ariz. 2018) (involving an infant who died from *Salmonella*).

191. Robert R. Dunn et al., *Home Life: Factors Structuring the Bacterial Diversity Found Within and Between Homes*, 8 PLOS ONE 1, 1–2 (May 2013) (describing the predominance of “house-associated microbial communities [which] are ubiquitous and diverse” and include “many hundreds or even thousands” of different types of

circumstantial evidence.¹⁹² For example, a person who works on a farm that administers subtherapeutic antibiotics to its livestock and acquires an antibiotic-resistant infection could likely offer testimony about his presence at the farm as circumstantial evidence for proving proximate causation, just as, in *Bussey v. E.S.C. Restaurants, Inc.*, the woman's testimony about eating beef tips in a restaurant before later experiencing food poisoning symptoms was admissible to prove proximate causation.¹⁹³

The causation with respect to improper antibiotic use is similar to the causation in *In re StarLink Corn Products Liability Litigation*.¹⁹⁴ In that case, the defendants disseminated a genetically-modified strain of corn seed, which contaminated other farmers' corn through pollen transfer.¹⁹⁵ Though the defendants tried to argue they could not be responsible for any nuisance because they were not in control of the seeds once other farmers planted them, the court found that the defendants had caused the nuisance.¹⁹⁶ Especially because the plaintiffs never had any ability to control the nuisance, the court refused to absolve the defendants of responsibility as the source of the corn.¹⁹⁷ Likewise, a farmer who uses subtherapeutic levels of antibiotics cannot argue that he is not responsible for the transfer of antibiotic-resistant bacteria because the improper use occurs on his property where he can exercise control.

Unlike many of the modern harms that attorneys have attempted to address using novel applications of public nuisance theory, improper antibiotic use will not suffer from the same difficulty of proving the defendants had control over the nuisance-producing conduct. Many academics have criticized, and many courts have rejected, cases attempting to use public nuisance theory to address topics such as climate change, lead paint, handguns, tobacco use, environmental pollution, and, most recently, opiates.¹⁹⁸ The party analogous to the

bacteria that "vary across the wide range of surfaces found within homes," not to mention the bacteria that people encounter outside their homes).

192. See *Craten*, 305 F. Supp. 3d at 1061–62 (pointing to evidence like expert testimony and epidemiological information as establishing causation).

193. See *supra* notes 150–155 and accompanying text.

¹⁹⁴ 212 F. Supp. 2d 828 (N.D. Ill. 2002).

195. See *id.* at 844–45.

196. See *id.* at 845, 847.

197. *Id.* at 846–47.

198. See, e.g., Joseph W. Cleary, Comment, *Municipalities Versus Gun Manufacturers: Why Public Nuisance Claims Just Do Not Work*, 31 U. BALT. L. REV. 273, 302–03 (2002) (criticizing any possible judicial acceptance of public nuisance actions against gun manufacturers as "judicial activism [that] may be costly in its own right to the stability

lead paint manufacturers in a public nuisance claim concerning improper antibiotic use would be the pharmaceutical companies who manufacture antibiotics; even if the companies knew their antibiotics could potentially be used in dangerous ways, they would not necessarily have control over how veterinarians prescribed or how farmers used their products. To avoid this issue, the proper defendant would be the farmer who administers antibiotics at a subtherapeutic level. It is also possible that veterinarians who prescribe antibiotics for use at a subtherapeutic level, or who reasonably should know that the antibiotics they are prescribing will be used at a subtherapeutic level, could be defendants.

D. Both Private and Public Plaintiffs Could Bring an Antibiotic Misuse Public Nuisance Action

Two types of plaintiffs could bring a public nuisance action to enjoin subtherapeutic antibiotic use or perhaps to recover damages: private citizens and a state official as *parens patriae*. While an action brought by the state typically has a less burdensome causation requirement, the possibility of private citizens bringing public nuisance claims offers an additional opportunity to address antibiotic resistance.

