TOWN OF ROUND LAKE
SAWYER COUNTY, WISCONSIN

ORDINANCE NO. 2022-05
CONCENTRATED ANIMAL FEEDING OPERATIONS ORDINANCE

The Town Board of the Town of Round Lake, Wisconsin, does ordain as follows:

Section 1. Authority

This Ordinance is adopted pursuant to the powers granted under Wisconsin Constitution, and Wisconsin Statutes including but not limited to Section 92.15. This Ordinance is further adopted pursuant to the powers granted to the Town Board under the grant of village powers pursuant to Sec. 60.22 of Wis. Statutes for the protection of public health, safety and general welfare.

Section 2. Purpose and Findings

The purpose of this Ordinance is to effectively, efficiently and comprehensively regulate the operation of Large-Scale Concentrated Animal Feeding Operations of 1,000 animal units or greater ("CAFO") in the Town of Round Lake, without respect to siting, to protect public health (including human and animal health), safety, and general welfare, to prevent pollution and the creation of private nuisances and public nuisances, and to preserve the quality of life, environment, and existing small-scale livestock and other agricultural operations of the Town of Round Lake and to achieve water quality standards within the Town of Round Lake. This Ordinance sets forth the procedures for obtaining a CAFO Operations Permit for the operation of new and expanded livestock facilities in the Town of Round Lake (sometimes referred to as "the Town").

The need for this Ordinance is based upon the Town's obligation to protect the health, safety and general welfare of the public and is based upon reasonable and scientifically defensible findings, as adopted by the Town Board, clearly showing that these requirements are necessary to protect public health and safety. Specifically, the Town finds that there is ample scientific research and evidence establishing that CAFO's pose a significant risk to the integrity of the Town's groundwater, surface water, air quality, the health and well-being of its residents and local property values. These findings are based in part on the scientific articles and research studies discussed and listed below and in Appendix A.

On November 2, 2019, the American Public Health Association enacted a policy statement advising federal, state and local governments and public health agencies to impose a moratorium on all new and expanding CAFOs recommending a complete halt until additional scientific data has been collected and public health concerns associated with CAFOs are addressed.

CAFOs confine large numbers of animals of the same species—such as beef and dairy cattle, swine, broilers (poultry raised for meat consumption) and laying hens—on a small area of land.

The scale, density, and practices associated with these operations present a range of public health and ecological hazards, including large volumes of untreated animal waste, the release of environmental contaminants to air, water, and soil, and the generation and spread of antibiotic resistant pathogens. There is a significant body of evidence which shows CAFOs are directly associated with occupational and community health risks, as well as the social and economic decline of rural communities.

In 2010, the National Association of Local Boards of Health published a report identifying the following Environmental Health Effects of CAFOs:

1. Groundwater
2. Surface Water
3. Air Quality
4. Greenhouse Gas and Climate Change
5. Odors
6. Insect Vectors
7. Pathogens
8. Antibiotics
9. Property Values

Pollutants commonly found in air surrounding CAFOs include the following:

CAFO Emissions	Source	Traits	Health Risks
Ammonia	Formed when microbes decompose undigested organic nitrogen compounds in manure	Colorless, sharp pungent odor	Respiratory irritant, chemical burns to the respiratory tract, skin, and eyes, severe cough, chronic lung disease
Hydrogen Sulfide	Anaerobic bacterial decomposition of protein and other sulfur containing organic matter	Odor of rotten eggs	Inflammation of the moist membranes of eye and respiratory tract, olfactory neuron loss, death
Methane	Microbial degradation of organic matter under anaerobic conditions	Colorless, odorless, highly flammable	No health risks. Is a greenhouse gas and contributes to climate change.
Particulate Matter	Feed, bedding materials, dry manure, unpaved soil surfaces, animal dander, poultry feathers	Comprised of fecal matter, feed materials, pollen, bacteria, fungi, skin cells, silicates	Chronic bronchitis, chronic respiratory symptoms, declines in lung function, organic dust toxic syndrome

Pathogens found in animal manure that have been determined to cause illness in humans include the following:

Pathogen	Disease	Symptoms
Bacillus anthracis	Anthrax	Skin sores, headache, fever, chills, nausea, vomiting
Escherichia coli	Colibacilosis, Coliform mastitis-metris	Diarrhea, abdominal gas
Leptospira pomona	Leptospirosis	Abdominal pain, muscle pain, vomiting, fever
Listeria monocytogenes	Listerosis	Fever, fatigue, nausea, vomiting, diarrhea
Salmonella species	Salmonellosis	Abdominal pain, diarrhea, nausea, chills, fever, headache
Clostirdum tetani	Tetanus	Violent muscle spasms, lockjaw, difficulty breathing
Histoplasma capsulatum	Histoplasmosis	Fever, chills, muscle ache, cough rash, joint pain and stiffness
Microsporum and *Trichophyton*	Ringworm	Itching, rash
Giardia lamblia	Giardiasis	Diarrhea, abdominal pain, abdominal gas, nausea, vomiting, fever
Cryptosporidium species	Cryptosporidosis	Diarrhea, dehydration, weakness, abdominal cramping

Researchers at the Johns Hopkins Center for a Livable Future have found that the primary human health concerns related to industrial food animal production (IFAP) (also referred to as concentrated animal feeding operations (CAFOs)) 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.

Disease Transmission

The poor conditions, including crowding, characteristic of industrial animal operations present opportunities for disease transmission among animals, and between animals and humans. [1-2] (Footnotes refer to sources listed in Appendix A, References.) Nearby residents may have an

increased risk of infection from the transmission of harmful microorganisms from operations via flies or contaminated air and water. [3-9]

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 (nontherapeutic use) fosters the proliferation of antibiotic-resistant pathogens, and this practice is common in CAFOs. Resistant infections in humans are more difficult and expensive to treat [10] and more often fatal [11] than infections with nonresistant strains. A growing body of evidence provides support that antibiotic-resistant pathogens are found on animal operations that administer antibiotics for non-therapeutic purposes [12-13] and are also found in the environment in and around production facilities, [13-15] specifically in the manure, [16-18] air, [13] and flies. [19]

Manure runoff from CAFO operations may introduce these harmful microorganisms into nearby water sources. [20] Land application of manure presents an opportunity for pathogens contained in the manure to leach into the ground or run off into recreational water and drinking water sources, potentially causing a waterborne disease outbreak. [17] This is of particular concern for residents who rely on private wells for drinking water and household use; [21] private wells are not monitored by government agencies to ensure safe levels of pathogens.

Air Pollution

Community members living near CAFO operations also face increased exposure to air pollution from these operations, which can cause or exacerbate respiratory conditions including asthma [2224]; eye irritation, difficulty breathing, wheezing, sore throat, chest tightness, nausea [25]; and bronchitis and allergic reactions. [23] Air emissions include particulates, volatile organic compounds, and gases such as nitrous oxide, hydrogen sulfide, and ammonia. [22,26] Odors associated with air pollutants from large-scale hog operations have been shown to interfere with daily activities, quality of life, social gatherings, and community cohesion [22, 27-29] and contribute to stress and acute increased blood pressure. [29-30]

Contaminated Ground and Surface Water

The increase in concentration of livestock and poultry and transition to large, high-density, confined animal feeding operations over the last several decades has resulted in the concentration of animal waste over small geographic areas. [17] Although animal manure is an invaluable fertilizer, waste quantities of the magnitude produced by CAFO operations represent a public health and ecological hazard through the degradation of surface and ground water resources.[17] (For example a CAFO application recently submitted to Burnett County, WI indicated that the proposed operator expected a single facility to generate in excess of 9 million gallons of manure per year and that it intended to dispose of that waste by spreading it on local farm fields.)

Manure from these operations can contaminate ground and surface waters with nitrates, drug residues, and other hazards, [6, 31-33] 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. [32-34] Exposure to elevated levels of nitrates in drinking water is associated with adverse health effects, including cancer, [35-38] birth defects and other reproductive problems, [34,35,39,40] thyroid problems, [34-35] and methemoglobinemia. [34, 41]

Nutrient runoff (including nitrogen and phosphorus) has also been implicated in the growth of harmful algal blooms, [17, 42] which 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. [43-44]

Given the potential impacts to health, safety and general welfare, the Town has an obligation to enact reasonable regulations on the operations of CAFOs.

In addition to the general impacts, the Town of Round Lake has also determined that this Ordinance is necessary to achieve water quality standards under Wis. Stat. 281.15 which are designed to protect the public interest including the present and prospective future use of the Town's water for public and private water systems, propagation of fish and aquatic life and wildlife, domestic and recreational purposes and agricultural, commercial, industrial and other legitimate uses.

The waters of the Town of Round Lake are vitally important to its residents and the impacts of CAFOs on water systems, fish and aquatic life, agricultural, commercial and industrial uses require the Town's protection and regulation. Water contamination and impairment may result in detected levels of veterinary antibiotics, elevated levels of nitrates and the presence of pathogenic organisms.

Elevated nitrates in drinking water can be harmful to infants leading to various syndromes and the possibly of death. Low blood oxygen in adults can also lead to birth defects, miscarriages and poor general health.

Before a CAFO may begin operation within the Town of Round Lake, it is imperative that the operational risks be analyzed, base lines be established to control medical risks and the monitoring of each risk be established for evaluation and appropriate review.

It is for these reasons the Town of Round Lake enacts this Ordinance.

Section 3. Definitions

1. "Applicant" or "permittee" refer to the entity seeking a CAFO Operations Permit under the terms of this Ordinance.

2. "Large-Scale Concentrated Animal Feeding Operation" or "CAFO" means a lot or facility, other than a pasture or grazing area, where 1,000 or more animal units have been, are, or will be stabled or concentrated, and will be fed or maintained by the same owner(s), manager(s) or operator(s) for a total of 45 days or more in any 12-month period. Two or more smaller lots or facilities under common ownership or common management or operation are a single Large-Scale Concentrated Animal Feeding Operation or CAFO if the total number of animals stabled or concentrated at the lots or facilities equal 1,000 or more animal units and at least one of the following is true: (1) The operations are adjacent; (2) The operations utilize common systems for the land spreading of manure or wastes; (3) Animals are transferred between the lots or facilities; (4) The lots or facilities share staff, vehicles, or equipment; or (5) Manure, barnyard runoff or other wastes are comingled in a common storage facility at any time.

