

TOWN OF BONE LAKE
POLK COUNTY, WISCONSIN

ORDINANCE NO. 2-2022
CONCENTRATED ANIMAL FEEDING OPERATIONS (CAFO) ORDINANCE

APPENDIX A

Journal Articles
University Programs
Regulatory & Court Documents
Media Articles

Journal Articles

1. Alarcón, L.V., Allepuz, A. & Mateu, E. Biosecurity in pig farms: a review. *Porc Health Manag* 7, 5 (2021).
Link: <https://doi.org/10.1186/s40813-020-00181-z>
The perception of the importance of animal health and its relationship with biosecurity has increased in recent years with the emergence and re-emergence of several diseases difficult to control. This is particularly evident in the case of pig farming as shown by the recent episodes of African swine fever or porcine epidemic diarrhea. Moreover, a better biosecurity may help to improve productivity and may contribute to reducing the use of antibiotics. Biosecurity can be defined as the application of measures aimed to reduce the probability of the introduction (external biosecurity) and further spread of pathogens within the farm (internal biosecurity). Thus, the key idea is to avoid transmission, either between farms or within the farm. This implies knowledge of the epidemiology of the diseases to be avoided that is not always available, but since ways of transmission of pathogens are limited to a few, it is possible to implement effective actions even with some gaps in our knowledge on a given disease. The development of quantitative assessment methods will permit a more precise selection of measures and a fine evaluation of their impact. Collaboration with other branches of science such as sociology or psychology may help to the sustainable implementation of biosecurity plans.
2. Almond, G. Water: Optimizing Performance While Reducing Waste. *46th Annual North Carolina Pork Conference North Carolina State University*, 2002.
Link: [Water: Optimizing Performance \(ncsu.edu\)](http://www.ncsu.edu/water-optimizing-performance)
Due to the relative abundance of water and its “low price”, there previously was little demand for research on the role of water and water delivery systems in US pork production, and specifically with applications to North Carolina. Water is important in pork production for two general reasons: its role in pig performance and its contribution to waste.
3. American Academy of Pediatrics. Committee on Environmental Health and Committee on Infectious Diseases, 2009. Drinking water from private wells and risks to children. *Pediatrics* 123(6):1599–1605.
Link: [Drinking Water From Private Wells and Risks to Children \(aappublications.org\)](http://aappublications.org)
Drinking water for approximately one sixth of US households is obtained from private wells. These wells can become contaminated by pollutant chemicals or pathogenic organisms and cause illness. Although the US Environmental Protection Agency and all states offer guidance for construction, maintenance, and testing of private wells, there is little regulation. This policy statement provides recommendations for inspection, testing, and remediation for wells providing drinking water for children.

Containment of highly pathogenic avian influenza (HPAI) is a critical step which must be properly performed to ensure human and animal safety. This publication discusses how to prepare to contain a potential outbreak and what should be done to safely contain it.

9. 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-broiler-breeding-operations>

This study examined the extent of microbial atmospheric pollution caused by industrial broiler breeding operations and found that as birds aged, microbial numbers increased in the indoor air and were spread into the environment to a greater degree. The study also found that microorganisms could be spread by air flow up to 3000 meters from the production buildings.

10. 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>

The relationship between prenatal exposure to nitrates in drinking water and birth defects was examined in this study. The study concluded that higher maternal water nitrate consumption was associated with birth defects, including spina bifida, limb deficiency, cleft palate, and cleft lip.

11. Broom, DM. (2003) Causes of Poor Welfare in Large Animals During Transport. *Veterinary research communications*, 27 Suppl 1, 515–518.

Link: [Causes of poor welfare in animal transport \(nih.gov\)](#)

The welfare of animals during transport should be assessed using a range of behavioral, physiological and carcass quality measures. In addition, health is an important part of welfare so the extent of any disease, injury or mortality resulting from, or exacerbated by, transport should be measured. Many of the indicators are measures of stress in that they involve long-term adverse effects on the individual. Key factors affecting the welfare of animals during handling and transport which are discussed are: attitudes to animals and the need for training of staff; methods of payment of staff; laws and retailers' codes; genetics, especially selection for high productivity; rearing conditions and experience; the mixing of animals from different social groups; handling procedures: driving methods; stocking density; increased susceptibility to disease and increased spread of disease.

12. Brumm, M. Patterns of Drinking Use in Pork Production Facilities. (2006) *Nebraska Swine Reports*. 221.

Link: [Patterns of Drinking Water Use in Pork Production Facilities](#)

The amount of drinking water needed daily by the pig depends on numerous influences, including temperature, diet, stage of production and health. Daily drinking water needs for pigs range from less than 0.5 gal/pig/day for newly weaned pigs to greater than 1.5 gal/pig/day for grow-finish pigs. Water requirements for breeding swine range from 3 to 4 gal/day for gestating females and 6 gal/day for lactating swine.

13. 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>

In addition to human and veterinary medicine, antibiotics are extensively used in agricultural settings, such as for treatment of infections, growth enhancement, and prophylaxis in food animals, leading to selection of drug and multidrug-resistant bacteria. To help circumvent the problem of bacterial antibiotic resistance, it is first necessary to

These poisonings result in respiratory and allergic reactions, gastrointestinal disturbances, acute hepatotoxicosis and peracute neurotoxicosis.

17. 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>

Nearly 80% of antibiotics in the United States are sold for use in livestock feeds. The manure produced by these animals contains antibiotic-resistant bacteria, resistance genes, and antibiotics and is subsequently applied to crop fields, where it may put community members at risk for antibiotic-resistant infections. The objective of this study was to assess the association between individual exposure to swine and dairy/veal industrial agriculture and risk of methicillin-resistant *Staphylococcus aureus* (MRSA) infection. This study was a population-based, nested case-control study of primary care patients from a single health care system in Pennsylvania from 2005 to 2010. Incident MRSA cases were identified using electronic health records, classified as community-associated MRSA or health care—associated MRSA, and frequency matched to randomly selected controls and patients with skin and soft-tissue infection. Nutrient management plans were used to create 2 exposure variables: seasonal crop field manure application and number of livestock animals at the operation. In a sub-study, we collected 200 isolates from patients stratified by location of diagnosis and proximity to livestock operations. The study measured community-associated MRSA, health care—associated MRSA, and skin and soft-tissue infection status (with no history of MRSA) compared with controls. From a total population of 446,480 patients, 1,539 community-associated MRSA, 1335 health care-associated MRSA, 2895 skin and soft-tissue infection cases, and 2914 controls were included. After adjustment for MRSA risk factors, the highest quartile of swine crop field exposure was significantly associated with community-associated MRSA, health care-associated MRSA, and skin and soft-tissue infection case status (adjusted odds ratios, 1.38 [95% CI, 1.13-1.69], 1.30 [95% CI, 1.05-1.61], and 1.37 [95% CI, 1.18-1.60], respectively); and there was a trend of increasing odds across quartiles for each outcome ($P \leq .01$ for trend in all comparisons). There were similar but weaker associations of swine operations with community-associated MRSA and skin and soft-tissue infection. Molecular testing of 200 isolates identified 31 unique *spa* types, none of which corresponded to CC398 (clonal complex 398), but some have been previously found in swine. Proximity to swine manure application to crop fields and livestock operations each was associated with MRSA and skin and soft-tissue infection. These findings contribute to the growing concern about the potential public health impacts of high-density livestock production.

18. Center for Food Security and Public Health, Iowa State University. Prepare for animal disease threats.

Link: [CFSPH - Center for Food Security and Public Health \(iastate.edu\)](http://www.cfsph.iastate.edu)

African Swine Fever was confirmed for the first time in recent years in samples from pigs in the Dominican Republic on July 28. Keeping this transboundary disease out is key.

19. Centro del los Derechos Del Migrante. Recruitment Revealed: Fundamental Flaws in the H-2 Temporary Worker Program and Recommendations for Change. 2018

Link: [Recruitment Revealed](#)

This report reveals the reality of international labor recruitment for low-wage, temporary jobs in the United States, examining recruitment in Mexico, home to the largest number of temporary migrants who labor under H-2 visas in the U.S. The findings are based on data gathered by Centro de los Derechos Migrante through a groundbreaking survey and lengthy interviews of hundreds of H-2 workers.

and composting. Biosecurity, transportation logistics, public perception, and environmental concerns limit the use of some of these methods. During a disease outbreak, the large number of mortalities often exceeds the capacity of local rendering plants and landfills. Transporting mortalities to disposal and incineration facilities outside the production operation introduces biosecurity risks. Burying mortalities is limited by the size and availability of suitable sites and it has the risk of pathogen survival and contamination of groundwater and soil. Portable incinerators are expensive and have the potential to aerosolize infectious particles. Composting, on the other hand, has been recognized as a biosecure disposal method. Although composting has been shown to eliminate HPAI, FMD, PED, and PRRS viruses, no studies have been reported regarding African swine fever. More studies are needed to show the biosecurity of composting in eliminating infectious diseases and especially microbial DNA, which is often referred to be the reason for reoccurring diseases.

