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Written Statement Submitted for the Record to the
Senate Committee on Energy and Environment
For the Hearing on
Senate Bill 583: Relating to industrial dairies; declaring an emergency

April 1, 2021

SUPPORT

Disclaimer: The opinions expressed herein are our own and do not necessarily reflect the views of The Johns Hopkins University.

Honorable Chair Lee Beyer, Vice Chair Lynn Findley, and Honorable Members of the Oregon Senate Committee on Energy and Environment,

Thank you for the opportunity to submit this statement. We are researchers at The Johns Hopkins Center for a Livable Future based at the Bloomberg School of Public Health in the Department of Environmental Health and Engineering. The Center engages in research, policy analysis, education, and other activities guided by an ecologic perspective that diet, food production, the environment, and public health are interwoven elements of a complex system. We recognize the prominent role that food animal production plays regarding a wide range of public health issues surrounding that system.

We became aware of the recent introduction of Senate Bill 583, "Relating to industrial dairies; declaring an emergency." The goal of this legislation is to "prohibit the Department of Environmental Quality and State Department of Agriculture from issuing or renewing license or permit to allow construction or operation of new industrial dairy, addition to or expansion of existing industrial dairy or addition to or expansion of dairy that would cause dairy to become industrial dairy". As we know that industrial agriculture can have important impacts on the health of workers, local communities, and the health of the environment, we enthusiastically support the adoption of this bill.

After reviewing extensive evidence of the public health, environmental and community negative impacts, the 2019 American Public Health Association "Precautionary Moratorium on New and Expanding Concentrated Animal Feeding Operations" resolution was adopted.[1] This document outlines the negative effects of enormous amounts of manure and waste produced by large-scale animal production, as well as the injustices experienced by workers and communities that are influenced by these facilities. APHA believes that the externalized costs are likely to mount in coming years, as growing evidence indicate that CAFOs pose health and environmental risks and negative impacts.

[1.] APHA 2019, Precautionary Moratorium on New and Expanding Concentrated Animal Feeding Operations, Date: NOV 05, 2019, Policy Statement Number:20194. Link: https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2020/01/13/precautionary-moratorium-on-new-and-expanding-concentrated-animal-feeding-operations

The APHA resolution outlines 12 legislative and regulatory steps that need to be taken to mitigate the public health threats before establishing new or expanding existing CAFOs. CAFO regulations and their enforcement have failed to adequately protect human health and the environment.

We were asked to provide an evidence-informed expert perspective on the public health and environmental considerations stemming from CAFO/industrial food animal production (IFAP). We provide a summary of this information below which we believe to be highly relevant to local communities, government, and health officials in Oregon. In response to this request we have referenced research articles related to the large-scale animal production and hope this information will be helpful in support of this bill.

Summary of Public Health Concerns Associated with IFAP

The primary human health concerns related to IFAP include: infections resulting from transmission of harmful microorganisms from animal operations to nearby residents; respiratory effects from increased exposure to air pollution from animal operations; and multiple negative health impacts due to increased exposure to ground and/or surface waters that can be contaminated by manure from animal operations. These concerns are described in more detail below.

Disease Transmission

The poor conditions, including crowding, characteristic of industrial animal operations present opportunities for disease transmission among animals, and between animals and humans.[2,3] Nearby residents, especially if they live in close proximity to multiple operations, may have an increased risk of infection from the transmission of harmful microorganisms from operations manure handling, storage and spreading, or via flies or contaminated air and water.[4-9]

The risk of human gastrointestinal infection associated with exposure to airborne pathogens following the land application of dairy manure was explored in this study. It was concluded that bioaerosol emissions

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2. Gomes A, Quinteiro-Filho W, Ribeiro A, et al. Overcrowding stress decreases macrophage activity and increases *Salmonella* enteritidis invasion in broiler chickens. *Avian Pathol*. 2014;43(1):82-90. Link: https://www.ncbi.nlm.nih.gov/pubmed/24350836

3. Rostagno MH. Can stress in farm animals increase food safety risk? *Foodborne pathogens and disease*. 2009;6(7):767-776. Link: http://online.liebertpub.com/doi/pdf/10.1089/fpd.2009.0315

4. Rule AM, Evans SL, Silbergeld EK. Food animal transport: A potential source of community exposures to health hazards from industrial farming (CAFOs). *Journal of Infection and Public Health*. 2008;1(1):33-39. Link: https://www.ncbi.nlm.nih.gov/pubmed/20701843