3. "Operations" means a course of procedure or productive activity for purposes of conducting and carrying on the business of a CAFO including populating animal housing facilities, storing and managing animal and other waste materials, and conducting any other business activities.

4. "Pollution" means degradation that results in any violation of any environmental law as determined by an administrative proceeding, civil action, criminal action or other legal or administrative action investigation or proceeding.

5. "Private Nuisance" means a non-trespassory invasion of another's interest in the private use and enjoyment of land, and the invasion is either: (1) intentional und unreasonable, or (2) unintentional and otherwise actionable under the rules of controlling liability for negligent or reckless conduct, or for abnormally dangerous conditions or activities.

6. "Public Nuisance" means a thing, act, occupation, condition or use of property which shall continue for such length of time as to " (1) substantially annoy, injure or endanger the comfort, health, repose or safety of the public; (2) in any way render the public insecure in life, health or in the use of property; or (3) unreasonably and substantially interfere with, obstruct or tend to obstruct or render dangerous for passage or public use any street, alley, highway, navigable

body of water or other public way or the use of public property or other public rights.

Section 4. License Required

Regardless of siting, a livestock facility with 1,000 or more animal units shall be allowed to conduct operations within the Town of Round Lake only as provided under this Ordinance. Applicants shall apply for a CAFO Operations Permit to operate in the Town of Round Lake under this Ordinance prior to conducting any operations.

1. General

A CAFO Operations Permit issued by the Town of Round Lake is required for new or expanded livestock facilities that will operate with 1,000 or more animal units.

2. Licenses for Existing Livestock Facilities

A CAFO Operations Permit is required for the expansion of a pre-existing or previously approved livestock facility if the number of animal units kept at the expanded livestock facility will exceed 1,000 animal units.

Section 5. Licensing Administration

The Town Board shall administer this Ordinance and related matters thereto and shall have the authority to issues licenses under this Ordinance.

Section 6. License Application and Standards

The applicant shall apply for a CAFO Operations Permit prior to conducting any operations associated with a Large-Scale Concentrated Animal Feeding Operation in the Town of Round Lake. The application shall be submitted on a form provided by the Town Clerk. (See Appendix B)

The Town Board shall decide whether to approve and issue a CAFO Operations Permit to an applicant that has submitted a complete application and paid the required application fee, after holding a public hearing on the application and considering any evidence concerning the application and the proposed operation presented by the applicant and any other interested persons or parties, including members of the public, other governmental agencies or entities, special legal counsel and expert consultants who may be hired by the Town Board to review the application and advise the Town Board.

The Town Board shall approve and issue a CAFO Operations Permit, either with or without conditions, if it is determined by a majority vote of all members, supported by

clear and convincing evidence presented by the applicant, that: the applicant can and will comply with all conditions imposed by the Town; that the applicant's operations as proposed, with or without conditions, will protect public health (including human and animal health), safety, and general welfare, prevent pollution, prevent the creation of private nuisances, prevent the creation of public nuisances and preserve the quality of life, environment, existing small-scale livestock and other agricultural operations of the Town of Round Lake; and that the applicant and the application meet all other requirements of this Ordinance.

Section 7. License Application Fee

A non-refundable application fee of One Dollar ($1.00) per proposed animal unit payable to the Town of Round Lake shall accompany an application for the purpose of offsetting the Town costs to review and process the application.

Section 8. Application Procedure

1. An applicant for a CAFO Operations Permit shall complete a Town of Round Lake CAFO Operations Permit Application and pay the required application fee. The applicant must be an owner or officer of the corporate entity proposing to operate the CAFO.

2. Upon signing and submitting a CAFO Operations Permit Application to the Town Clerk, the applicant shall agree to fully compensate the Town for all legal services, expert consulting services, and other expenses which may be reasonably incurred by the Town in reviewing and considering the application, regardless of whether or not the application for a permit is subsequently approved, with or without conditions, or denied by the Town Board. The applicant shall submit an administrative fee deposit as required by the Town Clerk.

3. After receiving the application and the application fee, the Town Clerk shall mail a notice that a CAFO Operations Permit Application has been received to all landowners within 3 miles of the proposed CAFO with the date and time of a Town Board meeting at which the application will be considered. The notice shall provide information on how interested persons and parties may inspect and obtain a copy of the application.

4. The Town Clerk shall place the application on the agenda for the next regular Town Board meeting for which required notice can be provided.

5. At a formal public hearing held by the Town Board on the application at least sixty (60) days after it has been determined to be complete, the Town Board shall consider any evidence concerning the application and the proposed CAFO

presented by the applicant and any other interested persons or parties, including members of the public and other governmental agencies or entities, and special legal counsel and expert consultants who may be hired by the Town to review the application and advise the Town Board.

6. In its review and consideration of a CAFO Operations Permit Application, the Town Board shall act in a quasi-judicial capacity, and its final decision on whether to approve and issue a CAFO Operations Permit, either with or without conditions, shall be based on written findings of fact and conclusions of law consistent with the provisions of this Ordinance, which shall be filed with the Town Clerk and served on the applicant by regular U.S. Mail.

7. The Town Board shall approve and issue a CAFO Operations Permit, either with or without conditions, if it determines by a majority vote of all members of the Town Board, supported by clear and convincing evidence presented by the applicant, that the operations of the proposed CAFO, with or without conditions, will protect health (including human and animal), safety, and general welfare, prevent pollution and the creation of private nuisances and public nuisances, and preserve the quality of life, environment, and existing small-scale livestock and other agricultural operations of the Town and that the application meets all other requirements of this Ordinance.

Section 9. Financial Surety

A CAFO Operations Permit shall require the applicant and all contractors, subcontractors, agents and representatives, to ensure that sufficient funds will be available for pollution clean-up, nuisance abatement, and proper closure of the operation if it is abandoned or otherwise ceases to operate as planned and permitted, based on the following provisions:

1. A determination shall be made regarding the financial assurance level required by the scale of the operation. As a condition of the license, the required financial assurance shall be filed with the Town of Round Lake in an amount sufficient to clean up environmental contamination if the same were to occur, to abate public nuisances caused by the operation, including but not limited to the testing and replacement of any potentially contaminated private and public wells and water supplies within the areas subject to operations, and to ensure proper closure of the operations should the applicant elect to close or should closure occur for some other reason. Upon notification of the required financial assurance, but prior to commencing operations, the applicant shall file with the Town the financial assurance conditioned on faithful performance of all requirements for the license. Upon notification of finance assurance or deposit approval and conformance with license conditions, the applicant may commence operations.

2. The applicant may deposit cash or irrevocable letters of credit established with a bank acceptable to the Town as the required financial assurance.

3. The Town may reevaluate and adjust accordingly the amount of the financial assurance required on an annual basis.

Section 10. Conditions of Approval

A CAFO Operations Permit may be approved with conditions to protect public health (including human and animal health), safety, and general welfare, prevent pollution and the creation of private nuisances and public nuisances, and preserve the quality of life, environment, and existing small-scale livestock and other agricultural operations of the Town. To the extent not expressly or otherwise preempted by Wis. Stat. 93.90, and Wis. Admin. Code Ch. ATCP 51 or any other provision of state or federal law, such conditions may include, but are not limited to:

1. Conditions relating to the operational characteristics of the proposed operation, to protect public health, prevent point and non-point sources of air and water pollution, and prevent private nuisances and public nuisances.

2. Conditions relating to the management of animal and other waste that may be generated as part of an operation's ongoing operation, to protect public health, prevent point and non-point sources of air and water pollution, and prevent private nuisances and public nuisances.

3. Conditions relating to the population and depopulation of individual animal housing facilities, to protect public health and prevent the spread of animal-borne and vector-borne disease, to assure a safe level of sanitation, and to assure human health hazard control or health protection for the community.

4. Conditions relating to biosecurity and the maintenance of animal health and welfare, to prevent the spread of animal-borne and vector-borne disease, to protect public health, and provide for animal safety and welfare.

5. Conditions relating to transportation of animals as part of the ongoing operations, to protect public health, prevent pollution, and prevent private nuisances and public nuisances.

6. Conditions relating to protection of private and public drinking and agricultural wells, and other public water supplies, as part of an ongoing operation to protect public health, prevent pollution, and prevent private nuisances and public nuisances.

7. Conditions relating to air emissions and dust control as part of an ongoing operation, to protect public health, prevent pollution and prevent private nuisances and public nuisances.

8. Conditions relating to protection of the private and public property rights and property values of affected property owners, as part of an ongoing operation, to protect the general welfare of the Town's residents and property owners, and to prevent private nuisances and public nuisances.

9. Conditions relating to permit compliance, enforcement and monitoring, including establishment of fees that may be assessed against the permittee to cover the costs of hiring, training, and maintaining Town personnel, or for contracting with private consultants, to conduct permit compliance, enforcement and monitoring activities for the Town.

10. Conditions relating to the monitoring of surface water, ground water, air quality and all other environmental factors and considerations.

11. Any other conditions deemed reasonably necessary or appropriate by the Town Board to effectively, efficiently, and comprehensively regulate the operations of a facility, to protect public health (including human and animal health), safety, and general welfare, prevent pollution and the creation of private nuisances and public nuisances, and preserve the quality of life, environment, and existing small-scale livestock and other agricultural operations of the Town.

These conditions may apply not only to the CAFO facility itself, but also to any property upon which manure, carcasses, body tissue or other by products of the CAFO are spread, deposited or disposed of. Any conditions imposed under this Ordinance may be modified by the Town Board at the time of each annual renewal. Any modifications must be documented as required by section 11, below.

Section 11. Record of Decision

The Town Board must issue its decision in writing. The decision must be based on written findings of fact supported by evidence in the record.

Section 12. Transferability of License

A CAFO Operations Permit and the privileges granted by this license run with the land approved under the license and remain in effect, despite a change in ownership of the livestock facility, as long as the new operator does not violate the terms of the local approval.

Upon change of ownership of the livestock facility, the new owner of the facility shall file information with the Town Clerk providing pertinent information, including but not limited to such information as the name and address of the new owner and date of transfer of ownership.

Section 13. Expiration of License

A CAFO Operations Permit remains in effect regardless of the amount of time that elapses before the livestock operator exercises the authority granted under this permit, and regardless of whether the livestock operator exercises the full authority granted by the approval. However, the Town may treat a CAFO Operations Permit as lapsed and withdraw the license if the license holder fails to do all of the following within 2 years after issuance of license:

1. Begin populating the CAFO.

2. Begin constructing all the new or expanded livestock housing or waste storage structures proposed in the application for local approval.