25. Costa, D. Employers increase their profits and put downward pressure on wages and labor standards by exploiting migrant workers. *Economic Policy Institute*, Aug 27, 2019.

Link: [Employers and Migrant Workers](#)

Our current immigration system isn't working for workers. Instead, it benefits low-road employers who exploit the immigration status of unauthorized immigrants and authorized guestworkers through a legal framework that puts downward pressure on wages and leaves migrant workers powerless to enforce their labor rights and hold employers accountable. This hurts both migrants and the U.S. workers—citizens and lawful permanent residents—who work alongside them. Congress needs to reform the U.S. immigration system by granting lawful permanent resident status to the current unauthorized immigrant population; revising temporary work visa program rules; enacting new protections from retaliation for migrant workers; appropriating more funding for labor standards enforcement; and permanently banning employers from hiring through temporary work visa programs if they have violated immigration or labor laws.

26. Cullens, F. Water Use on Dairy Farms. Michigan State University Extension. October 18, 2011.

Link: [Water use on dairy farms - MSU Extension](#)

A reliable, high quality water supply is essential to dairy farms. Water is used for animal consumption, milk cooling, cleaning and sanitizing equipment, cow cooling, irrigating crops, producing value added products, moving manure and cleaning the barns via flush systems.

27. Dee SA, Deen J. Evaluation of an industry-based sanitation protocol for transport vehicles contaminated with porcine reproductive and respiratory syndrome virus. *J Swine Health Prod.* 2006;14(3):126-132.

Link: [Evaluation of an industry-based sanitation protocol](#)

Contaminated livestock trailers certainly represent a significant risk for movement of the virus between and within herds. Historically, this disease risk has been effectively mitigated in some cases with the use of trailer washing, disinfection protocols, and thermo-assisted drying and decontamination (TADD) systems. This paper summarizes four studies that evaluated individual aspects of trailer sanitation programs including TADD and multiple disinfectants alone, as well several protocols that include washing, disinfection and TADD. To test a protocol, using conditions found on commercial swine production units, for sanitation of 1:150 scale models of commercial transport vehicles contaminated with porcine reproductive and respiratory syndrome virus (PRRSV). High-pressure washing of transport trailers, followed by 90 to 120 minutes exposure to either modified potassium monopersulfate or quaternary ammonium chloride disinfectants applied with a hydrofoamer is likely to eliminate residual infectious PRRSV.

Because of reports of initial cases of COVID-19, in some meat processing facilities, states were asked to provide aggregated data concerning the number of meat and poultry processing facilities affected by COVID-19 and the number of workers with COVID-19 in these facilities, including COVID-19–related deaths. Qualitative data gathered by CDC during on-site and remote assessments were analyzed and summarized. During April 9–27, aggregate data on COVID-19 cases among 115 meat or poultry processing facilities in 19 states were reported to CDC.

32. Eastridge, M. Water Usage on Dairy Farms. *Buckeye Dairy News Ohio State University Extension* Volume 8 Issue 1.

Link: [Water Usage on Dairy Farms \(osu.edu\)](http://www.osu.edu/water-usage-on-dairy-farms)

As we always say "water is the most important nutrient", but all too often it is the most ignored nutrient when we are thinking of nutrition and animal performance. Therefore, we must constantly monitor water quality and quantity on dairy farms for animal health and performance and for protecting the environment.

33. 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>

Healthcare costs of methicillin-resistant *S. aureus* (MRSA) infections and methicillin-susceptible *S. aureus* (MSSA) were compared in this study. MRSA infections were found to be independently associated with higher costs, more comorbidities, and higher likelihood of death than MSSA infections.

34. Foltz JD, Jackson-Smith D, Chen L. Do purchasing patterns differ between large and small dairy farms? Econometric evidence from three Wisconsin communities. *Agric Resour Econ Rev*. 2002;31(1):28–38

Link: [Do Purchasing Patterns Differ Between Large and Small Dairy Farms? \(umn.edu\)](http://www.umn.edu/do-purchasing-patterns-differ-between-large-and-small-dairy-farms)

Using farm data from three dairy-dependent communities in Wisconsin, this study addresses the question: Do small farms spend more locally than large farms? The work develops a theoretical model of farm cost functions with transaction costs varying between local and distant input sources. This model is then tested econometrically, describing farm costs and where they were spent as a function of transaction/search costs and farm characteristics. The results suggest that scale does matter to farm spending patterns.

35. Fox, M. A., et. al. (2016). Meeting the public health challenge of protecting private wells: Proceedings and recommendations from an expert panel workshop. *Science of the Total Environment*, 554-555, 113-118.

Link: <https://doi.org/10.1016/j.scitotenv.2016.02.128>

Private wells serving fewer than 25 people are federally unregulated, and their users may be exposed to naturally occurring agents of concern. This panel assessed current conditions of ground water as a source for private wells, identified emerging threats, critical gaps in knowledge, and public health needs, and recommended strategies to guide future activities to ensure the safety of private drinking water wells.

36. 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>

This study explored how state permitting and agriculture agencies respond to environmental public health concerns regarding industrial food animal production through qualitative

This study examined if and how antibiotic resistant bacteria are transferred from poultry operations to nearby communities, and found that flies caught near poultry operations carried the same drug-resistant pathogens as those found in poultry litter. The study concludes that flies may be an important vector in the spread of drug resistant bacteria from poultry operations and may increase human exposure to these resistant pathogens.

41. 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>

Trends affecting food animal waste production, risks associated with food-animal wastes, and differences between food-animal waste and human biosolid management practices were examined in this study. The study found that no standards exist for the 335 million tons of food animal waste applied to land in the US, while human biosolids, which make up just 1% of all land-applied wastes, are subject to standards. Hormones, arsenicals, high nutrient loads, antibiotics, and pathogens, including antibiotic-resistant pathogens, are often present in animal waste. The authors made recommendations for improving management of food-animal waste through existing and new policies.

42. Guberti, V., Khomenko, S., Masiulis, M. & Kerba S. 2019. African swine fever in wild boar ecology and biosecurity. *FAO Animal Production and Health Manual No. 22*. Rome, FAO, OIE and EC.

Link: <en-manual-asfinwildboar-2019-web.pdf> (oie.int)

African swine fever (ASF) is a devastating hemorrhagic viral disease of pigs, affecting domestic and wild pigs of all ages and sexes. The disease is the cause of major economic losses, threatens food security and safe trade, and challenges sustained swine production in affected countries. Since ASF emergence in Georgia in 2007, the disease has spread to many countries in Europe and in 2018 was detected in East Asia, where over 60 percent of global domestic pig inventories are found.

43. 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>

This ecologic study was conducted to assess the association between nitrate levels in drinking water with non-Hodgkin lymphoma and cancers of the digestive and urinary tracts in an agricultural district. The study found is that a higher incidence of some cancers was associated with higher levels of nitrate in drinking water. The trend was found in women for overall cancer cases, stomach cancer, colorectal cancer and non-Hodgkin lymphoma, and in men for non-Hodgkin lymphoma and colorectal cancer.

44. Guthrie, T. Water Needs of Pigs. Michigan State Extension. May 2011

Link: [Water needs of pigs - MSU Extension](#)

How much water do pigs need? Pigs lose water through four routes: kidneys (urination), intestines (defecation), lungs (respiration) and some through evaporation (skin- sweat glands are largely dormant).

45. Harmon, J. Drip Cooling for Sows in Farrowing House. *Iowa State Extension Store*. October 2008

Link: [Drip Cooling of Sows in Farrowing House](#) (iastate.edu)

Research indicates that summer heat stress on sows can be reduced by using a system that continually drips water on the sow's shoulder in hot weather.

numerous public health and environmental problems and should thus be monitored to prevent harm to surrounding communities. Suggested actions include passing ordinances and regulations, and increasing water and air quality monitoring and testing. The report also concludes that local boards of health, in collaboration with state and local agencies, are an appropriate body for instituting these actions due to the local nature of CAFO concerns and risks.

51. Hseu Z-Y, Chen Z-S. Experiences of Mass Pig Carcass Disposal Related to Groundwater Quality Monitoring in Taiwan. *Sustainability*. 2017; 9(1):46.

Link: <https://doi.org/10.3390/su9010046>

Although burial is widely used to dispose of the large number of pig carcasses generated from FMD outbreaks, this disposal method has not undergone comprehensive scientific investigation. After the burial of culled pigs, dissolved components from carcass decomposition are slowly released into the external environment in the form of leachate, depending on the local environmental conditions. Nevertheless, the properties of groundwater, including total bacterial count, fecal coliform, *Salmonella* spp., nitrite-N, nitrate-N, ammonium-N, sulfate, NPOC, total oil, and TDS, are recognized as indicators of groundwater contamination resulting from the pig carcass burial during the FMD outbreak in Taiwan. Because very few studies have been performed, there is not enough information on the characteristics of groundwater at the burial sites, duration of pig carcass decomposition, and effects of leachate on groundwater quality worldwide. Although information on the biological and chemical characteristics of leachate is gradually being accumulated from the limited number of studies, guidelines for groundwater quality control should be established for livestock carcass disposal in all modern countries.