One with “authority as a public official or public agency to represent the state or a political subdivision” may bring a lawsuit to enjoin a public nuisance.¹⁹⁹ This category includes *parens patriae* lawsuits brought by a state’s attorney general.²⁰⁰ A *parens patriae* lawsuit is likely preferable to a public nuisance lawsuit brought by a private citizen because a government actor probably will not have to trace a particular individual’s infection to a particular farm.²⁰¹ In order to argue that the state has standing, the attorney general could rely on the increased costs of state-funded medical care for residents with resistant

of the entire legal system,” which would result in the tort of public nuisance “hav[ing] such limitless dimensions that it would cease to have any meaningful legal significance”); Donald G. Gifford, *Impersonating the Legislature: State Attorneys General and Parens Patriae Product Litigation*, 49 B.C. L. REV. 913, 913 (2008) (arguing that attorneys general suing on behalf of their states for product-related diseases “seek to supplant the regulatory regimes previously enacted by Congress, the state legislature, or federal agencies with one that reflects their own visions” and have a “symbiotic relationship” with “a small number of plaintiffs’ law firms [which] distorts both governmental priorities and fiscal policy”).

199. RESTATEMENT (SECOND) OF TORTS § 821C(2)(b) (AM. LAW INST. 1979).

200. See, e.g., *Missouri v. Illinois*, 180 U.S. 208 (1901) (involving a *parens patriae* lawsuit on behalf of Missouri to stop Chicago from devising a sewer system that would carry sewage to the Mississippi River and into Missouri).

201. See Wiley, *supra* note 57, at 231–32 n.95, 236–37.

infections, which are much more directly related to the alleged nuisance than, for example, the increased police costs from the illegal use of guns were related to manufacturers simply manufacturing guns in *Ganim v. Smith & Wesson Corp.*²⁰² More importantly, the type of public right involved in antibiotics cases would not amount to a “mere aggregation of interests”—the accusation often asserted against public nuisance actions resembling products liability ones. Instead, actions that decrease the continued availability of effective antibiotics constitute an “interference with the interests of the community at large.”²⁰³ In addition, antibiotic misuse has “a continuing inherent or natural tendency to create danger and inflict injury.”²⁰⁴

Furthermore, the attorney general would be able to articulate a “quasi-sovereign interest.”²⁰⁵ A quasi-sovereign interest includes a public right that involves “an indivisible resource shared by the public at large, like air, water, or public rights of way.”²⁰⁶ Arguably, continued availability of antibiotics to the public is such an “indivisible resource,” or what is sometimes referred to as a “public good.” Because the misuse of antibiotics affects the public indiscriminately, by generally increasing the levels of antibiotic-resistant bacteria, it is similar to an “indivisible resource,” like air, which affects the public indiscriminately if polluted. Antibiotic misuse is a negative externality because livestock farms improperly use antibiotics to increase their profits, without accounting for the costs to the public resulting from the proliferation of antibiotic-resistant bacteria.

Alternatively, a private citizen could bring a public nuisance lawsuit if she has “suffered harm of a kind different from that suffered by other members of the public exercising the right common to the general public that was the subject of interference.”²⁰⁷ According to the court

202. See *Ganim v. Smith & Wesson Corp.*, 780 A.2d 98, 118 (Conn. 2001) (dismissing a public nuisance claim against gun manufacturers as the court was not convinced by the plaintiffs’ allegation that “[a]s a result of the defendants’ conduct, [the Plaintiff city] has incurred increased expenses for police services, including courts, prisons and related services, emergency services . . . [, which] has been required to impose related increased tax burdens on [the city’s] taxpayers”).

203. *In re Lead Paint Litig.*, 924 A.2d 484, 495 (N.J. 2007) (quoting RESTATEMENT (SECOND) OF TORTS § 821B cmt. b).

204. *Ganim*, 780 A.2d at 131 (quoting *Carabetta v. City of Meriden*, 142 A.2d 727, 728 (Conn. 1958)).

205. *Massachusetts v. EPA*, 549 U.S. 497, 538 (2007) (Roberts, C.J., dissenting).