5. Price LB, Graham JP, Lackey LG, Roess A, Vailes R, Silbergeld E. Elevated risk of carrying gentamicin-resistant *Escherichia coli* among US poultry workers. *Environ Health Perspect*. 2007:1738-1742. Link: https://www.ncbi.nlm.nih.gov/pubmed/18087592

6. Baykov B, Stoyanov M. Microbial air pollution caused by intensive broiler chicken breeding. *FEMS Microbiol Ecol*. 1999;29(4):389-392. Link: https://academic.oup.com/femsec/article/29/4/389/527380/Microbial-air-pollution-caused-by-intensive

7. Spencer JL, Guan J. Public health implications related to spread of pathogens in manure from livestock and poultry operations. *Public Health Microbiology: Methods and Protocols*. 2004:503-515. Link: https://www.ncbi.nlm.nih.gov/pubmed/15156064

8. Graham JP, Leibler JH, Price LB, et al. The animal-human interface and infectious disease in industrial food animal production: Rethinking biosecurity and biocontainment. *Public Health Rep*. 2008:282-299. Link: https://www.ncbi.nlm.nih.gov/pubmed/19006971

9. Jahne MA, Rogers SW, Holsen TM, Grimberg SJ, Ramler IP. Emission and dispersion of bioaerosols from dairy manure application sites: Human health risk assessment. *Environ Sci Technol*. 2015;49(16):9842-9849. Link: https://www.ncbi.nlm.nih.gov/pubmed/26158489

from manure application sites may present significant public health risks to downwind receptors, and improved manure management practices that include better controls for bioaerosols were recommended to reduce the risk of disease transmission.[10]

Of additional concern is exposure to pathogens that are resistant to antibiotics used in human medicine. Administering antibiotics to animals at levels too low to treat disease (non-therapeutic use) fosters the proliferation of antibiotic-resistant pathogens, and this practice is common in IFAP. Resistant infections in humans are more difficult and expensive to treat[11] and more often fatal[12] than infections with non-resistant strains. A growing body of evidence provides support that antibiotic-resistant pathogens are found on animal operations that administer antibiotics for non-therapeutic purposes[13,14] and are also found in the environment in and around production facilities,[14-16] specifically in the manure,[17-19] air,[14] and flies.[19]

Of critical importance, research suggests that the infectious agent for COVID-19, SARS-CoV-2, may have originated from an animal as a zoonotic illness that was transferred to humans. Though studies have shown that some animals are not susceptible to SARS-CoV-2 infection,[20] it has been shown that zoonotic transmission of disease agents is a common process for emerging human illness.[21, 22] Once introduced, these diseases can then transfer from person-to-person.

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10. Casey JA, Curriero FC, Cosgrove SE, Nachman KE, Schwartz BS. High-density livestock operations, crop field application of manure, and risk of community-associated methicillin-resistant *Staphylococcus aureus* infection in Pennsylvania. *JAMA Internal Medicine*. 2013;173(21):1980-1990. Link: https://www.ncbi.nlm.nih.gov/pubmed/24043228

11. Roberts RR, Hota B, Ahmad I, et al. Hospital and societal costs of antimicrobial-resistant infections in a Chicago teaching hospital: Implications for antibiotic stewardship. *Clin Infect Dis*. 2009;49(8):1175-1184. Link: https://academic.oup.com/cid/article/49/8/1175/425330/Hospital-and-Societal-Costs-of-Antimicrobial

12. Filice GA, Nyman JA, Lexau C, et al. Excess costs and utilization associated with methicillin resistance for patients with *Staphylococcus aureus* infection. *Infection Control & Hospital Epidemiology*. 2010;31(04):365-373. Link: https://www.ncbi.nlm.nih.gov/pubmed/20184420

13. Price LB, Lackey LG, Vailes R, Silbergeld E. The persistence of fluoroquinolone-resistant *Campylobacter* in poultry production. *Environ Health Perspect*. 2007:1035-1039. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913601/

14. Schulz J, Friese A, Klees S, et al. Longitudinal study of the contamination of air and of soil surfaces in the vicinity of pig barns by livestock-associated methicillin-resistant *Staphylococcus aureus*. *Appl Environ Microbiol*. 2012;78(16):5666-5671. Link: https://www.ncbi.nlm.nih.gov/pubmed/22685139

15. Burgos J, Ellington B, Varela M. Presence of multidrug-resistant enteric bacteria in dairy farm topsoil. *J Dairy Sci*. 2005;88(4):1391-1398. Link: https://www.ncbi.nlm.nih.gov/pubmed/15778307

16. Sapkota AR, Curriero FC, Gibson KE, Schwab KJ. Antibiotic-resistant enterococci and fecal indicators in surface water and groundwater impacted by a concentrated swine feeding operation. *Environ Health Perspect*. 2007:1040-1045. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913567/