3. Pay the renewal fee on or before January 1 of each calendar year as required by Section 14 of this Ordinance.

Section 14. License Terms and Modifications

A CAFO Operations Permit and the privileges granted by a CAFO Operations Permit issued under this Ordinance is conditioned on the livestock operator's compliance with the standards in this Ordinance, and with commitments made in the application for a CAFO Operations Permit. The operator may make reasonable changes that maintain compliance with the standards in this Ordinance, and the Town Board shall not withhold authorization for those changes unless the Town can demonstrate good cause to do so. A violation of the Permit or a failure to comply with the commitments made in the application may result in suspension and/or termination of the Permit.

The Town Board, or its designee, shall work to ensure on an ongoing basis that all requirements and conditions of any permit issued under this Ordinance are followed by the permit holder. To assist in accomplishing this task, any permit issued pursuant to this Ordinance shall be subject to an annual renewal fee in the amount of One Dollar ($1.00) per animal unit. Modifications to the conditions of a CAFO Operations Permit may be made as described in Sections 10 and 11.

Section 15. Penalties

Any person who violates any of the provisions of this Ordinance, or who fails, neglects or refuses to comply with the provisions of this Ordinance, or who knowingly makes any

materially false statement or knowing omission in any document required to be submitted under the provisions hereof, shall be subject to the following penalties:

1. Upon conviction by a court of law, pay a forfeiture of not less than $100 nor more than $1,000, plus the applicable surcharges, assessments, and costs for each violation.

2. Each day a violation exists or continues shall be considered a separate offense under this Ordinance.

3. In addition, the Town Board may seek injunctive relief from a court of record to enjoin further violations.

4. In addition, the Town Board may suspend or revoke the local approval of a CAFO Operations Permit under this Ordinance after due notice to the livestock facility owner and a public hearing to determine whether the license should be suspended or revoked.

The Town shall exercise sound judgment in deciding whether to suspend or revoke a CAFO Operations Permit. The Town shall consider extenuating circumstances, such as adverse weather conditions, that may affect an operator's ability to comply.

In addition to any other penalty imposed by this Ordinance, the cost of abatement of any public nuisance on the licensed premises by the Town may be collected under this Ordinance or Sec.
823.06 of Wis. Statutes against the owner of the real estate upon which the public nuisance exists. Such costs of abatement may be recovered against the real estate as a special charge under Sec.
66.0627 of Wis. Statutes unless paid earlier.

Section 16. Appeals

An applicant or any other person or party who is aggrieved by a final decision of the Town Board on whether to issue a CAFO Operations Permit, either with or without conditions, or a taxpayer, may, within thirty (30) days after the filing of the decision with the Town Clerk, commence an action seeking the remedy available by certiorari in Sawyer County Circuit Court. The court shall not stay the decision appealed from, but may, with notice to the Town Board, grant a restraining order. The Town Board shall not be required to return the original papers acted upon by it, but it shall be sufficient to return certified or sworn copies thereof. If necessary, for the proper disposition of the matter, the court may take evidence, or appoint a referee to take evidence and report findings of fact and conclusions of law as it directs, which shall constitute a part of the proceedings upon which the determination of the court shall be made. The court may reverse or affirm, wholly or partly, or may modify, the decision brought up for review.

In any certiorari proceeding brought under the preceding paragraph, attorney fees and costs shall not be allowed against the Town Board unless it shall appear to the court that it acted with gross negligence, or in bad faith, or with malice in making the decision appealed from.

A final decision of the Town Board under this ordinance is not subject to appeal under Wis. Stat. 93.90(5), Wis. Stat 93.30, or Wis. Admin Code Ch. ATCP 51, which apply only to siting decisions.

Section 17. Severability

If any provision of this Ordinance or its application to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of this Ordinance that can be given effect without the invalid provision or application, and to that end, the provisions of this Ordinance are severable.

Section 18. Effective Date

This Ordinance is effective the day after publication.

Adopted this 9th day of June, 2022 by the Town Board of Supervisors.

Town Chair – Rolfe Hanson

Town Supervisor – Kay Wilson

Town Supervisor – James Strandlund

Town Supervisor – Donald Stover

Town Supervisor – Virginia Chabek

Attest:
Town Clerk – Kathy McCoy

TOWN OF ROUND LAKE
SAWYER COUNTY, WISCONSIN

ORDINANCE NO. _____
CONCENTRATED ANIMAL FEEDING OPERATIONS ORDINANCE

APPENDIX A

References

1. 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;43Link: https://www.ncbi.nlm.nih.zov/pubmed/24350836

   This study sought to characterize the immunosuppressive effect of overcrowding stress in broiler chickens. Overcrowding was found to compromise the intestinal immune barrier and integrity of the small intestine, resulting in inflammation and decreased nutrient absorption. The study concludes that animal welfare measures and avoiding overcrowding stress factors in maintaining poultry health and decreased susceptibility to Salmonella infection.

2. 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.2009.031 5

   This study reviewed current knowledge to assess the potential impact of stress—such as that from inadequate nutrition, deprivation of water and/or feed, heat, cold, overcrowding, handling and transport—in farm animals on food safety risk. The review focused on stress mechanisms influencing the colonization and shedding of enteric pathogens in food animals due to the potential for their dissemination into the human food chain, a serious public health and economic concern. The review concluded that there is a growing body of evidence that demonstrates the negative impact of stress on food safety through a variety of potential mechanisms, and recommends additional research to optimize animal welfare and minimize production loses and food safety risks.

3. 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

   The results of this study support the hypothesis that curr nt methods of food animal transport from farm to slaughterhouse result in the transfer of bacteria, including antibiotic-resistant bacteria, to the vehicles travelling the same road.

Bacteria were isolated from air and surface samples from vehicles following open poultry trucks, suggesting a new route of exposure to pathogens and the further dissemination of these pathogens to the general environment.

4. 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.
2007:17381742.
Link: https://www.ncbi.nlm.nih.gov/pubmed/18087592
Occupational and environmental pathways of human exposure to antimicrobial-resistant bacteria were explored in this study by comparing the relative risk of antimicrobial-resistant E. coli among poultry workers compared with community referents. The study concluded that occupational exposure to antimicrobial-resistant bacteria may be an important route of entry for the bacteria into the community, as poultry workers had 32 times the odds of carrying resistant E. coli compared to the community referents.

5. 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/2.9/4/389/527380/Microbial-air-pollution-causedby-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.

6. 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

Objectionable odors, flies, excessive levels of nitrogen and phosphorus and the potential spread of human pathogens are among the public concerns with the disposal of animal manure and the spread of dust and manure blown from powerful building fans. The study also finds that importance of animal manure in the spread of infectious pathogens is often underestimated despite the linkages between livestock operations and gastroenteritis in humans.

7. 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

The transition of food animal production from small-scale methods to industrial-scale operations has been accompanied by substantial evidence of the transfer of pathogens between and among industrial food animal facilities, the environment, and exposure to farm workers. This challenges the notion that modem animal production is more biosecure than smaller operations in regards to the introduction and release of pathogens. The study concludes that industrialized food animal production risk factors must be included in strategies to mitigate or prevent the emergence of pandemic avian influenza.
Refer to page 17 ofthis documentfor the complete article abstract.

8. 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

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 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. Refer to page 12 ofthis documentfor the contplet.e article abstract.

9. 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

This study assessed the association between exposure to swine and dairy/veal industrial agriculture and the risk of methicillin-resistant Staphylococcus aureus (MRSA) infection. The study found that proximity to livestock operations and crop fields treated with swine manure were each associated with MRSA, skin and soft-tissue infection.
Refer to page 16 d this document for the complete article abstract.

10. 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 Dis. 9:49(8):11751 184.
Link: https://academic.oup.com/cid/article/49/8/1 175/425330/Hospital-and-Societal-Costsof-Antimicrobial

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.

11. Filice GA, Nyman JA, Lexau C, et al. Excess costs and utilization associated with methicillin resistance for patients with Staphylococcus aureus 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.

12. 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/a1ticles/F'MC19136() 1/

Halting fluoroquinolone use was not found to have an impact on the proportion of fluoroquinolone-resistant Campylobacter on products from the conventional producers, indicating that antibiotic-resistant bacteria may persistently contaminate poultry products even after on-farm use of the antibiotic has ceased. Also, Campylobacter strains from the conventional producers were more likely to be resistant to fluoroquinolone than those from the antibiotic-free producers, indicating that antibiotic use in food animal production contributes to the develop of antibioticresistant pathogens.

13. Schulz J, Friese A, Klees S, et al. Longitudinal study of the contamination of air and of soil surfaces in the vicinity of pig bams 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 livestockassociated 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.
R€f&r to page 21 Q/'this document.för (he complete article abstract.

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

This study was conducted to better understand how widespread antibiotic-resistant bacteria are in agricultural settings, particularly in dairy farm environments. The study concluded that dairy farm topsoil contains multidmg resistant enteric bacteria and antibiotic-resistant plasmids, and suggests that dairy topsoils serve as a reservoir for the development of bacterial resistance to antibiotics relevant in clinical medicine.
Refer to page 12 of this documentfor the conjplete article abstract.

15. 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/PMC 1 9 1 3567/

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.
R€fer to page 20 dthis documentfor the complete article abstract.

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

This study examined the survival of anti-microbial resistant enterococci and staphylococci and resistance genes in poultry litter to better understand how land application of poultry litter can affect the surrounding populations environment. The study found that poultry litter storage practices do not eliminate drug-resistant bacterial strains, thus allowing the spread of these drugresistant pathogens into and through the environment via land application of poultry litter.

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

This EPA report on the environmental occurrence and potential effects of livestock and poultry manure related contaminants on water quality found that 60-70% of manure nitrogen and phosphorus may not be assimilated by the famland where it was generated due to the increasing concentration of industrial animal production. The report also notes the variety of pathogens contained in livestock and poultry manure, as well as the potential for their spread to humans when surface and groundwater and food crops come into contact with manure through runoff, spills, and land-application of manure. It also refers to research indicating that antimicrobial use in livestock and poultry production has contributed to the occun•ence of anti-microbial resistant 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.