52. Isakson, Hans R. An analysis of the impact of swine CAFOs on the value of nearby houses. *Agricultural Economics*. November 2008; pages 365-372.

Link: <https://doi.org/10.1111/j.1574-0862.2008.00339.x>

The impact of 39 swine confined or concentrated animal feeding operations (CAFOs) in Black Hawk County, Iowa on 5,822 house sales is explored by introducing a new variable that more accurately captures the effects of prevailing winds, exploring potential adverse effects within concentric circles around each CAFO, managing selection bias, and incorporating spatial correlation into the error term of the empirical model. Large adverse impacts suffered by houses that are within 3 miles and directly downwind from a CAFO are found. Beyond 3 miles, CAFOs have a generally decreasing adverse impact on house prices as distance to the CAFO increases.

53. Jackson, L, Keeney, D, Gilbert, E. Swine manure management plans in North-Central Iowa: Nutrient loading and policy implications. *Journal of Soil and Water Conservation* April 2000, 55 (2) 205-212.

Link: [Swine manure management plans in North-Central Iowa...](#)

Public record were used to document the manure management practices of CAFOs housing 59,700 finishing hogs in a 1,554 ha area of Hamilton County, Iowa. Together, they generated an estimated 811,500 kg of nitrogen (N) each year, more than 70% of which volatilized into the atmosphere. CAFOs minimized the area required for applying manure by underestimating manure N content, projecting above average crop yields, and applying manure to soybeans. Some fields were claimed by more than one operator, and some field sizes were overestimated. Manure application based on crop demand for phosphorus would require 9,350 ha of cropland, compared to the 990 ha actually used. Several policy changes could alleviate the nutrient management problems...

54. 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 .

58. Kikuti, M, Paploski IA, et al. Newly emerging PRRSV Lineage 1C variant nomenclature. *Swine Health Information Center* 2021
 Link: [SHMP 2020|21.34 \[Lineage 1C variant nomenclature\].pdf](#)
 Recent outbreaks caused by a highly similar PRRSV variant have been reported. As we move forward with investigations of these farm level outbreaks, we continue to confirm that these form a tight genetic cluster not similar (using a 98% nucleotide identity as a cutoff) to any other sequences from our dataset. Because this is such a specific variant and because the common nomenclature used in the field has been restriction fragment length polymorphism (RFLP) typing, a review of the limitations of different PRRSV classification systems is warranted.
59. Kim, J, Goldsmith P. Using Spatial Econometrics to Assess the Impact of Swine Production on Residential Property Values American Agricultural Economics Association, Denver, July, 2004
 Link: [Microsoft Word - Paper 2 v.4pete.doc \(rosemonteis.us\)](#)
 A spatial hedonic model is developed to assess monetary harm of confined animal feeding operations (CAFOs) on property values, taking explicitly spatial dependence in property values into account. Spatial autocorrelation was found in the form of spatial lag dependence, not spatial error dependence. When spatial lag dependence is explicitly taken into account, on average the impact is reduced by 18%. The magnitude of the spatial autoregressive parameter was about 0.2 for the 1-mile distance band, meaning one-fifth of the house value could be explained by the values of the neighboring houses.
60. 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/>
 Two cases of infant methemoglobinemia associated with nitrate contaminated private well water were described in this paper. The case studies underscore the danger that this contaminated water poses to infants during the first six months of life, as well as the risks of long-term exposure, which include cancer, thyroid disease and diabetes. Steps to reduce nitrate inputs in groundwater and routine well water testing are recommended to protect health.
61. Knobeloch, L., Gorski, P., Christenson, M., & Anderson, H. (2013). Private drinking water quality in rural Wisconsin. *Journal of environmental health*, 75(7), 16–20.
 Link: [Private drinking water quality in rural Wisconsin - PubMed \(nih.gov\)](#)
 Between July 1, 2007, and December 31, 2010, Wisconsin health departments tested nearly 4,000 rural drinking water supplies for coliform bacteria, nitrate, fluoride, and 13 metals as part of a state-funded program that provides assistance to low-income families. The authors' review of laboratory findings found that 47% of these wells had an exceedance of one or more health-based water quality standards. Test results for iron and coliform bacteria exceeded safe limits in 21% and 18% of these wells, respectively. In addition, 10% of the water samples from these wells were high in nitrate and 11% had an elevated result for aluminum, arsenic, lead, manganese, or strontium. The high percentage of unsafe test results emphasizes the importance of water quality monitoring to the health of nearly one million families including 300,000 Wisconsin children whose drinking water comes from a privately owned well.
62. [Kravchenko J](#), [Rhew S](#), [Akushevich I](#), [Agarwal P](#), [Lylerly, HK](#): Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations. *NC Med J* Sep-Oct 2018;79(5):278-288.
 Link: <https://www.ncbi.nlm.nih.gov/pubmed/30228132>
Background Life expectancy in southeastern North Carolina communities located in an area with multiple concentrated animal feeding operations (CAFOs) after adjusting for socioeconomic factors remains low. We hypothesized that poor health outcomes in this

65. Ma W, Lager KM, Vincent AL, Janke BH, Gramer MR, Richt JA. The role of swine in the generation of novel influenza viruses. *Zoonoses Public Health*. 2009 Aug;56(6-7):326-37. Link: <https://www.ncbi.nlm.nih.gov/pubmed/19486316>

The ecology of influenza A viruses is very complicated involving multiple host species and viral genes. Avian species have variable susceptibility to influenza A viruses with wild aquatic birds being the reservoir for this group of pathogens. Occasionally, influenza A viruses are transmitted to mammals from avian species, which can lead to the development of human pandemic strains by direct or indirect transmission to man. Because swine are also susceptible to infection with avian and human influenza viruses, genetic reassortment between these viruses and/or swine influenza viruses can occur. The potential to generate novel influenza viruses has resulted in swine being labelled 'mixing vessels'. The mixing vessel theory is one mechanism by which unique viruses can be transmitted from an avian reservoir to man. Although swine can generate novel influenza viruses capable of infecting man, at present, it is difficult to predict which viruses, if any, will cause a human pandemic. Clearly, the ecology of influenza A viruses is dynamic and can impact human health, companion animals, as well as the health of livestock and poultry for production of valuable protein commodities. For these reasons, influenza is, and will continue to be, a serious threat to the wellbeing of mankind.

66. Malecki, K., Schultz, A. A., Severtson, D. J., Anderson, H. A., & VanDerslice, J. A. (2017). Private-well stewardship among a general population based sample of private well-owners. *The Science of the total environment*, 601-602, 1533–1543.

Link: <https://doi.org/10.1016/j.scitotenv.2017.05.284>

Private well stewardship, including on-going testing and treatment, can ensure private well users are able to maintain source-water quality and prevent exposures to potentially harmful constituents in primary drinking water supplies. Unlike municipal water supplies, private well users are largely responsible for their own testing and treatment and well stewardship is often minimal. The importance of factors influencing regular testing, and treatment behaviors, including knowledge, risk perception, convenience and social norms, can vary by geography and population characteristics. The primary goals of this study were to survey a general statewide population of private well users in Wisconsin in order to quantify testing and treatment patterns and gather data on motivations and barriers to well stewardship. The majority of respondents reported using and drinking well water daily but only about one half of respondents reported testing their wells in the last ten years and of these, only 10% reported testing in the last 12 months. Bacteria and nitrates were contaminants most often tested; and, a private laboratory most often conducted testing. The most commonly reported water treatment was a water softener. Living in a particular geographic region and income were the most significant predictors of water testing and treatment. Iron and hardness, which influence water aesthetics but not always safety, were the most commonly reported water quality problems. Health concerns or perceived lack thereof were, respectively, motivators and barriers to testing and treatment. Limited knowledge of testing and treatment options were also identified as barriers. Results confirm previous findings that well stewardship practices are minimal and often context specific. Understanding the target population's perceptions of risk and knowledge are important elements to consider in identifying vulnerable populations and developing education and policy efforts to improve well stewardship.

67. 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/>

next location or on to slaughter. Between groups the facility is thoroughly cleaned by pre-soaking and/or pressure washing.

71. Milligan, W. R., Fuller, Z. L., Agarwal, I., Eisen, M. B., Przeworski, M., & Sella, G. (2021). Impact of essential workers in the context of social distancing for epidemic control. *PLoS one*, 16(8), e0255680.