17. Graham JP, Evans SL, Price LB, Silbergeld EK. Fate of antimicrobial-resistant enterococci and staphylococci and resistance determinants in stored poultry litter. *Environ Res*. 2009;109(6):682-689. Link: https://www.ncbi.nlm.nih.gov/pubmed/19541298

18. United States Environmental Protection Agency. Literature review of contaminants in livestock and poultry manure and implications for water quality. July 2013:1-137. Link: http://ow.ly/mTDw308qwbZ

19. Wichmann F, Udikovic-Kolic N, Andrew S, Handelsman J. Diverse antibiotic resistance genes in dairy cow manure. *MBio*. 2014;5(2):e01017-13. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3993861/

20. Graham JP, Price LB, Evans SL, Graczyk TK, Silbergeld EK. Antibiotic resistant enterococci and staphylococci isolated from flies collected near confined poultry feeding operations. *Sci Total Environ*. 2009;407(8):2701-2710. Link: https://www.ncbi.nlm.nih.gov/pubmed/19157515

21. Opriessnig T, Huang YW. Further information on possible animal sources for human COVID 19. *Xenotransplantation*. 2020;27(6):e12651. doi:10.1111/xen.12651

22. Mackenzie, J. S., Jeggo, M., Daszak, P., & Richt, J. A. (2013). One Health: the human-animal-environment interfaces in emerging infectious diseases. (J. S. Mackenzie, M. Jeggo, P. Daszak, & J. A. Richt, Eds.) (Vol. 365). Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/978-3-642-36889-9

During the ongoing COVID-19 pandemic there have been reported outbreaks among workers in industrial-animal production facilities as well as animal processing facilities. Investigating the contributing factors associated with these outbreaks have highlighted crowded working conditions, long hours of work and poor COVID safety protocols. These production facilities and the health of the workers in those facilities directly influence community health and transmission of the disease.[23]

Manure runoff from IFAP operations may introduce these harmful microorganisms into nearby surface and groundwater sources.[24] Land application of manure presents an opportunity for pathogens contained in the manure to leach into the ground or run off into recreational surface water and drinking water sources, potentially causing a waterborne disease outbreak[18]. This is of particular concern as it is estimated that 90% of all public water supplies in Oregon is exclusively from groundwater sources. In 2005, DEQ reported that 70% of Oregonians and 90% of rural Oregonians depend on groundwater for drinking water;[25] many of those private drinking water wells are not monitored by government agencies to ensure safe levels of pathogens or other contaminants.

Air Pollution

Community members living near IFAP operations also face increased exposure to air pollution from these operations, which can cause or exacerbate respiratory conditions including asthma;[26-28] eye irritation, difficulty breathing, wheezing, sore throat, chest tightness, nausea[26] and bronchitis and allergic reactions.[27] Air emissions include particulate matter, volatile organic compounds, and gases such as nitrous oxide, hydrogen sulfide, and ammonia.[29, 30] Animal agriculture is also a significant contributor to greenhouse gas emissions that affect local, regional, national and global air quality.[30] Odors associated with air pollutants from large-scale animal operations have been shown to interfere with daily activities,

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[23.] Waltenburg M.A., Victoroff T., Rose C.E., et al. Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities – United States, April-May 2020. MMWR Morb Mortal Wkly Rep 2020;69:887-892. doi:10.15585/mmwr.mm6927e2

[24.] Heaney CD, Myers K, Wing S, Hall D, Baron D, Stewart JR. Source tracking swine fecal waste in surface water proximal to swine concentrated animal feeding operations. *Sci Total Environ*. 2015;511:676-683. Link: https://www.ncbi.nlm.nih.gov/pubmed/25600418

[25.] 2005 Groundwater Quality Monitoring in Oregon, DEQ Report to the Legislature State of Oregon Department of Environmental Quality. Accessed 3/31/2021 Link: https://www.oregonlegislature.gov/citizen_engagement/Reports/2005_DEQ_Groundwater%20quality%20protection%20in%20Oregon.pdf

[26.] Heederik D, Sigsgaard T, Thorne PS, et al. Health effects of airborne exposures from concentrated animal feeding operations. *Environ Health Perspect*. 2007:298-302. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817709/

[27.] Cambra-López M, Aarnink AJ, Zhao Y, Calvet S, Torres AG. Airborne particulate matter from livestock production systems: A review of an air pollution problem. *Environmental Pollution*. 2010;158(1):1-17. Link: https://www.ncbi.nlm.nih.gov/pubmed/19656601