18. 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 /

This study was conducted to better understand the cow microbiome and the role of the land application of cow manure in the spread of antibiotic resistance. The study reports the discovery of new and diverse antibiotic resistant genes in the cow microbiome, and provides evidence that it is a significant reservoir of antibiotic resistant genes.
Refer to page 14 ofthis documentfor the complete article abstract.

19. 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

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.

20. 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

The microbial quality of surface water proximal to swine CAFOs was investigated in this study to better understand the impact of CAFOs on the surrounding environment. The results demonstrate overall poor water quality in areas with a high density of swine CAFOs, with high fecal indicator bacteria concentrations in waters both up- and down-stream of CAFO lagoon waste land application sites. The swine-specific microbial source tracking markers used in the study were also shown to be useful for tracking off-site conveyance of swine fecal wastes and during rain events.
Refer to page 17 ofthis document for the complete article abstract.

21. United States Geological Survey (USGS). USGS water use data for the nation. http://waterdata.usgs.gov/nwis/wu. Updated June 852016. Accessed January 3 1 ,2017.

This United States Geological Survey website provides national water use data by area type (aquifer, watershed, county, state), source (rivers or groundwater), and category such as irrigation or public supply.

22. 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/a1ticles/PMC 1 8 17709/

This report from a Conference on Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards —Searching for Solutions working group states that toxic gases, vapors and particles are emitted from CAFOs into the general environnnent, and that while these agents are known to be harmful to human health, there are few studies that explore the health risks of exposure to these agents for the people living near CAFOs. While there is evidence that psychophysiologic changes may result from exposure to malodors and that microbial exposures are related to deleterious respiratory health effects, the working group concluded that there is great need to study and evaluate the health effects of cotnmunity exposure to these CAFO related air pollutants to better understand the impact of CAFOs on the health of community members and farm workers.

23. Cambra-Lopez M, Aarnink AJ, Zhao Y, Calvet S, Tones AG. Airborne particulate matter fronl livestock production systems: A review of an air pollution problem. Environnæntal Pollution.

2010;158(1):1-17.

Link: https://www.ncbi.nlm.nih.gov/pubmed/19656601

This paper reviews research on particulate matter inside and emitted from livestock production system and reports that livestock housing is an ilnportant source of particulate matter emissions. The paper recommends additional research to characterize and control particulate Inatter in livestock houses, as high concentrations such as those found in livestock houses can threaten the environment and the health and welfare of humans and animals.

24. 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; 1l8(1):e6

Link: http://pediatrics .aappublications .org/content/1 1 8/1/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. Refer to page 19 Q/this document for the ccnnplete article abstract.

25. 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.

201 1 ;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, respiratoty symptoms, difficulty breathing, wheezing, declined forced expiratory volume, sore throat, chest tightness, and nausea were related to pollutants measured near hog operations.

Refer to page 21 ofthis document,for the complete article abstract,

26. Hribar C, Schultz M. Understanding concentrated animal feeding operations and their impact on communities. Bowling Green, OH: National Association Q/'Local Boards oj'Health. 2010. Link: https://www.cdc.gov/nceh/ehs/docs/understancling cafos nalboh.pdf

The National Association of Local Boards of Health produced this report with the support of the Centers for Disease Control and Prevention and the National Center for Environmental Health to assist local board of health members better understand their role in mitigating potential issues with CAFOs. The report concludes that large-scale industrial food animal production can cause numerous public health and environmental problems and should thus be monitored to prevent ham 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.

27. Donham KJ, Wing S, Osterberg D, et al. Community health and socioeconomic issues surrounding concentrated animal feeding operations. Environ Health Perspect. 2007:3 17-320. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC 1 8 1 7697/

The Workgroup on Community and Socioeconomic Issues examined the impacts of CAFOs on the health of rural communities, using the World Health Organization's definition of health, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." The workgroup recommended Inore stringent CAFO pennitting, limiting animal density per watershed, improving local control, mandating environmental impact statements and considering bonding for manure storage basins.

Refer to page 16 ofthis document for the conzplete article abstract.

28. 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/PMC 1 637983/

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.

29. 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):S6 10-S615.
Link: https://www.ncbi.nlm.nih.gov/pubmed/19890165

The association between malodor and air pollutants from nearby hog CAFOs and reported stress and negative mood was evaluated in this study to better understand the role of CAFOs in human health. The study found that malodor and air pollutants acted as environmental stressors and triggers of negative mood and recommended their inclusion in studies of the health impacts of environmental injustice.
R€fer to page 18 ofthis document,/ör the complete article abstract.

30. Wing S, Horton RA, Rose KM. Air pollution from industrial swine operations and blood pressure of neighboring residents. Environmental Health Perspectives (Online). 2013; 1 2 1 (I):92.
Link: https://ehp.niehs.nih.gov/1205109/

The association of air pollution and malodor with stress and blood pressure wcrc 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 devclopnw•nt of chronic hypertension. Refer to page 22 Q/this document.for the complete article abstract.

31. Graham JP, Nachman KE. Managing waste from confined animal feeding operations in the United States: The need for sanitary reform. Journal Q/' 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-anilnal wastes, and differences between food-animal waste and hillnan biosolid Inanagement 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. Horinones, arsenicals, high nutrient loads, antibiotics, and pathogens, including antibiotic-resistant pathogens, are often present in anilnal waste. The authors made recommendations for improving Inanagelncnt of food-anirnal waste through existing and new policies.

32. 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.uov/pubmed/18677991

This study sought to identify sources of drinking water well nitrate contamination in a housing development built on a dairy farm site using isotopic compositions of nitrate, ammonia, groundwater and chemical ratios. The results indicate that the elevated nitrate levels were due to the leaching of animal waste from pastures into groundwater during thc 35 years of dairy operations. The study suggests enacting statutes requiring well water tests prior to the sale of homes built on urbanized farmland to protect the health of homeowners. Refer to page 13 ofthis documentfÖr the conplete article abstract.

33. 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.

This study examined the effectiveness of various techniques to identify specific sources of high nitrate levels in residential drinking watcr 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.
For more detail on this report, refer to page 14 of this document.

34. Burkholder J, Libra B, Weyer P, et al. Impacts of waste from concentrated anilnal feeding operations on water quality. Environ Health Perspecl. 2007:308-312.
Link: https://www.ncbi.nlm.nih.gov/pmc/articles/F^{T}IVIC 1 8 17674/

This work-group, part of the Conference on Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards—Searching for Solutions, found that current and generally accepted livestock waste management

practices do not protect water resources from the pathogens, pharmaceuticals and excessive nutrients found in animal waste. As concem about
the potential human and environmental health impact of long-term exposure to contaminated water grows, there is greater need for rigorous Inonitoring of CAFOs, improved understanding of the major toxicants affecting human and environmental health, and a system to enforce these practices.

35. 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.nihæov/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 ntnoff. Nitrates are associated with a range of adverse health 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.

36. 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 Q/ Toxicology and Environnwntal Hectlth, Part A. 2007;70(12):1000-1004.
Link: https://www.ncbi.nlm.nih.gov/pubmed/17497410

The association between bladder cancer mortality and nitrate exposure from Taiwan drinking water was investigated in this study. The results showed a significant positive relationship between the levels of nitrates in the drinking water and the risk of death fl'01n bladder cancer, indicating that environmental exposure to nitrates plays a role in the development of bladder cancer.

37. Ward MH, Kilfoy BA, Weyer PJ, Anderson ICE, Folsom AR, Cerhan JR. Nitrate intake and the risk of thyroid cancer and thyroid disease. Epideniologv. 2010;21(3):389-395. Link: https://www.ncbi.nlm.nih.gov/pmc/a1ticles/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.

38. Gulis G, Czompolyova M, Cerhan JR. An ecologic study of nitrate in municipal drinking water and cancer incidence in Tmava district, Slovakia. Environ Res. 2002;88(3): 1 82-1 87. Link: https://www.ncbi.nlm.nih.gov/pubmed/12051 796

This ecologic study was conducted to assess thc as'sociation 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 son)e 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 nonHodgkin lymphoma and colorectal cancer.

39. Manassaram DM, Backer LC, Moll DM. A review of nitrates in drinking water: Maternal exposure and adverse reproductive and developmental outcomes. Environinental Health Perspectives. 2006. Link: https://www.ncbi.nlm.nih.gov/pnc/alticlcs/PlMC 1392223/

The relationship between maternal exposure to nitrates through drinking water and adverse reproductive and developmental outcomes was reviewed in this study. Anilnal studies support the association between nitrate exposure and adverse reproductivc effects, and solne studies report an association between nitrates in drinking water and spontaneous abortion, intrauterine growth restriction and various birth defects, though a direct exposure-response relationship remains unclear and there is insufficient evidence to establish a causal relationship.

40. 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
Link: https://www.ncbi.n1m.nih.gov/pub1ned/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 consulnption was associated with birth defects, including spina bifida, limb deficiency, cleft palate, and cleft lip.

41. Knobeloch L, Salna B, Hogan A, Postle J, Anderson H. Blue babies and nitrate-contanlinated well water. Environ Health Perspect. 2000; 108(7):675-678.
Link: https://www.ncbi.nlm.nih.gov/pmc/a1ticles/PMC 1 6382()4/

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 contanlinated water poses to infants during the first six months of life, as well as the risks of long-tenn 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.

42. Heisler J, Glibert PM, Burkholder JM, et al. Eutrophication and hannful algal blootns: A scientific consensus. Harmful Algae. I):3-13.
Link: http://www.sciencedirect.com/science article/pii/ S 1 568988308()() 1066

The US EPA held a roundtable discussion to devclop consensus aniong academic, federal and state agency representatives on the relationship between eutrophication and harmful algal blooms. Seven statements were adopted during the session, which include acknowledgement of the important role of nutrient pollution and degraded water quality in the development and persistence of many harmful algal blooms.

43. Carmichael WW. Health effects of toxin-producing cyanobacteria: "The CyanoHABs". Htnnan and
Ecological Risk Assessment: An International Journal. 20() I 1393-1407.
Link: http://www.tandfonline.com/doi/abs/10.1080' 2001 8()9 1095087

Current understandings of cyanobacteria toxin poisonings (CTPs) and their risk to hunnan health were reviewed in this paper. CTPs occur in fresh and brackish waters throughout the world as a result of eutrophication and climate change. Cyanobacteria toxins are responsible for acute lethal, acute, chronic and sub-chronic poisonings of wild and domestic animals and humans. These poisonings result in respiratory and allergic reactions, gastrointestinal disturbances, acute hepatotoxicosis and peracute neurotoxicosis.