206. *City of Chicago v. Am. Cyanamid Co.*, 823 N.E.2d 126, 131 (Ill. App. Ct. 2005).

207. RESTATEMENT (SECOND) OF TORTS § 821C(1).

in a 2009 California case, *Birke v. Oakwood Worldwide*,²⁰⁸ an injury “to the health and comfort of an individual, is in its nature special and peculiar and does not cause a damage which can properly be said to be common or public.”²⁰⁹ Accordingly, an obvious example of a private citizen who could bring a public nuisance lawsuit would be a farm worker who developed an antibiotic-resistant infection, since actually contracting an antibiotic-resistant infection is a harm more severe than the general public’s increased risk of exposure to antibiotic-resistant bacteria as a result of the defendant’s practices. Theoretically, though causation might be more difficult to prove, any person involved in a farm-to-consumer supply chain could contract an antibiotic-resistant illness and associate it with a farm’s antibiotic practices. In addition, since people who live close to farms are more likely to acquire antibiotic-resistant infections, they might be well situated to bring public nuisance claims.²¹⁰

While there are no extant public nuisance cases dealing with antibiotics, other types of actions involving infections suggest individuals could bring successful antibiotics-related public nuisance actions. For example, in *Dega Poultry Co.*,²¹¹ a veterinarian successfully proved in a workers’ compensation proceeding that his Salmonella infection was contracted during his employment by a poultry company.²¹² The veterinarian had inspected the company’s chickens for disease, and he believed that he had contracted salmonella from one of the company’s flocks because the sick chickens had some of the same symptoms that he had.²¹³ The poultry company and its insurance company argued that there was “no substantial proof that [the veterinarian’s] salmonellosis arose out of his employment.”²¹⁴

208. 87 Cal. Rptr. 3d 602 (Cal. Ct. App. 2009).

209. *See id.* at 610–11 (holding that the plaintiff could successfully allege special injury in a case about a second-hand smoke nuisance because his childhood asthma was aggravated, which was a special injury as compared to the general public’s increased risk of lung cancer).

210. Several studies have analyzed the high incidence of MRSA infection among pig farmers. *See, e.g.*, Casey et al., *supra* note 34, at 1981 (mentioning several studies, including some analyzing pig farming families, that found that living or working on a farm was a risk factor for MRSA infection); Tara C. Smith et al., *Methicillin-Resistant Staphylococcus aureus (MRSA) Strain ST398 Is Present in Midwestern U.S. Swine and Swine Workers*, 4 PLOS ONE 1, 1, 3 (Jan. 2009) (finding that forty-nine percent of swine workers were colonized with MRSA, which is thirty times the national average infection).

211. 533 S.W.2d 207 (Ark. 1976).

212. *Id.* at 208–09.

213. *Id.* at 209.

214. *Id.*

However, the court disagreed, calling the evidence “one-sided” in favor of the veterinarian and explaining, “If the claimant’s disability arises soon after the accident and is logically attributable to it, with nothing to suggest any other explanation for the employee’s condition, we may say without hesitation that there is no substantial evidence to sustain the commission’s refusal to make an award.”²¹⁵ Ultimately, the court concluded that there was a “strong probability” that the veterinarian was infected by the company’s flock and dismissed the notion that a claimant “must prove the source of an infection with absolute certainty” as “a manifest impossibility.”²¹⁶ As long as a plaintiff bringing a public nuisance lawsuit with a special injury of an antibiotic-resistant infection encountered a court with a similar willingness to accept reasonably persuasive circumstantial evidence, the action could succeed.

E. Right-to-Farm Laws Are Not Insurmountable

Right-to-farm laws should not bar public nuisance actions regarding antibiotic misuse. A public nuisance claim relating to improper antibiotic use would not resemble the type of nuisance lawsuits that legislatures attempted to abate with right-to-farm laws.²¹⁷ This is mainly because the “coming to the nuisance” theory is tied to the plaintiff owning physical property close enough to the defendant to be subjected to the nuisance.²¹⁸

A public nuisance action to enjoin subtherapeutic use of antibiotics in livestock would instead allege an unreasonable interference with a public right. This type of action does not require the plaintiff to own

215. *Id.* (quoting *Hall v. Pittman Constr. Co.*, 357 S.W.2d 263, 264 (Ark. 1962)).