Link: <https://doi.org/10.1371/journal.pone.0255680>

New emerging infectious diseases are identified every year, a subset of which become global pandemics like COVID-19. In the case of COVID-19, many governments have responded to the ongoing pandemic by imposing social policies that restrict contacts outside of the home, resulting in a large fraction of the workforce either working from home or not working. To ensure essential services, however, a substantial number of workers are not subject to these limitations, and maintain many of their pre-intervention contacts. To explore how contacts among such "essential" workers, and between essential workers and the rest of the population, impact disease risk and the effectiveness of pandemic control, we evaluated several mathematical models of essential worker contacts within a standard epidemiology framework. The models were designed to correspond to key characteristics of cashiers, factory employees, and healthcare workers. We find in all three models that essential workers are at substantially elevated risk of infection compared to the rest of the population, as has been documented, and that increasing the numbers of essential workers necessitates the imposition of more stringent controls on contacts among the rest of the population to manage the pandemic. Importantly, however, different archetypes of essential workers differ in both their individual probability of infection and impact on the broader pandemic dynamics, highlighting the need to understand and target intervention for the specific risks faced by different groups of essential workers. These findings, especially in light of the massive human costs of the current COVID-19 pandemic, indicate that contingency plans for future epidemics should account for the impacts of essential workers on disease spread.

72. 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/>

The relationship between exposure to airborne effluent from swine CAFOs and asthma symptoms in adolescents age 12-14 years old was assessed in this study to better understand the health effects of living near industrial swine facilities. The study found that estimated exposure to swine CAFO air-pollution was associated with wheezing symptoms in adolescents.

73. Morrow, WE, Ferket, PR. Alternative Methods for the Disposal of Swine Carcasses Factsheet. *North Carolina State University, Raleigh, NC* Nov 2001. ANS01-815S

Link: https://projects.ncsu.edu/project/swine_extension/publications/factsheets/815s.pdf

There is probably no one best way to dispose of swine mortality carcasses. The optimum system for any particular farm location would need to be selected based on a number of criteria, including the current state of the protein/oil market, the biosecurity required, the distance to processing sites, the local public's perception, and the government regulations that apply to that location. The tonnage of dead pigs produced annually is substantial. A typical 5000 sow farrow-to-finish farming system (with mortality losses of 7%, 10%, 5%, 1%, and 1% in the sow, neonatal, nursery, growing, and finishing herd, respectively) will produce over 200,000 pounds of dead pigs annually. In many farming systems in the USA, actual losses may be much higher. The

77. Paploski, IA, Corzo C, Rovira AI, et al. Temporal Dynamics of Co-circulating Lineages of Porcine Reproductive and Respiratory Syndrome Virus. *Frontiers in Microbiology*. 2019 Vol 10: 2486
 Link: <https://www.frontiersin.org/article/10.3389/fmicb.2019.02486>
 Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) is the most important endemic pathogen in the U.S. swine industry. Despite control efforts involving improved biosecurity and different vaccination protocols, the virus continues to circulate and evolve. One of the foremost challenges in its control is high levels of genetic and antigenic diversity. Here, we quantify the co-circulation, emergence and sequential turnover of multiple PRRSV lineages in a single swine-producing region in the United States over a span of 9 years (2009–2017) using the Morrison Swine Health Monitoring Project housed at the University of Minnesota.
78. Polaris Project. Recruitment, Human Trafficking, and Temporary Visa Workers. Sept 2021
 Link: [Recruitment, Human Trafficking, and Temporary Visa Workers](#)
 This report examines the roles recruitment practices, regulations, and enforcement play in the experiences of trafficking victims who are in the United States on temporary worker visas. Data from the U.S. National Human Trafficking Hotline identified 4,8163 likely victims from January 1, 2015 – December 31, 20204 who were in the United States and working under any of the visa categories listed at the time of their abuse.
79. Polaris Project. Human Trafficking on Temporary Work Visas: A Data Analysis 2015-2017.
 Link: [Human Trafficking on Temporary Work Visas](#)
 This report details how human traffickers are using workers under H-2A, H-2B and other temporary work visas and making legitimate businesses, consumers and the U.S. government complicit in the \$150 billion business of global human trafficking.
80. Poulsen, Melissa N.a.,b; Pollak, Jonathana; Sills, Deborah L.c; Casey, Joan A.d; Nachman, Keeve E.a.,e.,f; Cosgrove, Sara E.g.,h; Stewart, Daltonc; Schwartz, Brian S. High-density poultry operations and community-acquired pneumonia in Pennsylvania. *Environmental Epidemiology*: June 2018 - Volume 2 - Issue 2 - p e013
 Link:https://journals.lww.com/enviroepidem/Fulltext/2018/06000/High_density_poultry_operations_and.5.aspx
Background Air pollution from industrial food animal production may increase vulnerability to pneumonia among individuals living in nearby communities. We evaluated the association between individual-level residential proximity to high-density poultry operations and diagnosis with community-acquired pneumonia (CAP).
Methods We conducted a nested case–control study among patients of a large health system in Pennsylvania, USA. We used diagnostic codes for pneumonia and chest imaging from electronic health records from 2004 to 2015 to identify 11,910 child and adult cases of CAP and 59,550 frequency-matched outpatient controls. We estimated exposure to poultry operations using data from nutrient management plans, calculating an inverse-distance squared activity metric based on operation and residential addresses that incorporated number, size, and location of operations. Mixed effects logistic regression models evaluated associations between quartiles of the activity metric and CAP diagnosis. Models controlled for sex, age, race/ethnicity, Medical Assistance (proxy for low socioeconomic status), and smoking status.
Results Individuals living in the highest (versus lowest) quartile of the poultry operation metric had 66% increased odds of CAP diagnosis (adjusted odds ratio [confidence interval]) Q2, 0.98 [0.74, 1.31]; Q3, 1.17 [0.93, 1.46]; Q4, 1.66 [1.27, 2.18]).
Conclusions Findings suggest that living in closer proximity to more and larger poultry operations may increase risk of CAP, contributing to growing concern regarding public health impacts of industrial food animal production.

with livestock raised with versus without antibiotic selective pressure remains unclear. We aimed to examine prevalence, antibiotic susceptibility, and molecular characteristics of *S. aureus* among industrial livestock operation (ILO) and antibiotic-free livestock operation (AFLO) workers and household members in North Carolina.

Methods. Participants in this cross-sectional study were interviewed and provided a nasal swab for *S. aureus* analysis. Resulting *S. aureus* isolates were assessed for antibiotic susceptibility, multi-locus sequence type, and absence of the *sen* gene (a marker of livestock association).

Results. Among 99 ILO and 105 AFLO participants, *S. aureus* nasal carriage prevalence was 41% and 40%, respectively. Among ILO and AFLO *S. aureus* carriers, MRSA was detected in 7% (3/41) and 7% (3/42), respectively. Thirty seven percent of 41 ILO versus 19% of 42 AFLO *S. aureus*-positive participants carried MDRSA. *S. aureus* clonal complex (CC) 398 was observed only among workers and predominated among ILO (13/34) compared with AFLO (1/35) *S. aureus*-positive workers. Only ILO workers carried *scn*-negative MRSA CC398 (2/34) and *scn*-negative MDRSA CC398 (6/34), and all of these isolates were tetracycline resistant.

Conclusions. Despite similar *S. aureus* and MRSA prevalence among ILO and AFLO-exposed individuals, livestock-associated MRSA and MDRSA (tetracycline-resistant, CC398, *scn*-negative) were only present among ILO-exposed individuals. These findings support growing concern about antibiotics use and confinement in livestock production, raising questions about the potential for occupational exposure to an opportunistic and drug-resistant pathogen, which in other settings including hospitals and the community is of broad public health importance.

85. Rioja-Lang, FC. A Review of Swine Transportation on Priority Welfare Issues. *Frontiers in Veterinary Science* February 22, 2019.

Link: [Review of Swine Transportation Research\(frontiersin.org\)](https://doi.org/10.3389/fvets.2019.00022)

Review is to present the best available scientific knowledge on key animal welfare issues during swine transport, such as transport duration and distance, time off feed and water, rest intervals, environmental conditions, loading density, and transport of young animals, based on their impact on stress, injury, fatigue, dehydration, body temperature, mortality, and carcass and meat quality.

86. 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://doi.org/10.1086/605630>

Medical and societal costs attributable to antimicrobial-resistant infections are considerable, and important factors in understanding the potential benefits of prevention programs. Medical costs attributable to antimicrobial-resistant infections range from \$18,588 to \$29,069 per patient, hospital stay durations from 6.4-12.7 days, and mortality of 6.5%. Societal costs were estimated at \$10.7-\$15 million.

87. Rosov K, Mallin M, Cahoon L: Waste nutrients from U.S. animal feeding operations: Regulations are inconsistent across states and inadequately assess nutrient export risk. *Journal of Environmental Management*, Volume 269, 2020

Link: <https://doi.org/10.1016/j.jenvman.2020.110738>

Livestock production in the United States has been transformed over the past several decades, largely as a result of widespread development of industrial-scale mass production facilities,

underlying population of non-case farms. A similar geographical clustering of PRRS outbreaks was observed during winter in the Southeast of the United States. Pig dense areas were associated with a higher incidence rate throughout the year. However, this association tended to be stronger during the summer. Additionally, herds with ≥ 2500 sows had an increased incidence rate during all seasons except spring compared to those with < 2500 sows. PRRS incidence was lower in year-round air-filtered herds compared to non-filtered herds throughout the year. We showed that not only the spatial risk of PRRS varies regionally according to the season of the year, but also that the effect of swine density, herd size and air filtering on PRRS incidence may also vary according to the season of the year. Further studies should investigate regional and seasonal drivers of disease. Breeding herds should maintain high biosecurity standards throughout the year.