44. Paerl FIW, Fulton RS ,3rd, Moisander PH, Dyble J. Harniful freshwater algal blootns, with an emphasis on cyanobacteria. Scientific World Journal. 2001 ; I : 76-1 1 3.

This paper reviews the effects of harmful freshwater algal blooms, resulting froni nutrient oversupply and eutrophication, on water quality. Algal b1001ns contribute to water quality degradation, including malodor and fbul taste, fish kills, toxicity, and web alterations, while algal bloom toxins can adversely affect human and anilnal health through exposure to contaminated recreational and drinking water. The control and nnanagenlent of bloonns, and their negative outcomes, must include nutrient input constraints, particularly on nitrogen and phosphoms.

45. 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 anili%ll production sites.
Plos one.2013;8(1):e54720.
Link: http://j ournals .plos .org/plosone/article?id=10 . 1371/j ournal .pone .0054720

The role of local and state health departments in responding to and preventing conununity concerns with industrial food animal production are explored in this study through qualitative interviews with state and county health department staff and conununity menibers in eight states. Political barriers, lack ofjurisdiction, and lilnited resources, expertise and staff all lilnit health departments' ability to respond to IFAP concerns, while conununity Inelnbers reported difficulty in engaging with health departments. These limitations and difficulties contribute to limited health department engagement on these issues.

46. Fry JP, Laestadius LI, Grechis C, Nachman KE, NetT RA. Investigating the role of state pennitting and agriculture agencies in addressing public health concerns related to industrial föod anilnal production.
Plos one.2014;9(2):e89870.
Link: http://iournals.plos.org/plosone/article?id= I (). 1 37 1 /iournal.pone.0089870

This study explored how state permitting and agriculture agencies respond to environmental public health concerns regarding industrial food animal production through qualitative interviews with state agency staffin seven states. The study found that the agencies were unable to adequately address these environmental public health concerns due to narrow regulations, linnited resources and a lack of public health expertise. When these constraints are considered alongside those faced by health departments, significant gaps in the ability to respond to and prevent public health concerns and issues are revealed.

I

Research Articles Related to Dairy Production

Burgos, J. M., B. A. Ellington, and M. F. Varela. "Presence of nulltidrug-resistant enteric bacteria in dairy farm topsoil." Journal Q/Dairy Science 88.4 (2005): 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 enhancelnent, and prophylaxis in food animals, leading to selection of drug and nutltidrug-resistant bacteria. To help circumvent the problem of bacterial antibiotic resistance, it is first necessary to understand the scope of the problem. However, it is not fully understood how widespread antibiotic-resistant bacteria are in agricultural settings. The lack of such sun'eillance data is especially evident in dairy fann environments, such as soil. It is also unknown to what extent various physiological modulators, such as salicylate, a connponcnt of aspirin and known model modulator of multiple antibiotic resistance (mar) genes, influence bacterial multi-drug resistance. We isolated and identified enteric soil bacteria frotn local dairy farms within Roosevelt County, NM, determined the resistance profiles to antibiotics associated with mar, such as chloramphenicol, nalidixic acid, penicillin G, and tetracycline. We then purified and characterized plasmid DNA and detected mar phenotypic activity. The minimal inhibitory concentrations (MIC) of antibiotics for the isolates ranged from 6 to >50 microg/mL for chloramphenicol, 2 to 8 noicrog/nfl. for nalidixic acid, 25 to >300 microg/mL for penicillin G, and I to microg/lnL for tetracycline. On the other hand, many of the isolates had significantly enhanced MIC for the same antibiotics in the presence of 5 mM salicylate. Plaslnid DNA extracted from 12 randomly chosen isolates ranged in size fr01n 6 to 12.5 kb and, in several cases, conferred resistance to chloramphenicol and penicillin G. It is concluded that enteric bacteria frolü dairy farm topsoil are multidrug resistant and harbor antibiotic-resistance plasmids. A role for dairy topsoil in zoonoses is suggested, implicating this environtnent as a reservoir for development of bacterial resistance auainst clinically relevant antibiotics.

Jahne, Michael A., et al. "Emission and Dispersion of Bioaerosols fl•onl Dairy Manure Application Sites: Human Health Risk Assessment." Environmental Science & Technologn [t] 49.16 (201 5): 9842-9849. Link: http://pubs.acs.org/doi/pdfplus/10.1021 /acs.est.5b0198 1

> In this study, we report the human health risk of °astrointestinal infection associated with inhalation exposure to airbome zoonotic pathogens emitted fol lowing application of dairv cattle manure to land. Inverse dispersion modeling with the USEPA's AERMOD dispersion model was used to determine bioaerosol emission rates based on edge-of-field bioaerosol and source material samples analyzed by

real-time quantitative polytnerase chain reaction (qPCR). Bioaerosol emissions and transport sinullated with AERMOD. previously reported viable manure pathogen contents, relevant exposure pathways, and pathogen-specific dose-response relationships were then used to estimate potential downwind risks with a quantitative microbial risk assessnwnt (QMRA) approach. Median 8-h infection risks decreased exponentially with distance froln a Inedian of :2700 at edge-of-field to 1:13 000 at 100 m and 1:200 000 at 1000 nv, peak risks vv'ere considerably greater (1 :33, 1:170, and I :2500, respectively). These results indicate that bioaerosols emitted from manure application sites following nnanure application Inav • present significant public health risks to downwind receptors. Manure nvanagelnent practices should consider improved controls for bioaerosols in order to reduce the risk of disease transmission.

Schmalzried, Hans D., and L. Fleming Fallon Jr. "Proposed Mega-Dairies and Quality-of-Life Concerns:
Using Public Health Practices to Engage Neighbors." Public Health Reports 125.5 (2010): 754. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2925014/

This article describes the steps taken by the Henry Countv Health Department (Ohio) to engage with concemed community members by collaborating in baseline data collection prior to the arrival of a large-scale dairy operation. Data collection included water quality testing of residential wells neighboring the dairy operation, a fly trapping and counting program, and a review of local property values. As a dairy with 690 cows will have average water requirements of 35,000 gallons/day, the Health Department coordinated a pumping test to assess groundwater levels and found that groundwater volumes were sufficient to supply the needs of the dairy and the surounding residential wells. Residential wells were tested for coliform bacteria and field-tested for nitrates and hydrogen sulfide gas, and some of the wells tested unsafe for bacteria. In these cases, homeowners were given instructions on how to disinfect their wells and advised to do follow-up testing. The narrative concludes that data obtained prior to operations can be very useful and that local health departments can work with neighbors and facility operators to ensure that appropriate preventive measures are in place before operation to protect the public.

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/fu11/1 0.1021 /es071551 t

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 ofN03(815NN03 and M80 N03), NH4 (815NNH4). groundwater (62Hwt and 8 180wt) and chloride/bromide ratios were used to determine the source of nitrate contamination in drinkin water wells in a housing development that was built on the site of a dairy fann in the North Carolina Piedmont U.S. The 615NN03 and 6180 N03 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. 615NN03 and 6180N03compositions 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 C02. This water—002 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 re uire well water to be tested rior to the sale of homes built on urbanized farmland.

Wichmann, Fabienne, et al. "Diverse antibiotic resistance genes in dairy cow manure." MBio 5.2 (2014): e01017-13.
Link: http://mbio.asm.orz/content/5/2/e01017-13 .short

Application of manure from antibiotic-treated animals to crops facilitates the dissemination of antibiotic resistance determinants into the environment.

However, our knowledge of the identity, diversity, and patterns of distribution of these antibiotic resistance determinants remains limited. We used a new combination of methods to examine the resistome of dairy cow manure, a common soil amendment. Metagenomic libraries constructed with DNA extracted from manure were screened for resistance to beta-lactams, phenicols, aminoglycosides, and tetracyclines. Functional screening of fosmid and small* insert libraries identified 80 different antibiotic resistance genes whose deduced protein sequences were on average 50 to 60% identical to sequences deposited in GenBank. The resistance genes were frequently found in clusters and originated from a taxonomically diverse set of species, suggesting that some microorganisms

in manure harbor multiple resistance genes. Furthermore, amid the great genetic diversity in manure, we discovered a novel Glade of chloramphenicol acetyltransferases. Our study combined functional metagenomics with thirdgeneration PacBio sequencing to significantly extend the roster of functional antibiotic resistance genes found in animal gut bacteria, providing a particularly broad resource for understanding the origins and dispersal of antibiotic resistance genes in agriculture and clinical settings. The increasing prevalence of antibiotic resistance among bacteria is one of the most intractable challenges in 21 st-century public health. The origins of resistance are complex, and a better understanding of the impacts of antibiotics used on farms would produce a more robust platform for public policy. Microbiomes of farm animals are reservoirs of antibiotic resistance genes, which may affect distribution of antibiotic resistance genes in human pathogens. Previous studies have focused on antibiotic resistance genes in manures of animals subjected to intensive antibiotic use, such as pigs and chickens. Cow manure has received less attention, although it is commonly used in crop production. Here, we report the discovery of novel and diverse antibiotic resistance genes in the cow microbiome, demonstrating that it is a significant reservoir of antibiotic resistance genes. The genomic resource presented here lays the groundwork for understanding the dispersal of antibiotic resistance from the agroecosystem to other settings.

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: htt s://www3.e as [cr]ov/re ion10/ df/sites/ akima[o]w/nitrate in water wells stud 9-27-2012. df

Several investigations relating to nitrate contamination in the Lower Yakima Valley in Washington State have shown nitrate levels in drinking water above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 10 mg/L. From February through April 2010, EPA conducted sampling of drinking water wells and potential sources of nitrate contamination in the Lower

Yakima Valley, in central Washington State. This report presents the results of these sampling efforts. EPA collected over 33 1 samples from residential drinking water wells for nitrate and bacteria, and multi-parameter sampling on 29 water wells (26 residential drinking water wells and three dairy supply wells), 12 dairy lagoons (15 samples), 11 soil samples (five at dairy application fields and six at inigated and fertilized crop fields), five dairy manure pile samples, and three wastewater treatment plant (WWTP) influent samples.