216. *See id.* (listing the evidence that the court considered substantial: a physician who had treated the veterinarian testified that “salmonella paratyphoid is a rare disease” that “is found in the digestive tract of human beings, chickens, and other creatures”; the veterinarian stripped out the intestines of chickens when “performing post mortem examinations for disease”; the treating physician “testified positively that [the veterinarian] had the disease” and thought it was likely contracted by working with the infected chickens; a different veterinarian “testified that poultry products are a common source of salmonellosis”; and the veterinarian had handled only the poultry company’s birds).

217. *See Buchanan v. Simplot Feeders Ltd. P’ship*, 952 P.2d 610, 614–16 (Wash. 1998) (en banc) (holding, after analyzing legislative intent, that the right-to-farm law’s protection should be applied only when the nuisance arises because of urban encroachment upon an agricultural area, and declaring that the right-to-farm protections “should not be read to insulate agricultural enterprises from nuisance actions brought by an agricultural or other rural plaintiff, especially if the plaintiff occupied the land before the nuisance activity was established”).

218. *Id.* at 615.

any property; instead, the lawsuit aims to enjoin a harm that is dispersed, which would exist regardless of where the farm is located because of the nature of microbial transfer. Since the premise of right-to-farm laws—the notion of coming-to-the-nuisance—addresses property-based nuisances, logically, right-to-farm laws should not apply to public-right-based nuisance actions. Perhaps in recognition of this, some states' right-to-farm statutes contain exceptions for potential harms to public health. If a plaintiff can prove that subtherapeutic antibiotic use is an unreasonable interference with public health in the first place, the plaintiff can take advantage of this exception in the right-to-farm law. Since the World Health Organization and the CDC (along with many other groups) have both identified antibiotic resistance as a threat to public health, it might not be very difficult to exploit public health exceptions in right-to-farm laws.²¹⁹

CONCLUSION

Over the past few decades, large industries have unrelentingly harmed and taken advantage of Americans while simultaneously denying any wrongdoing. The tobacco industry's prolonged deception about cigarettes' health risks and addictiveness is one infamous example of this unfortunate phenomenon; another is the oil and gas industry's stubborn refusal to acknowledge the existence of man-made climate change. Undoubtedly, countless more instances of similar misconduct lurk below the public awareness. The agriculture industry's persistent refusal to admit that the subtherapeutic use of antibiotics in farm animals fosters AMR is yet more duplicity maintained for too long. As climate change has helped us realize, eventually there comes a time when so much surreptitious misconduct has slipped by unaddressed that the damage is irreparable. Since industry capture too often strangles legislatures and regulatory agencies, the courts ought to assume a role more protective of the populace.

Antibiotics are vital for modern medicine. Unfortunately, though, antibiotic resistance is already a major health crisis, and it is ever increasing. Despite this, the U.S. government continues to fail to adequately address antibiotic misuse. Public nuisance lawsuits can provide a novel approach for combating the improper use of antibiotics in livestock. Improper subtherapeutic antibiotic use is a threat to public health because it increases the risk and incidence of antibiotic-resistant

219. See *supra* notes 25, 27 and accompanying text.

infection and threatens continued availability of effective antibiotics. The relationship between subtherapeutic antibiotic use and increased AMR is now undeniable, and viable alternatives exist for producers to keep their livestock healthy. Although state right-to-farm laws might complicate public nuisance lawsuits, they are by no means insurmountable. After all, “public nuisance law, like common law generally, adapts to changing scientific and factual circumstances.”²²⁰

220. *Am. Elec. Power Co. v. Connecticut*, 564 U.S. 410, 423 (2011).