91. Saenz RA, Hethcote HW, Gray GC. Confined animal feeding operations as amplifiers of influenza. *Vector Borne Zoonotic Dis.* 2006;6(4):338-346.

Link: [Confined Animal Feeding Operations as Amplifiers of Influenza \(nih.gov\)](#)

Influenza pandemics occur when a novel influenza strain, often of animal origin, becomes transmissible between humans. Domestic animal species such as poultry or swine in confined animal feeding operations (CAFOs) could serve as local amplifiers for such a new strain of influenza. A mathematical model is used to examine the transmission dynamics of a new influenza virus among three sequentially linked populations: the CAFO species, the CAFO workers (the bridging population), and the rest of the local human population. Using parameters based on swine data, simulations showed that when CAFO workers comprised 15-45% of the community, human influenza cases increased by 42-86%. Successful vaccination of at least 50% of CAFO workers cancelled the amplification. A human influenza epidemic due to a new virus could be locally amplified by the presence of confined animal feeding operations in the community.

92. 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/>

Surface and groundwater located up and down gradient from a swine facility was analyzed for the presence of antibiotic-resistant enterococci and other fecal indicators in this study. Both were detected at elevated levels in down gradient water sources relative to the swine facility compared to up-gradient sources, providing evidence that water contaminated with swine manure can contribute to the spread of antibiotic resistance.

93. 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/>

This study examined the associations between reported malodor and monitored air pollutants with lung function and physical symptoms in people residing within 1.5 miles of hog operations to better understand the effect of CAFO air pollutants on human health. The study reported that acute physical symptoms, including eye irritation, respiratory symptoms, difficulty breathing, wheezing, declined forced expiratory volume, sore throat, chest tightness, and nausea were related to pollutants measured near hog operations.

96. 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/>
This study examined the presence and concentration of MRSA in air and soil downwind from swine CAFOs. The results demonstrate regular transmission and deposition of airborne livestock-associated MRSA to areas up to **at least 300 meters** around pig barns that tested positive for MRSA, suggesting that swine CAFOs can expose other farm animals, wildlife, and people to MRSA.
97. Shaw, K. A., Szablewski, C. M., Kellner, S., Kornegay, L., Bair, P., Brennan, S., Kunkes, A., Davis, M., McGovern, O. L., Winchell, J., Kobayashi, M., Burton, N., de Perio, M. A., Gabel, J., Drenzek, C., Murphy, J., Holsinger, C., & Forlano, L. (2019). Psittacosis Outbreak among Workers at Chicken Slaughter Plants, Virginia and Georgia, USA, 2018. *Emerging infectious diseases*, 25(11), 2143–2145.
Link: <https://doi.org/10.3201/eid2511.190703>
During August-October, 2018, an outbreak of severe respiratory illness was reported among poultry slaughter plant workers in Virginia and Georgia, USA. A multiorganizational team investigated the cause and extent of illness, determined that the illness was psittacosis, and evaluated and recommended controls for health hazards in the workplace to prevent additional cases.
98. Showers, William J., et al. "Nitrate contamination in groundwater on an urbanized dairy farm." *Environmental Science & Technology* 42.13 (2008): 4683-4688.
Link: <http://pubs.acs.org/doi/ful1/10.1021/es071551t>
Urbanization of rural farmland is a pervasive trend around the globe, and maintaining and protecting adequate water supplies in suburban areas is a growing problem. Identification of the sources of groundwater contamination in urbanized areas is problematic but will become important in areas of rapid population growth and development. The isotopic composition of NO₃(815NNO₃ and M80 NO₃), NH₄ (815NNH₄), groundwater (62Hwt and 8180wt) and chloride/bromide ratios were used to determine the source of nitrate contamination in drinking water wells in a housing development that was built on the site of a dairy farm in the North Carolina Piedmont, U.S. The 615NNO₃ and 6180 NO₃ compositions imply that elevated nitrate levels at this site in drinking well water are the result of waste contamination, and that denitrification has not significantly attenuated the groundwater nitrate concentrations. 615NNO₃ and 6180NO₃compositions in groundwater could not differentiate between septic effluent and animal waste contamination. Chloride/bromide ratios in the most contaminated drinking water wells were similar to ratios found in animal waste application fields and were higher than Cl/Br ratios observed in septic drain fields in the area. 6180wt was depleted near the site of a buried waste lagoon without an accompanying shift in 62Hwt suggesting water oxygen exchange with CO₂. This water—O₂ exchange resulted from the reduction of buried lagoon organic matter, and oxidation of the released gases in aerobic soils. 6180wt is not depleted in the contaminated drinking water wells, indicating that the buried dairy lagoon is not a source of waste contamination. The isotope and Cl/Br ratios indicate that nitrate contamination in these drinking wells are not from septic systems, but are the result of animal waste leached from pastures into groundwater during 35 years of dairy operations which did not violate any existing regulations. Statutes need to be enacted to protect the health of the homeowners that require well water to be tested prior to the sale of homes built on urbanized farmland.
99. Song D, Moon H, Kang B. Porcine epidemic diarrhea: A review of current epidemiology and available vaccines. *Clin Exp Vaccine Res*. 2015;4(2):166-176. doi:10.7774/cevr.2015.4.2.166

multisite production, the economics of finishing pigs in the Midwest, plus location of the US packing industry, the chances of transmission of respiratory or enteric organisms have increased. All trucks, trailers, and other vehicles used for transporting animals, animal products, products, feed, offal, and contaminated equipment are a potential risk in the spread of disease.

105. Ueijo, C. K., et. al. (2014). Drinking water systems, hydrology, and childhood gastrointestinal illness in central and northern Wisconsin. *American Journal of Public Health*, 104(4):639- 646.
Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4025711/>
106. US Meat Export Federation. FAQ: How do Red Meat Exports Benefit the Industry?
Link: [FAQ : U.S. Meat Export Federation \(usmef.org\)](http://www.usmef.org/faq)
107. 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/>
Nitrate, the breakdown product of nitrogen fertilizers, accumulates in groundwater under agricultural land and can spread through waterways due to agricultural field runoff. Nitrates are associated with a range of adverse health effects, including methemoglobinemia, various cancers, negative reproductive outcomes, diabetes, and thyroid conditions. Additional research is needed to further evaluate the health effects of nitrate exposure, especially as environmental exposure to nitrates has increased over the last 50 years and 90% of rural Americans depend on groundwater for drinking water, many relying on private wells, which are not regulated by the Safe Drinking Water Act.
108. 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/>
This study examined the association between nitrate intake through public water and diet with the risk of thyroid cancer and hypo- and hyperthyroidism. The study found an increased risk of thyroid cancer with high water nitrate levels and with longer consumption of water containing nitrates. The increased intake of dietary nitrate was associated with an increased risk of thyroid cancer, and with the prevalence of hypothyroidism.
109. Weyer, P.J., J.R. Cerhan, B.C. Kross , G.R. Hallberb, J. Kantamneni, G. Breuer, M.P. Jones, W. Zheng, C.F. Lynch. 2001. *Epidemiology*, 11(3):327-338. Municipal Drinking Water Nitrate Level and Cancer Risk in Older Women: The Iowa Women's Health Study, *Epidemiology*: May 2001 - Volume 12 - Issue 3 - p 327-338
Link: [Municipal Drinking Water Nitrate Level and Cancer Risk](#)
Nitrate contamination of drinking water may increase cancer risk, because nitrate is endogenously reduced to nitrite and subsequent nitrosation reactions give rise to N-nitroso compounds; these compounds are highly carcinogenic and can act systemically. We analyzed cancer incidence in a cohort of 21,977 Iowa women who were 55–69 years of age at baseline in 1986 and had used the same water supply more than 10 years (87% >20 years); 16,541 of these women were on a municipal supply, and the remainder used a private well. We assessed nitrate exposure from 1955 through 1988 using public databases for municipal water supplies in Iowa (quartile cutpoints: 0.36, 1.01, and 2.46 mg per liter nitrate-nitrogen). As no individual water consumption data were available, we assigned each woman an average level of exposure calculated on a community basis; no nitrate data were available for women using private wells. Cancer incidence (N = 3,150 cases) from 1986 through 1998 was determined by linkage to the Iowa Cancer Registry. For all cancers, there was no association with increasing nitrate in drinking water, nor were there clear and consistent associations for non-Hodgkin lymphoma; leukemia; melanoma; or cancers of the

2, and 2 km or more, respectively. The mean levels for Phase II were 29, 16, and 11 ppb for distances <0.5, 0.5-1, and 1 km or more, respectively. The results of the distance stratification are the best results of this study and provide the strongest evidence that distance to one or more CAFOs is the key variable in controlling weekly NH₃ atmospheric concentration at the community level in Eastern NC. Statistical analyses confirmed that source terms such as distance to a hog CAFO and live weight per operation, as well as temperature, wind speed and wind direction were important predictors of atmospheric NH₃ at community locations. The results indicate potential zones of exposure for human populations who live or go to school near hog CAFOs.