[28.] Mirabelli MC, Wing S, Marshall SW, Wilcosky TC. Asthma symptoms among adolescents who attend public schools that are located near confined swine feeding operations. *Pediatrics*. 2006;118(1):e66-75. Link: http://pediatrics.aappublications.org/content/118/1/e66

[29.] Schinasi L, Horton RA, Guidry VT, Wing S, Marshall SW, Morland KB. Air pollution, lung function, and physical symptoms in communities near concentrated swine feeding operations. *Epidemiology*. 2011;22(2):208-215. Link: https://www.ncbi.nlm.nih.gov/pubmed/21228696

[30.] Hribar C, Schultz M. Understanding concentrated animal feeding operations and their impact on communities. *Bowling Green, OH: National Association of Local Boards of Health.* 2010. Link: https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf

quality of life, social gatherings, and community cohesion[26, 31-33] and contribute to stress and acute increased blood pressure.[33, 34]

Contaminated Ground and Surface Water

The increased concentration and density of animals in confined animal feeding operations in the last several decades has resulted in the concentration of animal waste over local and regional geographic areas.[18] Although animal manure is an invaluable fertilizer, waste quantities of the magnitude produced by IFAP operations represent a public health and ecological hazard through distribution practices, land application and the degradation of surface and ground water resources.[18] Of concern in Oregon is the designation of the Lower Umatilla Basin under a ground water management plan; the influence of the dairy industry and cattle feed lots in the area are cited as a potential contributors to decreased water quality from nitrates, chemical and pesticide contamination.[25]

Manure from these operations can contaminate ground and surface waters with nitrates, drug residues, and other hazards,[7, 35-37] and studies have demonstrated that humans can be exposed to waterborne contaminants from livestock and poultry operations through the recreational use of contaminated surface water and the ingestion of contaminated drinking water.[36-38] Exposure to elevated levels of nitrates in drinking water is associated with adverse health effects, including cancer,[39-42] birth defects and other reproductive problems,[38, 39, 43, 44] thyroid problems,[38,39] and methemoglobinemia.[38, 45]

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31. Donham KJ, Wing S, Osterberg D, et al. Community health and socioeconomic issues surrounding concentrated animal feeding operations. *Environ Health Perspect*. 2007:317-320.
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817697/

32. Wing S, Wolf S. Intensive livestock operations, health, and quality of life among eastern North Carolina residents. *Environ Health Perspect*. 2000;108(3):233-238. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637983/

33. Horton RA, Wing S, Marshall SW, Brownley KA. Malodor as a trigger of stress and negative mood in neighbors of industrial hog operations. *Am J Public Health*. 2009;99(S3):S610-S615.
Link: https://www.ncbi.nlm.nih.gov/pubmed/19890165

34. Wing S, Horton RA, Rose KM. Air pollution from industrial swine operations and blood pressure of neighboring residents. *Environmental Health Perspectives (Online)*. 2013;121(1):92. Link: https://ehp.niehs.nih.gov/1205109/

35. Graham JP, Nachman KE. Managing waste from confined animal feeding operations in the United States: The need for sanitary reform. *Journal of Water and Health*. 2010;8(4):646-670. Link: https://www.ncbi.nlm.nih.gov/pubmed/20705978

36. Showers WJ, Genna B, McDade T, Bolich R, Fountain JC. Nitrate contamination in groundwater on an urbanized dairy farm. *Environ Sci Technol*. 2008;42(13):4683-4688. Link: https://www.ncbi.nlm.nih.gov/pubmed/18677991

37. Relation between nitrates in water wells and potential sources in the lower Yakima Valley, Washington state. U.S. Environmental Protection Agency, Washington, D.C., 2012. Link:
Https://Www3.epa.gov/region10/pdf/sites/yakimagw/nitrate_in_water_wells_study_9-27-2012.pdf.

38. Burkholder J, Libra B, Weyer P, et al. Impacts of waste from concentrated animal feeding operations on water quality. *Environ Health Perspect*. 2007:308-312. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/

39. Ward MH. Too much of a good thing? Nitrate from nitrogen fertilizers and cancer. *Rev Environ Health*. 2009;24(4):357-363. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068045/

40. Chiu H, Tsai S, Yang C. Nitrate in drinking water and risk of death from bladder cancer: An ecological case-control study in Taiwan. *Journal of Toxicology and Environmental Health, Part A*. 2007;70(12):1000-1004.
Link: https://www.ncbi.nlm.nih.gov/pubmed/17497410

41. Ward MH, Kilfoy BA, Weyer PJ, Anderson KE, Folsom AR, Cerhan JR. Nitrate intake and the risk of thyroid cancer and thyroid disease. *Epidemiology*. 2010;21(3):389-395. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2879161/