EPA's data provide some indication of the likely nitrate sources for seven of the 25 residential wells testedanimal waste was determined to be the source for six of the wells, and synthetic fertilizer the source for one of the wells. Given the historic and current volumes of wastes generated and stored by dairies, and the application of nitrogen-rich fertilizers including dairy waste in the Lower

Yakima Valley, it is expected that dairies are a likely source of high nitrate levels in downgradient drinking water wells. The total nitrogen, major ions, alkalinity and barium data provide strong evidence that the dairies evaluated in this stud are likel sources of the hi h nitrate levels in the drinking water wells downgradient of the dairies. Additional information that supports this conclusion includes: there are few potential sources of nitrogen located upgradient of the dairies; the dairy lagoons are likely leaking large quantities of nitrogen-rich liquid into the subsurface: and Washington State Department of Agriculture inspectors have reported elevated levels of nitrogen in application fields of the dairies in the study. Evaluating actions to reduce nitrate concentrations in residential drinking water wells was beyond the scope of the EPA's report. EPA concluded that actions to reduce nitrate levels are needed,

although it may take many years to reduce nitrates in residential drinking water wells to safe levels because of the extent of the nitrate contamination in the Lower Yakima Valley and the persistence of nitrate in the environment.

Research Articles Related to Swine Production

Casey JA, Curriero FC, Cosgrove SE, Nachman ICE, Schwartz BS. High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant

Staphylococcus aureus Infection in Pennsylvania. JAMA Intern Med. 2013 Sep 16; 21205(21): 1980-90. 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 obiective 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 ofprimary 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 softtissue 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 softtissue 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 communityassociated MRSA health care-associated MRSA and skin and soft-tissue infection case status (adjusted odds ratios, 1.38 [95% 1.13-1.691, 1.30 [95% Cl, 1.051.611, and 1.37 [95% Cl. 1.18-1.60]. respectively): and there was a trend of increasing odds across quartiles for each outcome (P .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 coresponded 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 highdensity livestock production.

Donham KJ, Wing S, Osterberg D, al et, Flora JL, Hodne C, et al. Community health and socioeconomic issues surrounding concentrated animal feeding operations. Environ Health Perspect. 2007 Feb; 115(2):31
Link: ht!ps ://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817697/

A consensus of the Workgroup on Community and Socioeconomic Issues was that improving and sustaining healthy rural communities depends on integrating socioeconomic development and environmental protection. The workgroup agreed that the World Health Organization's definition of health, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," applies to rural communities. These principles are embodied in the following main points agreed upon by this workgroup. Healthy rural communities ensure a) the physical and mental health of individuals, b) financial security for individuals and the greater community, c) social well-being, d) social and environmental justice, and e) political equity and access. This workgroup evaluated impacts of the proliferation of concentrated animal feeding operations (CAFOs) on sustaining the health of rural communities. Recommended policy changes include a more stringent process for issuing permits for CAFOs, considering bonding for manure storage basins, limiting animal density per watershed, enhancing local control, and mandating environmental impact statements.

Graham JP, Leibler JH, Price LB, Otte JM, Pfeiffer DU, Tiensin T, et al. The animal-human interface and infectious disease in industrial food animal production: rethinking biosecurity and biocontainment. Public Health Rep.2008;123(3):282-99.

Link: https://www.ncbi.nlm.nih.gov/pubmed/19006971

> Understanding interactions between animals and humans is critical in preventing outbreaks of zoonotic disease. This is particularly important for avian influenza. Food animal production has been transfomed since the 1918 influenza pandemic. Poultry and swine production have changed from small-scale methods to industrial-scale operations. There is substantial evidence of pathogen movement between and among these industrial facilities, release to the external environment, and exposure to farm workers, which challenges the assumption that modem poultry production is more biosecure and biocontained as compared with backyard or small holder operations in preventing introduction and release of pathogens. An analysis of data from the Thai government investigation in 2004 indicates that the odds of H5Nl outbreaks and infections were significantly higher in large-scale commercial poultry operations as compared with backyard flocks. These data suggest that successful strategies to prevent or mitigate the emergence of pandemic avian influenza must consider risk factors specific to modem industrialized food animal production.

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. Elsevier; 2015; 51 1:676-83.
Link: h!tp : //www . sciencedirect. com/science/article/pii/S0048969714017641

> Swine farming has gone through many changes in the last few decades, resulting in operations with a high animal density known as confined animal feeding operations (CAFOs). These operations produce a large quantity of fecal waste whose environmental impacts are not well understood. The purpose of this study was to investigate microbial water quality in surface waters proximal to swine CAFOs including microbial source tracking of fecal microbes specific to swine. For one year, surface water samples at up- and downstream sites proximal to swine CAFO lagoon waste land application sites were tested for fecal indicator bacteria (fecal coliforms, Escherichia coli and Enterococcus) and candidate swine-specific microbial source-tracking (MST) markers (Bacteroidales Pig-I-Bac, Pig-2-Bac, and Pig-Bac-2, and methanogen P23-2). Testing of 187 samples showed
> high fecal indicator bacteria concentrations at both up- and downstream sites. Overall, 40%, 23%, and 61% of samples exceeded state and federal recreational water quality guidelines for fecal coliforms, E. coli, and Enterococcus, respectively. Pig-I -Bac and Pig-2-Bac showed the highest specificity to swine fecal wastes and were 2.47 (95% confidence interval [CI] = 1.03, 5.94) and 2.30 times (95% CI = 0.90, 5.88) as prevalent proximal down- than proximal upstream of swine CAFOs, respectively. Pig-I-Bac and

Pig-2-Bac were also 2.87 (95% CI =1.21, 6.80) and 3.36 (95% CI = 1.34, 8.41) times as prevalent when 48-hour antecedent rainfall was greater than versus less than the mean, respectively. Results suggest diffuse and overall poor sanitary quality of surface waters where swine CAFO density is high. Pig-I -Bac and Pig-2-Bac are useful for tracking off* site conveyance of swine fecal wastes into surface waters proximal to and downstream of swine CAFOs and during rain events.

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 Nov;99 Suppl 3:S610-5. Link: https://www.ncbi.nlm.nih.zov/pubmed/19890165

Objectives. We evaluated malodor and air ollutants near industrial ho o erations as environmental stressors and negative mood triggers.
Methods. We collected data from 101 nonsmoking adults in 16 neighborhoods within 1.5 miles of at least 1 industrial hog operation in eastern North Carolina. Participants rated malodor intensity, stress, and mood for 2 weeks while air pollutants were monitored.
Results. Reported malodor was associated with stress and 4 mood states; odds ratios (ORS) for a I-unit change on the 0-to-8 odor scale ranged from 1.31 (95% confidence interval [Cl] = 1.16, 1.50) to 1.81 (95% Cl = 1.63, 2.00). ORS for stress and feeling nervous or anxious were 1.18 (95% CI = I .08, 1.30) and l , 12 (95% CI = 1.03, 1.22), respectively, for a I ppb change in hydrogen sulfide and 1.06 (95% CI = 1.00, 1.11) and 1.10 (95% CI = 1.03, 1.17), respectively, for a 1 gg/m^3 change in semivolatile particulate matter less than 10 pm in aerodynamic diameter (PM 10). Conclusions. Hog odor. hydrogen sulfide, and semivolatile PICO are related to stress and negative mood in disproportionately low-income communities near industrial hog operations in eastern North Carolina. Malodor should be considered in studies of health impacts of environmental iniustice.

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 enetic reassortment between these viruses and/or swine influenza viruses can occur. The otentialto enerate 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.

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 Jul; 118(1):e66-75.
Link: http://pediatrics.aappublications.orz/content/1 1 8/1 /e66

Objectives. Little is known about the health effects of living in close proximity to industrial swine operations. We assessed the relationship between estimated exposure to airborne effluent from confined swine feeding operations and asthma symptoms among adolescents who were aged 12 to 14 years.
Methods. During the 1999-2000 school year, 58,169 adolescents in North Carolina answered questions about their respiratory symptoms, allergies, medications, socioeconomic status, and household environments. To estimate the extent to which these students may have been exposed during the school day to air pollution from confined swine feeding operations, we used publicly available data about schools (n = 265) and swine operations (n = 2343) to generate estimates of exposure for each public school. Prevalence ratios and 95% confidence intervals for wheezing within the past year were estimated using random-intercepts binary regression models, adjusting for potential confounders, including age, race, socioeconomic status, smoking, school exposures, and household exposures. Results. The prevalence of wheezing during the past year was slightly higher at schools that were estimated to be exposed to airborne effluent from confined swine feeding operations. For students who reported allergies, the prevalence of wheezing within the past year was 5% higher at schools that were located within 3 miles of an operation relative to those beyond 3 miles and 24% higher at schools in which livestock odor was noticeable indoors twice per month or more relative to those with no odor.
Conclusions. Estimated exposure to airborne pollution from confined swine feeding operations is associated with adolescents' wheezing symptoms.

Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus aureus Is Present among Industrial, Not

Antibiotic-Free Livestock Operation Workers in North Carolina. PLOS One. 2013;8(7). Link: https://www.ncbi.nlm.nih.gov/pubmed/23844044

> Objectives. Administration of antibiotics to food animals may select for drugresistant pathogens of clinical significance, such as methicillin-resistant Staphylococcus aureus (MRSA). In the United States, studies have examined prevalence of MRSA carriage among individuals exposed to livestock, but prevalence of multidrug-resistant S. aureus (MDRSA) carriage and the association 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 ILOexposed individuals. These findings support growing concern about antibiotics use and confinement in livestock roduction raisin uestions about the otential 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.

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 Jul;115(7):1040-5.
Link: https://www.ncbi.nlm.nih.gov/pubmed/17637920

> Background. The nontherapeutic use of antibiotics in swine feed can select for antibiotic resistance in swine enteric bacteria. Leaking swine waste storage pits and the land-application of swine manure can result in the dispersion of

resistant bacteria to water sources. However, there are few data comparing levels of resistant bacteria in swine manure—impacted water sources versus unaffected sources. Objectives. The goal of this study was to analyze surface water and groundwater situated up and down gradient from a swine faciliw for antibiotic-resistant enterococci and other fecal indicators.
Methods. Surface water and groundwater samples (n = 28) were collected up and down gradient from a swine facility from 2002 to 2004. Fecal indicators were isolated by membrane filtration, and enterococci (n = 200) were tested for susceptibility to erythromycin, tetracycline, clindamycin, virginiamycin, and vancomycin.
Results. Median concentrations of enterococci, fecal coliforms, and Escherichia coli were 4- to 33-fold higher in down-gradient versus up-gradient surface water and groundwater. We observed higher minimal inhibitory concentrations for four antibiotics in enterococci isolated from down-gradient versus up-gradient surface water and groundwater. Elevated percentages of erythromycin- (p 0.02) and tetracycline-resistant (p = 0.06) enterococci were detected in down-gradient surface waters, and higher percentages of tetracycline- (p = 0.07) and clindamycin-resistant (p < 0.001) enterococci were detected in down-gradient groundwater.
Conclusions. We detected elevated levels of fecal indicators and antibiotic-resistant enterococci in water sources situated down radient from a swine facili com ared with up-gradient sources. These findings provide additional evidence that water contaminated with swine manure could contribute to the spread of antibiotic resistance.