112. Wing 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/>

Reports of decreased health and quality of life from people who live near industrial animal operations were explored in this study through community surveys in three rural communities, one located near a large swine operation, one near two intensive cattle operations, and one area without nearby livestock operations using liquid waste management systems. Residents near the swine operation reported increased occurrences of poor health, such as headaches, diarrhea, sore throat, excessive coughing and burning eyes and reduced quality of life compared to those in the other two communities.

113. 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/>

The association of air pollution and malodor with stress and blood pressure were assessed in this study to improve understanding of the effects of industrial swine operations on human health. Malodor and some air pollutants were found to be associated with blood pressure increases and reported stress, which could contribute to the development of chronic hypertension.

114. Woods, J. et.al. (2008). Fatigue: a major cause of commercial livestock truck accidents. *Veterinaria italiana*, 44(1), 259–262.

Link: [Woods 259-262.doc \(izs.it\)](#)

Accident reports on 415 commercial livestock truck accidents were tabulated between 1994 and June 2007 in the United States and Canada. Data was collected from Google internet searches of newspaper and television news reports, unpublished industry sources and Alberta government agencies. Fifty-nine percent of the accidents occurred during the early morning hours from midnight to 9:00 am and 80% involved a single vehicle. Driver error was blamed for 85% of the wrecks. In 83% of the accidents, the vehicle rolled over and 84% of the truckers tipped over on their right side. In North America, vehicles travel on the right-hand side of the road and if a driver falls asleep at the wheel he usually drifts off toward the right. Driver fatigue is the most likely explanation for many of these accidents.

University Programs

115. Drake University Agricultural Law Center. Manure Agreement Decision Making Tool

Link: [Drake Decision Making Tool](#)

116. Iowa State University, Center for Food Security and Public Health, 2021 *Protecting Your Herd/Flock Biosecurity Tip Sheet*.

Link: <https://www.cfsph.iastate.edu/Assets/tip-sheet-protecting-your-herd-flock.pdf>

121. University of Minnesota. Newly funded: Investigating swine industry biocontainment strategies for airborne diseases. August 27, 2021

Link: [Swine industry biocontainment strategies for airborne diseases](#)

Airborne animal diseases in today's agricultural settings are difficult to contain. Let's say a pig raised in confinement with other swine contracts porcine reproductive and respiratory syndrome virus (PRRS); more than likely, the swine are in a controlled ventilated environment, where exhaust fans move airborne particles to the outdoors. In short order, air containing PRRS virus will flow into the environment and potentially to the swine farm across the road, causing an outbreak. How could the outbreak have been contained?

122. University of Minnesota Extension. Odor From Feedlots Estimation Tool (OFFSET).

Link: [offset-users-guide.pdf](#)

The amount of odor emitted from a particular farm is a function of animal species, housing types, manure storage and handling methods, the size of the odor sources, and the implementation of odor control technologies. However, the impact of these odors on the surrounding neighborhood or community is a function of both the amount of odor emitted and the weather conditions. Weather conditions strongly influence the movement and dilution of odors. Odor impact includes the strength of the odors and the frequency and duration of the odor events. OFFSET combines odor emission measurements with the average weather conditions to estimate the strength and frequency of odor events at various distances from a given farm.

123. University of Missouri. Securing Manure Spreading Rights through Easements. *Agricultural MU Guide*. G-361

Link: [G0361_03.qxd \(missouri.edu\)](#)

Several trends in modern animal agriculture are causing people to look at easements as a legal tool to help them meet their business objectives. Animal feeding operations are getting larger, and animals are housed in facilities engineered to capture and store manure. These larger animal feeding operations are highly specialized, sometimes owning less land than would be necessary to use the manure agronomically. Another trend is an increase in environmental regulation affecting many of these animal feeding operations. Recent concerns over the environmental impacts of animal feeding operations have led to new regulations. These trends often create a need to regularly export manure to neighboring farms; easements can be used to formalize this arrangement.

124. University of Wisconsin. Soil Nutrient Application Planner (SnapPlus)

Link: [SnapPlus – Wisconsin's Nutrient Management Planning Software](#)

SnapPlus is a Nutrient Management Planning software program designed for the preparation of nutrient management plans in accordance with Wisconsin's Nutrient Management Standard Code 590. SnapPlus will calculate:

- Crop nutrient (N, P₂O₅, K₂O) recommendations for all fields on a farm taking into account legume N and manure nutrient credits consistent with University of Wisconsin recommendations
- A RUSLE2-based soil loss assessment that will allow producers to determine whether fields that receive fertilizer or manure applications meet tolerable soil loss (T) requirements.
- A rotational Phosphorus Index value for all fields as required for using the P Index for phosphorus management.
- A rotational P balance for using soil test P as the criteria for phosphorus management.

Regulatory & Court Documents

The TMDL allows for 108,000 lbs/yr of phosphorus to be loaded to the St. Croix River from Polk County. This requires 53,000 lbs/yr of reduction from the estimated TMDL baseline load of 161,000 lbs/yr in the early 1990s. Polk County's required reduction ranks 1st largest among the 19 counties in the basin. To achieve the St. Croix Basin Partners' goal of 20% reduction by 2020, Polk County needs to reduce loadings by 39,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 1,300 lbs/yr over 30 yrs, or 3,900 lbs/yr over 10 yrs.

130. Minnesota Pollution Control Agency. Lake St. Croix Nutrient Total Maximum Daily Load (TMDL) May 2012

Link: [Lake St Croix TMDLFinalReport.pdf](#)

The St. Croix River and Lake St. Croix are highly valued resources that provide exceptional recreational opportunities and support a highly diverse ecology of aquatic and terrestrial species. However, over the years eutrophication, or nutrient enrichment, has occurred in Lake St. Croix due to excess phosphorus loading. This loading drives nuisance algae blooms which diminish the enjoyment and use of the lake. This report represents an important step in the improvement of Lake St. Croix by focusing on establishing the needed reduction in the loading of phosphorus from its contributing basin in order to achieve water quality standards.

131. National Fire Protection Association. NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas. 2017

Link: [NFPA 1141: Standard for Fire Protection for Wildland, Rural, and Suburban Areas](#)

Provides requirements for the development of fire protection and emergency services infrastructure to make sure that wildland, rural, and suburban areas undergoing land use changes or land development have the resources and strategies in place to protect people and property from fire dangers, and allow fire fighters to do their jobs safely and effectively.

132. National Fire Protection Association. NFPA 1142 Standard on Water Supplies for Suburban and Rural Fire Fighting. 2022

Link: [NFPA 1142: Standard on Water Supplies for Suburban and Rural Firefighting](#)

An adequate and reliable municipal-type water supply is sufficient every day of the year to control and extinguish anticipated fires in the jurisdiction. NFPA 1142 identifies minimum standards to assist rural and suburban fire departments in developing sufficient water supplies where no in-ground hydrant system, or an inadequate one, exists. Provides methods for determining water supply requirements based on occupancy and construction classifications. Also provides information regarding apparatus construction for water tankers.

133. National Fire Protection Association. NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fires. 2018

Link: [NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire](#)

This standard provides a methodology to assess wildland fire ignition hazards around existing structures and new structures located in wildland interface areas. Also provides minimum requirements for new construction to reduce the potential of structure ignition from wildland fires.

134. National Fire Protection Association. NFPA 150 Fire and Life Safety in Animal Housing Code. 2022

Link: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=150>

- f. **Suspected hazards** - Environmental or human health hazards must be referred to the county.
- g. **Residency** - Owner or operator must live within five (5) miles of the development.
- h. **Plans** - Professionally designed and drafted plans required for the main facility.

This swine CAFO ordinance was developed during a 12-month moratorium that required the county to study a wide range of environmental and health issues. This was supposed to be done because Wisconsin law requires ordinances to be based on "reasonable and scientifically defensible findings." However, the county did not do the needed work and provided no findings. As a result, DATCP staff issued a letter to the county that the ordinance is vulnerable to legal challenge.

140. St. Croix County, Wisconsin Community Development Committee (CDC). February 20, 2020 letter to Wisconsin DNR

Link: [SCC-CDC-letter-to-DNR-ESD-2020.pdf](#)

The documented violations and citizen concerns together are the reason this letter was prepared. Along with close scrutiny of the WPDES re-authorization application, CDC asks that additional measures and accountability be included in WPDES Permit 00593315-04-0 if the DNR chooses to re-issue the permit to Emerald Sky Dairy. The CDC requests full and quick enforcement of manure application rules and statutes for CAFO's located in St. Croix County. According to the Wisconsin Land and Water Conservation Association, loss of nutrients from cropland and pastures is the largest source of nonpoint source nutrient pollution in surface and groundwater in Wisconsin.