42. Gulis G, Czompolyova M, Cerhan JR. An ecologic study of nitrate in municipal drinking water and cancer incidence in Trnava district, Slovakia. *Environ Res*. 2002;88(3):182-187. Link: https://www.ncbi.nlm.nih.gov/pubmed/12051796

43. Manassaram DM, Backer LC, Moll DM. A review of nitrates in drinking water: Maternal exposure and adverse reproductive and developmental outcomes. *Environmental Health Perspectives*. 2006.
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1392223/

44. Brender JD, Weyer PJ, Romitti PA, et al. Prenatal nitrate intake from drinking water and selected birth defects in offspring of participants in the national birth defects prevention study. *Environ Health Perspect*. 2013;121(9):1083-1089. Link:
https://www.ncbi.nlm.nih.gov/pubmed/23771435

45. Knobeloch L, Salna B, Hogan A, Postle J, Anderson H. Blue babies and nitrate-contaminated well water. *Environ Health Perspect*. 2000;108(7):675-678. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638204/

These health risks are particularly relevant as the Oregon Department of Environmental Quality has already designated three regional groundwater management protection areas considered vulnerable to contamination because of local and regional sources and the generally shallow depth to groundwater in many areas and the permeable and porous pumice soils.[25] Given hydrogeological factors, there is cause for concern regarding protection of the groundwater supplies as well and the potential for influx of nitrate, chemicals and other manure contaminates into drinking water aquifers that are influenced by geological factors that are influenced by surface contamination.[25]

Nutrient runoff (including nitrogen and phosphorus) has also been implicated in the growth of harmful algal blooms,[18, 46] which impair regional surface water quality affecting aquatic species and wildlife. Harmful algal blooms may pose health risks for people who swim or fish in recreational waters, or who consume contaminated fish and shellfish. Exposure to algal toxins has been linked to neurological impairments, liver damage, gastrointestinal illness, severe dermatitis, and other adverse health effects.[47, 48]

In Conclusion

A growing body of evidence has implicated large-scale animal production in the spread of infectious diseases (including antibiotic-resistant strains such as MRSA*, E.coli, Campylobacter*, that are difficult to treat). Additionally, these operations have been associated with the generation of particulate matter, volatile organic compounds and gases that contribute to climate change, and the spread of airborne contaminants that affect property values, quality of life, and local and regional public health. Contamination of ground and surface waters affected by these operations have been found to render private wells unsafe and to reduce the quality of surface waters used for drinking water supply and critically important water-related economies. Contaminants associated with runoff from these operations can influence eutrophication affecting regional water quality and impair the economic and recreational use of surface waters for tourism, swimming, or fishing. The presence and expansion of large-scale animal production operations in Oregon will likely increase the production of, greenhouse gas emissions, contaminant hazards and risks to soil, air, ground, and surface water quality and increase risks to the health of Oregon residents. These and other factors support the adoption of Senate Bill 583 "Relating to industrial dairies; declaring an emergency" which will control the number and size of large-scale animal agriculture operations, support smaller family farm operations, and will enhance the ability of State and local regulatory agencies to mitigate and prevent the real hazards posed by these operations.

We hope our letter is helpful in describing some of the public health concerns associated large-scale animal production and will help to inform the deliberations for developing new ordinances and legislation to address the environmental and public health implications of agriculture. Through our research, we know that the legislature, local planning experts, departments of environment and health departments face many challenges when addressing issues surrounding large-scale food animal production; please do not hesitate to contact us if you have any questions.[49, 50]

[46.] Heisler J, Glibert PM, Burkholder JM, et al. Eutrophication and harmful algal blooms: A scientific consensus. *Harmful Algae*. 2008;8(1):3-13. Link: http://www.sciencedirect.com/science/article/pii/S1568988308001066

[47.] Carmichael WW. Health effects of toxin-producing cyanobacteria: "The CyanoHABs". *Human and Ecological Risk Assessment: An International Journal*. 2001;7(5):1393-1407. Link: http://www.tandfonline.com/doi/abs/10.1080/20018091095087

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[49.] Fry JP, Laestadius LI, Grechis C, Nachman KE, Neff RA. Investigating the role of state and local health departments in addressing public health concerns related to industrial food animal production sites. *PloS one*. 2013;8(1):e54720. Link: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0054720

[50.] Fry JP, Laestadius LI, Grechis C, Nachman KE, Neff RA. Investigating the role of state permitting and agriculture agencies in addressing public health concerns related to industrial food animal production. *PloS one*. 2014;9(2):e89870. Link: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0089870

Sincerely,

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