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
Mar;22(2):208-15.
Link: https://www.ncbi.nlm.nih.gov/pubmed/21228696

Background. Concentrated animal feeding operations emit air pollutants that may affect health. We examined associations of reported hog odor and of monitored air pollutants with physical symptoms and lung function in people living within I ,5 miles of hog operations.
Methods. Between September 2003 and September 2005, we measured hydrogen sulfide (H2S), endotoxin, and particulate matter (PMI 0, PM2.5, and PM2.5-10) for approximately 2-week periods in each of 16 eastern North Carolina communities. During the same time periods, 101 adults sat outside their homes twice a day for 10 minutes, reported hog odor and physical symptoms, and measured their lung function. Conditional fixed-effects logistic and linear regression models were used to derive estimates of associations.

Results. The log odds (±1 standard error) of acute eye irritation following 10 minutes outdoors increased by 0.53 (±0.06) for every unit increase in odor, by 0.15 (±0.06) per I ppb ofH2S, and by 0.36 (+0.11) per 10 pg/m3 of PMIO. Odor and
H2S were also associated with irritation and respiratory symptoms in the previous 12 hours. The log odds of difficulty breathing increased by 0.50 (±0.15) per unit of odor. A 10 gg/m3 increase in mean 12-hour PM2.5 was associated with increased log odds of wheezing (0.84 ± 0.29) and declines in forced expiratory volume in I second (-0.04 ± 0.02 L). A 10 EU/mg increase in endotoxin was associated with increased log odds of sore throat (0.10 ± 0.05), chest tightness (0.09 ± 0.04), and nausea (0.10 ± 0.05).
Conclusions. Pollutants measured near hog operations are related to acute physical symptoms in a longitudinal study using analyses that preclude confounding by time-invariant characteristics of individuals.

Schulz J, Friese A, Klees S, Tenhagen BA, Fetsch A, Rosier U, et al. Longitudinal study of the contamination of air and of soil surfaces in the vicinity of pig barns by livestock-associated methicillinresistant Staphylococcus aureus. Appl Environ Microbiol. 2012 Aug;78(16):5666-71. Link: http://aem.asm.org/contentJ78/16/5666.fu11

During I year, samples were taken on 4 days, one sample in each season, from pigs, the floor, and the air inside pig bams and from the ambient air and soil at different distances outside six commercial livestock-associated methicillin-resistant Staphylococcus aureus (LA-MRSA)-positive pig barns in the north and east of Germany. LA-MRSA was isolated from animals, floor, and air samples in the barn, showing a range of airborne LA-MRSA between 6 and 3,619 CFU/m(3) (median, 151 CFU/m(3)). Downwind of the barns, LA-MRSA was detected in low concentrations (1 1 to 14 CFU/m(3)) at distances of 50 and 150m; all upwind air samples were negative. In contrast, LA-MRSA was found on soil surfaces at distances of 50, 150, and 300m downwind from all bams, but no statistical differences could be observed between the proportions of positive soil surface samples at the three different distances. Upwind of the barns, positive soil surface samples were found only sporadically. Significantly more positive LA-MRSA samples were found in summer than in the other seasons both in air and soil samples upwind and downwind of the pig barns. spa typing was used to confinn the identity of LA-MRSA types found inside and outside the barns. The results show that there is regular airborne LA-MRSA transmission and deposition, which are strongly influenced by wind direction and season, of up to at least 300m around positive pig barns. The described boot sampling method seems suitable to characterize the contamination of the vicinity of LA-MRSA-positive pig barns by the airbome route.

Wing S, Horton RA. Rose KM. Air pollution from industrial swine operations and blood pressure of neighboring residents. Environ Health Perspect. 2013 Jan; 121 (1):92-6.Link: https://ehp.niehs.nih.gov/1205109/

Background. Industrial swine operations emit odorant chemicals including ammonia, hydrogen sulfide (H2S), and volatile organic compounds. Malodor and pollutant concentrations have been associated with self-reported stress and altered mood in prior studies.

Objectives: We conducted a repeated-measures study of air pollution, stress, and blood pressure in neighbors of swine operations.

Methods. For approximately 2 weeks, 101 nonsmoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina sat outdoors for 10 min twice daily at preselected times. Afterward, they reported levels of hog odor on a 9-point scale and measured their blood pressure twice using an automated oscillometric device. During the same 2- to 3-week period, we measured ambient levels ofH2S and PMI 0 at a central location in each neighborhood. Associations between systolic and diastolic blood pressure (SBP and DBP, respectively) and pollutant measures were estimated using fixed-effects(conditional) linear regression with adjustment for time of day.

Results. PM 10 showed little association with blood pressure. DBP [13 (SE)] increased 0.23 (0.08) mmHg per unit of reported hog odor during the 10 min outdoors and 0.12 (0.08) mmHg per I-ppb increase of H2S concentration in the same hour. SBP increased 0.10 (0.12) mmHg per odor unit and 0.29 (0.12) mmHg per I-ppb increase ofH2S in the same hour. Reported stress was strongly associated with BP; adjustment for stress reduced the odor—DBP association, but the H2S—SBP association changed little. Conclusions. Like noise and other repetitive environmental stressors, malodors may be associated with acute blood pressure increases that could contribute to development of chronic hypertension.

APPENDIX B

TOWN OF ROUND LAKE, SAWYER COUNTY

CAFO OPERATIONS PERMIT APPLICATION

Application Filing Fee: $_____(# of Animal Units) x $1.00 per AU = $ _____

Date of Application: _____

Name of Individual or Organization Operating CAFO): _____

_____

Name of Individual Completing Application: _____

Federal Employer ID#_____ State Employer ID# _____

Contact Person:

_____

Address:

_____

City_____State_____Zip_____

Phone: ( )_____Fax: ( )_____Cell Phone: ( ) _____

Email: _____

Provide the Legal Description and owner name and contact information for each parcel of the land at which the livestock facilities will be located. If any of the land is rented include a copy of the lease agreement or other document demonstrating permission to use the land and/or facilities as proposed. Provide the following information for each parcel.

_____¼ of_____¼, Section____Township____N. Range____W. Town of_____

Tax Parcel ID Number:_____Acreage_____ Name and A
Name:

_____

Address:

_____

City_____State_____Zip_____

Provide the Legal Description and owner name and contact information for each parcel of **Owned or Rented** land proposed to be used in conjunction with CAFO Operations (e.g., manure spreading). For each parcel of **Rented** land include a copy of a cropland lease agreement or other document demonstrating permission to use the land as proposed. The term of the lease agreement must be clearly indicated in the lease agreement. Provide the following information for each parcel.

_____¼ of_____¼, Section____Township____N. Range____W. Town of _____

Tax Parcel ID Number:_____Acreage_____ Name and A
Name:

_____

Address:

_____

City_____State_____Zip_____

(1) Describe current land uses within and immediately adjacent to the proposed CAFO site, including aerial photographs. For lands being used for crop production, include a description of crops currently being grown with an estimate of acreage of each crop.

(2) Permits:

a. Does this CAFO have a Sawyer County Siting License? **Yes** **No**

b. Does this CAFO have a Wisconsin Pollutant Discharge Elimination Systems Permit? **Yes** **No**

c. Does this CAFO have Sawyer County Land Use Permit(s)? **Yes** **No**
If so, identify the permits held.

_____

_____

d. If this CAFO lacks any of the above permits, please set forth all plans to obtain any of the above permits, including when applications have been or will be filed, and the expected date for approval or denial of the permit.

(3) Location/Crops/Phosphorus:

a. Identify each structure or facility intended to be used in conjunction with the proposed CAFO, setting forth the location, physical dimensions, and intended use for each structure, as well as how many animal units, if any, will be housed in each structure. At a minimum, include all information and drawings required by Wisconsin Administrative Rules, Chapter NR 243.12(1)(a) 1 through 5.

b. List each crop that will be grown on land managed by the CAFO. Provide an annual yield estimate for each crop and an explanation of how that estimate was determined.

c. Provide aerial photos that identify all perennial streams, intermittent streams, navigable waters, and direct conduits to navigable waters on or within 1,000 feet of any parcel of land intended to be used in conjunction with the proposed CAFO.

d. Provide a soil map using SSURGO data for all parcels of land intended to be used in conjunction with the proposed CAFO. Include a soil map unit description for each predominant and critical soil type shown on the maps and include an estimate of soil depth to bedrock or gravel or sand deposits. Include soil test data for phosphorus with one sample per five acres. The soil test data must have been collected no more than 12 months prior to submission of this application.

e. Using the P-Trade report in SNAP-PLUS or other viable means, provide an estimate of total annual field edge phosphorus losses for all fields to be used in conjunction with the proposed CAFO for each of the two full calendar years prior

to the date submitting this application.

f. Provide an estimate of total annual phosphorus losses for each of the two full calendar years prior to the date submitting this application for all existing agricultural facilities (buildings, animal lots, animal feeding areas, feed storage etc.) on all lands to be used in conjunction with the CAFO.

g. Provide an estimate of total annual phosphorus losses for each of the full five calendar years of the proposed operations for all existing agricultural facilities (buildings, animal lots, animal feeding areas, feed storage, etc.) on all lands to be used in conjunction with the CAFO.