141. Town of Laketown, Polk County, Wisconsin. Town of Laketown Comprehensive Plan. October 27, 2009

Link: [Town of Laketown Comprehensive Plan](#)

In July of 2007 Polk County, along with twenty-five of its municipalities, was awarded a multi-jurisdictional Comprehensive Planning Grant through the Wisconsin Department of Administration to develop Comprehensive Plans. The Town of Laketown participated in the grant and began working on the plan in September of 2007. In order to review the issues and opportunities unique to the Town of Laketown, the following will be addresses.

142. Town of Laketown, Polk County, Wisconsin. Moratorium on Livestock Facility Licensing Committee Report. December 22, 2020

Link: [Laketown Livestock Facility Report](#)

Study, review, consider and determine whether amendments to the Large Scale Development Ordinance or the creation of a Livestock Facilities Licensing Ordinance or other ordinances are required to protect the environment, public health or safety and property in Laketown Township in light of the unique environment and the key concerns identified in the Town of Laketown Comprehensive Plan.

143. United Nations Food and Agriculture Organization. 2020 Global control of African swine fever - 2020 to 2025. Paris

Link: [Global control of African swine fever \(fao.org\)](#)

144. United States Department of Agriculture. Mass Depopulation & Euthanasia- Swine Euthanasia. *Powerpoint slide show*

Link: [mde_swine_presentation.pptx \(live.com\)](#)

151. United States Department of Agriculture Foreign Agriculture Service. 2020 U.S. Agricultural Export Yearbook.
Link: [2020-ag-export-yearbook.pdf \(usda.gov\)](#)
Provides a statistical summary of U.S. agricultural commodity exports to the world. The 16 product groups or commodity aggregations, displayed in the Yearbook, are based on the United States' largest export categories. The United States' top 15 export destinations are included as well as a page for the United Kingdom (UK). The European Union (EU27+UK), a customs union comprised of 28 member states, is included as a single trading partner. The only exception is that the UK has its own yearbook page given the importance of its withdrawal from the EU-28. The top 14 export markets represent 80 percent of total U.S. agricultural exports in 2020.
152. United States Department of Agriculture - Secretary Vilsack Message on African Swine Fever.
Link: [African Swine Fever Message from USDA Secretary Tom Vilsack](#)
African swine fever (ASF) is a highly contagious and deadly viral disease affecting both domestic and feral swine of all ages. ASF has never been found in the United States – and we want to keep it that way. ASF is a devastating, deadly disease that would have a significant impact on U.S. livestock producers, their communities and the economy if it were found here. There is no treatment or vaccine available for this disease.
153. United States Department of Transportation, Federal Highway Administration, *Developing Safety Plans, A Manual for Local Rural Road Owners*. March 2012
Link: https://safety.fhwa.dot.gov/local_rural/training/fhwasa12017/
Over three-fourths of all road miles in the U.S. are in rural areas. Of those three million miles of rural roads, almost 80 percent are owned and operated by local entities. In 2009, rural roads accounted for approximately 33 percent of the vehicle miles traveled in the U.S., but 56 percent of fatalities. Local roads in rural areas may have design elements that increase the risk of fatalities or serious injuries, such as inappropriately high speed limits, narrow lane widths and shoulders, steep ditches, or trees close to the roadway. Additionally, the low population density and sparse land use of rural communities can increase detection, response, and travel times for emergency services, reducing key factors in crash survivability. It typically takes more than twice as long for emergency services to arrive at a crash scene in a rural community compared to an urban community. Recommendations for developing a Local Road Safety Plan include: defining specific areas of emphasis to evaluate: eg, intersection safety, speed management, hazardous locations, and roadway/lane departures. Evaluation of specific hazards may include engineering evaluation to be sure the roads will meet the needs of heavier and more frequent truck traffic related to the CAFO.
154. United States Environmental Protection Agency. *Carcass Management of Non-Diseased Animals in Response to the Coronavirus Outbreak*.
Link: [Carcass Management in Response to the Coronavirus \(Covid-19\) Outbreak](#)
Help for producers and facilities with non-diseased carcass management during the current Coronavirus outbreak (COVID-19). Due to Covid-19, animal production and processing facilities are encountering challenges associated with certain livestock and poultry processing plant closures due to workforce and staffing issues related to the COVID-19 outbreak at those plants. As a result of these shutdowns, and other factors, some animal production facilities may need to depopulate by euthanizing animals. Unlike mortalities at normal rates, large-scale mortalities present challenges that are not part of the typical operation of these facilities. Operators are typically advised to have plans for emergency large-scale mortalities; for example, due to extreme weather or disease. However, those plans may be insufficient given the extensive challenges being faced at the current time.

pathogens in animal operations and nearby environments. The report also presents that manure discharge to surface waters can occur by various means and have deleterious effects on aquatic life and contribute to toxic algal blooms harmful to animals, and to humans when exposed via contact with contaminated drinking water or recreational use of contaminated water.

160. United States Environmental Protection Agency, *National Management Measures to Control Nonpoint Source Pollution from Agriculture*, EPA 841-B-004, July 2003

Link: <https://www.epa.gov/nps/monitoring-guidance-determining-effectiveness-nonpoint-source-controls>.

This Guidance addresses design of water quality monitoring programs to assess impacts from nonpoint source pollution (including agriculture) and evaluate success of control practices and management measures. Since each situation is different, this guidance presents the theory and information needed to design monitoring programs tailored to particular situations.

161. United States Environmental Protection Agency. *NPDES Permit Writers' Manual for CAFOs*. February 2021

Link: [NPDES Permit Writers' Manual for CAFOs](#)

Provides information to National Pollutant Discharge Elimination System (NPDES) permit writers on permitting requirements for Concentrated Animal Feeding Operations (CAFOs). The information in the Manual may also be useful for inspectors, facility operators, and the general public. Under the Clean Water Act (CWA), it is unlawful to discharge any pollutant from a point source without an NPDES permit. The CWA defines point source to include “any discernible, confined, and discrete conveyance, including but not limited to any ... concentrated animal feeding operation ... from which pollutants are or may be discharged.” Under the NPDES CAFO regulations, a CAFO that discharges must seek NPDES permit coverage.

162. United States Environmental Protection Agency. *Relation between nitrates in water wells and potential sources in the lower Yakima Valley, Washington state*. Washington, D.C., 2012.

Link: [Relation between Nitrates in Water Wells and Potential Sources in the Lower Yakima Valley, Washington \(epa.gov\)](#)

This study examined the effectiveness of various techniques to identify specific sources of high nitrate levels in residential drinking water well. Dairy waste was concluded to be a likely source of nitrate contamination in the wells due to isotopic data and contextual evidence such as the historical and current volumes of dairy waste in the area, lack of other potential sources of nitrogen in the area, and soil indicators.

163. United States Environmental Protection Agency. *Risk Assessment Evaluation for Concentrated Animal Feeding Operations*. May 2004: 1-124.

Link: [US EPA Risk Management Evaluation For Concentrated Animal Feeding Operations](#)

The National Risk Management Research Laboratory (NRMRL) developed a Risk Management Evaluation (RME) to provide information to help plan research dealing with the environmental impact of concentrated animal feeding operations (CAFOs). Methods of animal production in the U.S. have undergone fundamental changes in the last 30 years. The majority of meat, dairy, and poultry production has been concentrated into large facilities. Dairies with more than 2,000 cows and swine operations with more than 10,000 hogs are not unusual. Broiler houses with 50,000 birds are common. With the concentration of animals has come a concomitant concentration of manure production. One animal facility with a large population of animals can easily equal a small city in terms of waste production. Current practices of waste handling often include minimal or no treatment before the wastes are disseminated into the environment. The RME was

Link: [Wisconsin Legislature: Chapter ATCP 10](#)

170. Wisconsin Department of Agriculture Trade and Consumer Protection. Chapter ATCP 93.90 Livestock Facility Siting and Expansion

Link: [Wisconsin Legislature: Chapter ATCP 93.90](#)

171. Wisconsin Department of Agriculture Trade and Consumer Protection. Wi Admin. Code Ch. ATCP 51

Link: [Wisconsin Legislature: Chapter ATCP 51](#)

172. Wisconsin Department of Agriculture Trade and Consumer Protection. Animal Movement

Link: [DATCP Animal Movement \(wi.gov\)](#)

This information provides general rules for importing any animal into Wisconsin. Species-specific information and other references regarding the movement of animals are listed.

173. Wisconsin Department of Agriculture Trade and Consumer Protection. Runoff Risk Advisory Forecast.

Link: [Runoff Risk Advisory Forecast \(wi.gov\)](#)

The tool helps determine the potential for manure runoff from a field depending on weather conditions and soil temperature. Spreading manure when there is an elevated risk of runoff can send manure into streams and threaten water quality.