(4) CAFO operations:

a. Describe the method or methods the CAFO will employ to store all animal waste products, including describing the exact location where such products will be stored at any time during operation of the CAFO. You may refer to information and drawings submitted in response to paragraph (3) a. above, as appropriate.

b. Describe the method or methods the CAFO will employ to handle and process all animal waste products, including the specific machinery and methods that will be employed, the location where the processing of waste will take place, and any materials or chemicals that will be used. Describe any technology or processes that will be used (such as anaerobic digestion) that will alter pathogen loads, nutrient content, or moisture levels of the manure prior to land-spreading.

c. Provide a complete nutrient management plan that meets the requirements of Wisconsin Administrative Code NR 243.14. The plan shall be based on the volume of manure that will be generated by the operation in each of the five calendar years covered by this Permit. Include all lands being used in conjunction with the operations of the CAFO, including but not limited to spreading manure, growing and harvesting crops, applying commercial fertilizer, shall be included in the nutrient management plan. Provide a copy of a cropland lease agreement or other document for all rented lands included in the nutrient management plan. The lease agreements must clearly allow the land use as proposed in the nutrient management plan.

d. Provide an estimate of how many livestock mortalities are expected for the operation each year and a description of how that estimate was determined. Describe the method or methods the CAFO will use to store dead animals (carcasses), including describing the exact location where such carcasses will be stored and for how long.

e. Describe the method or methods the CAFO will use to handle, process, and dispose of any and all dead animals, including the specific technology, machinery, and methods that will be employed, the location where the processing/disposal of carcasses will take place, and any materials or chemicals that will be used. If licenses or approvals are necessary from the Wisconsin Department of Natural Resources or other state, town, or federal agency, provide copies of those licenses, permits, and/or approvals. If this CAFO lacks any of the required licenses, permits, and/or approvals, describe all plans and expected dates for receiving them.

f. Describe the technologies or method(s) the CAFO will employ to reduce, eliminate, or treat methane, nitrous oxide, ammonia, hydrogen sulfide, and particulate emissions from the proposed CAFO, including the specific technology, machinery, and methods that will be employed, and any materials or chemicals that will be used.

f. Describe how animals will be transported to, from, and within the CAFO, including a description of the type, size and weight (loaded gross vehicle and each axle) of the transportation vehicles, all highways or roads within the Town that will be used, the proposed hours of operation for said transportation, and the specific path of travel for all such transportation.

g. Describe how all animal waste will be transported to, from and within the CAFO, including a description of the type, width, length, and weight (loaded gross vehicle and each axle) of the transportation vehicles, all highways or roads within the Town that will be used, the proposed hours of operation for said transportation, and the specific path of travel for all such transportation.

h. Describe how all other products or materials (apart from animals or manure) will be transported to, from and within the CAFO, including a description of the type, width, length, and weight (loaded gross vehicle and each axle) of the transportation vehicles, all highways or roads within the Town that will be used, the proposed hours of operation for said transportation, and the specific path of travel for all such transportation.

i. Describe the type, width, length, and weight (loaded gross vehicle and each axle) of each implement of husbandry (excluding manure and animal hauling equipment) that will be used on highways or roads within the Town. Provide aerial photos showing the specific path of travel for the implements of husbandry and the estimated hours of operation of the equipment on the highways or roads in the Town.

j. If manure is transported by pipeline (permanent or temporary) to fields for land-

spreading provide a map showing the intended route and the location and photo of every culvert used along the route. Show all perennial streams, intermittent streams, and direct conduits to navigable waters on the map(s). If required, provide a copy of the permit(s) allowing use of the right-of-way or culvert. If crossing driveways or land not under the control of the CAFO, provide a letter from the landowner clearly granting permission to cross the driveway or land with the permanent or temporary pipeline.

k. Identify all residential and business structures within 500 feet of a gravel road in the Town used at any time of the year by implements of husbandry, agricultural CMVs, tractor-trailers, or semi-trailers. Describe how road dust generated by use of the gravel roads by the CAFO will be controlled.

l. Identify the source of all water to be used at the proposed CAFO facility and the anticipated quantity of water that will be necessary for all CAFO related operations and set forth the location of any private or public well located within 1000 feet of any parcel of real estate to be used in conjunction with the proposed CAFO facility. Provide well-drilling records, if available, for all private or public wells within 1000 feet of any parcel of real estate to be used in conjunction with the proposed CAFO facility.

m. Identify a CAFO having substantially similar operational characteristics, housing the same species of animals, and utilizing similar operations, that has been continuously operated in the United States for at least ten (10) years without causing pollution of groundwater or surface water, and without causing either a private nuisance or a public nuisance. Set forth in what ways said existing CAFO has similar operational characteristics of the CAFO proposed in this application. In the alternative, state whether the applicant is requesting a waiver of this requirement and, if so, provide information that may be verified by the Town, to show that the proposed CAFO will otherwise meet the requirements set forth in the Ordinance.

(5) Animal Welfare:

a. Describe how all animals will be housed in the proposed CAFO, including a description of the size of each pen or stall any animal will be kept in, the number of animals that will be kept within each pen, and the location and type of any outdoor area allotted for animals.

b. In the event of power outages or equipment failure, describe how the welfare of animals housed by the CAFO will be maintained including, but not limited to: providing water, venting hazardous air emissions, cooling, and feeding.

c. Describe how all animal units will be fed, including the type of feed, the amount

of feed per animal, the method of feeding each animal, etc.

d. Apart from the feed identified above, identify all products (including chemicals or medicines) that will be injected in, fed to, or otherwise administered to animals in the CAFO on an ongoing basis (i.e., at least once per month):

e. Identify all measures that will be taken to prevent the spread of disease between animals and between animals and humans at the proposed CAFO.

f. Identify all veterinary care that will be routinely administered to or available to the animals of the proposed CAFO and identify all medicines or treatments that are anticipated to be administered to animals of the proposed CAFO. Identify steps that will be taken by the CAFO to limit development of resistance to antibiotics.

(6) Employee Welfare:

a. Identify the number of anticipated employees at the proposed CAFO.

b. What type of education will employees receive regarding operating safe CAFOs and maintaining safe and healthful conditions for animals and employees at said facility?

c. What type of healthcare will be made available to employees of the proposed CAFO, or what type of routine medical examinations will be performed?

d. What are the hours and days of anticipated operation of the proposed CAFO specifically identifying days and times where machinery or other equipment that may make noise detectable to neighboring properties will be in use?

(7) Emergency management:

a. Set forth in detail an emergency plan of action in the event of soil, water or air contamination emanating from the proposed CAFO, or in the event of a spill of animal waste products, whether on or off the proposed CAFO site, including the name and contact information for emergency management response team members, the equipment and location of equipment available to respond to such an emergency situation, the anticipated timeline for response to an emergency event, and the anticipated testing measures to be used to ensure the emergency response was effective. At a minimum, include all information and drawings required by Wisconsin Administrative Rules, Chapter NR 243.12(13)6.

b. Set forth in detail an emergency plan of action in the event of a mass animal mortality event (death of more than 5% of the animals within a 72-hour period) caused by natural disaster, disease, equipment failure, or other cause. Include the

name and contact information for the emergency management response team members, the equipment and location of equipment available to respond to such an emergency, the anticipated timeline for response to an emergency event, and the anticipated testing measures to be used to ensure the emergency response was effective.

c. Identify all residences and businesses within 1000' of the proposed CAFO site and provide names and contact information for all the owners of those residences and businesses. Indicate how each of those owners will be contacted within 30 minutes of a failure of air filtration or other equipment intended to limit emission of hazardous gasses or particulates.

d. Set forth in detail all regular testing or monitoring that will take place to ensure that no contamination or environmental degradation is occurring as a result of CAFO related activities. Provide a description of the testing or monitoring protocols and schedule as well as how the data will be communicated to the Town.

(8) Environmental impact:

a. List resources that may be impacted by the proposed CAFO such as timber, agriculture, surface water, ground water, air quality, noise pollution and plant, wildlife or fish habitat. Describe measures that will be taken to mitigate those impacts.

b. Are there any known endangered species on or near the proposed CAFO site?
Yes / No.
If yes – describe the species and whether an environmental impact statement will need to be prepared?

c. Will groundwater monitoring wells be installed? If not, describe why not. If so, provide information on each monitoring well including anticipated well depth, well location, chemicals and/or substances that will be monitored, and the schedule and protocol for testing the water from each well. How will this information be shared with the Town and the public?

d. Describe erosion control practices that will be used during the CAFO operations. If no measures will be used, explain why none are needed.

e. Describe how concentrated flow areas and direct conduits to surface waters will be maintained in perennial vegetation. If concentrated flow areas and/or direct conduits to groundwater are rutted during field operations, describe how the concentrated flow areas and/or direct conduits to surface water will be repaired. Provide an estimate of how often the concentrated flow areas and/or direct conduits to surface water will need to be repaired.

(9) Public and private nuisances:

a. Describe measures that will be taken to screen the CAFO operation from view of surrounding land uses or explain why such measures are not needed (include photos of the area to show affected areas or why no areas will be affected).

b. Describe how odor from the livestock facilities and land-spreading activities will be controlled. If no such measures are necessary, explain why. Also explain the schedule and method for air quality testing, if any, within a quarter mile of the proposed CAFO's boundaries before, during and after the CAFO is opened, worked and closed.

(10) Financial Security:

a. Set forth all bonds already in place in relation to CAFO operations and in support of this permit or, if no such bonds exist, set forth the amount the operation anticipates obtaining in a bond amount. Explain why this amount is sufficient pursuant to the terms of the Ordinance.

(11) Example CAFO Operations:

a. Set forth all bonds already in place in relation to CAFO operations and in support of this permit or, if no such bonds exist, set forth the amount the operation anticipates obtaining in a bond amount. Explain why this amount is sufficient pursuant to the terms of the Ordinance.

Print or Type the Livestock Operator's Name:

_____

Legal Name of Livestock Company:_____

Legal address of Livestock Company:_____

City_____State_____Zip _____

Signature: _____ _____

Authorized Operating Company Representative's Signature Date

Note: Signature of this application by the applicant or applicant's representative authorizes the Town and its designees to enter upon the property to perform needed inspections at any time and on as many occasions as the Town or its designee deems necessary without prior notice to applicant(s).

Note: Applicant(s) are required to provide ***twenty-five (25) copies*** of their completed application to the Town Clerk upon submission, along with the application filing fee. The additional copies are for the Town Board, adjoining landowners, and the general public at the public hearing.

Note: If the answers to any of the above questions can be found in an approved Sawyer County Siting Permit or WPDES permit, applicant may refer to the appropriate sections of said permit and attach a copy thereof to this application.