174. Wisconsin Livestock Facility Siting Rule modifies Wis. Admin. Code Ch. ATCP 51 (Final Draft Rule), October 24, 2019.

Link: [ProposedATCP51FinalDraftRulePacket.pdf \(wi.gov\)](#)

- Reflects revisions necessary to address the technical and implementation issues raised through three 4-year technical committee review processes, twelve statewide public hearings including verbal testimony from over 160 Wisconsin citizens and 465 written comments submitted to the department, as well as dozens of conversations with interested and potentially impacted parties to arrive at workable compromise to achieve multiple, diverse goals.
- Updates the water quality standards, including related Natural Resources Conservation Service (NRCS) technical standards, to ensure consistency with provisions in NR 151 and ATCP 50, including incorporation of the 2017 NRCS standard for waste storage structures, 2015 NRCS standard for nutrient management, the 2017 NRCS standard for waste treatment, and the 2016 NRCS standard for vegetated treatment areas.
- Modifies standards (subch. II of ATCP 51) consistent with the requirements in Wis. Stat. § 93.90(2), based on the technical recommendations of the 2014 and 2018 Technical Expert Committees and public input. Key changes include modifications to setback and odor standards.
- Modifies the procedures (subchs. I and III of ATCP 51) that local governments must follow in issuing a siting permit under a zoning or licensing ordinance including application completeness determinations, permit modifications, and the use of checklists to monitor facility compliance.
- Modifies local permit application forms and worksheets to reflect changes in requirements and to ensure that they are clear, complete, and elicit information that documents compliance with applicable siting standards.
- Makes other changes, clarifications and updates as necessary to improve implementation of the siting rule, consistent with the requirements in Wis. Stat. § 93.90(2).

175. Wisconsin Department of Agriculture Trade and Consumer Protection. Memo on Polk County Swine CAFO ordinance. August 2020

Link: [f3e1b58a-f0a9-42be-a7e5-023bb772e8a7.pdf](#)

other wells on the same property, has a capacity of more than 100,000 gallons per day.” Wisconsin has some 9500 wells capable of pumping more than 100,000 gallons per day, and only a handful were evaluated for their impacts on lakes, streams, and wetlands before receiving regulatory approval. High capacity well pumpage is typically about 250 billion gallons per year (reported for 2013, a fairly average weather year), with roughly 40% attributable each for agricultural irrigation and municipal use, and lesser amounts for industry, stock watering, mining, and others.

182. Wisconsin Legislative Audit Bureau. Wastewater Permitting and Enforcement, Report 16-6, June 2016.

Link: [Wastewater Permitting and Enforcement DNR June 2016](#)

The Wisconsin DNR struggles to keep up with the growth of CAFOs in Wisconsin from 135 in 2005 to 319 in 2020. For example, a 2016 study by the Legislative Audit Bureau of the WPDES program found that one-third of the CAFOs were operating under expired permits. In 2020, 91 (28%) CAFOs are operating under expired permits.

183. Wisconsin State Legislature. Chapter NR 151 Runoff Management

Link: [Wisconsin Legislature: Chapter NR 151](#)

184. Wisconsin Supreme Court Case No.: 2018AP59, July 8, 2021

Link: [WI Supreme Court - Clean WI vs WI DNR - High Capacity Wells](#)

Court ruled that the DNR must exercise its authority to protect Wisconsin’s water resources. Case looked at the impact of a controversial 2011 law known as Act 21 on the DNR’s ability to use its permitting process to protect water resources. Centered around eight high-capacity well permits issued by the DNR in the Central Sands region of the state for large-scale agriculture irrigation. Clean Wisconsin and co-litigant Pleasant Lake Management District challenged those permits, pointing to DNR’s own statements that the wells would harm nearby lakes and streams. The Wisconsin Legislature and industry groups intervened, arguing that Act 21 prevented the DNR from taking steps through its permitting process to keep groundwater and waterways from harm. DNR changed its position shortly after the election of Governor Tony Evers to support Clean Wisconsin’s challenges.

185. Wisconsin Supreme Court Case No.: 2016AP1688, July 8, 2021

Link: [WI Supreme Court - Clean WI & MEA vs WI DNR & Kinnard - Groundwater Monitoring](#)

Court ruled that the DNR must exercise its authority to protect Wisconsin’s water resources. Case looked at the impact of a controversial 2011 law known as Act 21 on the DNR’s ability to use its permitting process to protect water resources. Case involved a wastewater discharge permit issued by the DNR in 2012 for Kinnard Farms, a large dairy operation in Kewaunee County. Clean Wisconsin and co-litigant Midwest Environmental Advocates (MEA) argued the DNR should have required offsite groundwater monitoring and imposed an animal unit limit as conditions of its wastewater permit renewal to reduce the risk of manure contamination of nearby drinking water wells. The Wisconsin Legislature and Kinnard Farms dairy intervened, arguing that Act 21 prevented the DNR from taking steps through its permitting process to keep groundwater and waterways from harm. DNR changed its position shortly after the election of Governor Tony Evers to support Clean Wisconsin and MEA’s challenges.

186. Wisconsin Supreme Court Case No.: 2016AP1688, July 8, 2021

Link: [WI Supreme Court - Clean WI & MEA vs WI DNR & Kinnard - Groundwater Monitoring](#)

Beginning in April 2020, the US experienced a meat shortage and unprecedented meat prices. That's because COVID-19 outbreaks in at least 167 meat-processing plants forced almost 40 plants to close. In an already compact industry, any one plant closure strands millions of pigs at farms. Could this break in the supply chain been avoided? Agricultural economist Jayson Lusk says automation in meat-processing plants could be one solution. Another? Smaller, vertically integrated farms, like Belcampo Meat Co. in Northern California.

195. National Pork Producers Council. Statement on Implementation of Defense Production Act. April 29, 2020.

Link: [NPPC Statement on Implementation of Defense Production Act](#)

President Trump last night invoked the Defense Production Act (DPA) to extend much-needed federal support to the U.S. pork production system. By triggering the DPA, the federal government will prioritize the continuity of pork processing plant operations. Howard "A.V." Roth, NPPC president and a producer from Wauzeka, Wisconsin.

196. Neeley, Todd. Farms Exempt from Emissions Reporting. *Ohio Country Journal* June 5, 2019

Link: [Farms Exempt From Emissions Reporting – Ohio Ag Net](#)

Farms are now exempt from reporting air emissions from animal waste after the EPA on Tuesday finalized a new rule amending the emergency release notification regulations under the Emergency Planning and Community Right-to-Know Act, or EPCRA.

197. Swine Cast, Persistent PRRS in Finishing Pigs Raises Concerns. September 3, 2021

Link: [SwineCast 1168, Persistent PRRS in Finishing Pigs Raises Concerns](#)

Various PRRS strains, including 144 lineage C, remain dangerously active in the Midwest pig production belt, despite a hot, dry summer. Three veterinarians describe what they are seeing and doing to reverse PRRS-driven losses. Dr. Deb Murray (New Fashion Pork), Dr. Kat Wood (Christensen Farms), and Dr. Ryan Strobel (Swine Vet Center), have a lively and timely discussion with the At the Meeting team (Dr. Montserrat Torremorell - College of Veterinary Medicine, University of Minnesota, Dr. Gordon Spronk - Pipestone Veterinary Services, and Dr. Tom Wetzell - Swine Veterinary Consultant).

198. Weingarten D, Davis T: A Minnesota mega-dairy is transforming Arizona's aquifer and farming lifestyles. *High Country News*. August 4, 2021

Link: [A mega-dairy is transforming Arizona's aquifer and farming lifestyles \(Sucked Dry\) \(hcn.org\)](#)

Minnesota's Riverview Dairy has deep pockets and long straws. Hundreds of people, mostly low- to middle-income, living in Arizona's high-desert landscape whose groundwater is rapidly disappearing as water is pumped to grow alfalfa, corn, nuts, wheat and barley. Kerkhoven, Minnesota, farmers Jim and LeeAnn VanDerPol have watched as their community lost many of its residents following decades of shrinking agricultural margins and increased corporate consolidation in the livestock sectors. Their former neighbors have been replaced by the five huge Riverview facilities within 10 miles of their house. In Chokio, Minnesota, about an hour away, locals successfully fought to keep Riverview from building a 9,200-cow dairy, citing concerns about pollution and groundwater decline.

199. Ziemba, L. Yakima Case a Bellwether of Future Challenges Ahead. June 15, 2015 *Hoards*

Link: [Yakima case a bellwether of future challenges ahead \(hoards.com\)](#)

For decades CAFOs thought the federal Resource Conservation and Recovery Act (RCRA), applied to garbage landfills. That changed in 2015, when a federal judge in Washington State ruled that RCRA did apply to CAFO waste as part of a lawsuit against the 7,000 head Cow Palace. Settlement required mitigation measures including manure storage liners, monitoring wells, compliance monitoring and a reduction in the use of manure as fertilizer.