



# **Ohio's Concentrated Animal Feeding Facilities:**

A Review of Statewide Manure Management and Phosphorus Applications in the Western Lake Erie Watershed



Ohio Environmental Council

## Executive Summary

Toxic algae, or harmful blue-green algae, is a serious problem in Ohio. In 2010, numerous lakes, including Lake Erie, experienced large growths of this algae known for producing dangerous toxins. In 2011, Lake Erie made the front page of National Geographic with, then, the most severe bloom on record as measured by the National Oceanic and Atmospheric Administration. In 2013, Carroll Township, a township of 2,000 people, were told they could not use their tap water for three days because algal toxins contaminated Lake Erie where the city draws its drinking water. In 2014, a modern American city experienced the unthinkable when nearly half a million people in the Toledo area were told they could not use their tap water for approximately three days, again due to toxic algae contaminating a drinking water supply. In 2015, Lake Erie broke the record as the most severe season with harmful algae spanning the distance between Monroe, MI past the shores of Cleveland, Ohio. That same year, toxic algae stretched over 650 miles of the Ohio River.

Agricultural pollution is the main driver of toxic algae found in many of Ohio's rivers, streams, reservoirs and lakes. Manure is a known contributor to this problem, as it contains readily available phosphorus for plant growth. Manure, however, is difficult to track and quantify. Therefore, the Ohio Environmental Council (OEC) reviewed thousands of public records to learn how permitted livestock facilities across Ohio manage their manure specifically in the western Lake Erie watershed (WLEW). This summary report includes the approximate amounts of manure concentrated animal feeding facilities (CAFFs) generate, and the quantities sold or given to farms for application. The report dedicates one section for an evaluation of soil phosphorus levels at the time of manure application for CAFFs in the WLEW in order to assess the potential for possible pollution. It is widely known that in freshwater systems, such as Lake Erie, phosphorus is the limiting nutrient for blue-green algae growths.<sup>1</sup> In other words, the algae will consume all the phosphorus before nitrogen, the other main nutrient.

Ohio has thousands of concentrated animal feeding operations (AFOs). The exact number is unknown because the state does not require that AFO owners obtain a permit from the Ohio Department of Agriculture (ODA) unless the operation exceeds a certain number of animals. Those that do are classified as CAFFs, of which Ohio has 231 as of January 2017. Combined, these CAFFs are permitted to raise

### Box 1. AFO vs. CAFF vs. CAFO

State and federal law differentiates between Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Facilities (CAFFs) based on the specific number of animals it confines. If there are fewer animals than what the law specifies for a CAFF, then it is considered an AFO. This is important because state law only requires Large and Major CAFFs to obtain ODA permits and comply with applicable regulations. Ohio has around 230 permitted CAFFs, but thousands AFOs that do not require any kind of permit or registration with ODA.

CAFOs have the requisite number of animals to be classified as a large CAFF. They can also have fewer animals, but must be designed or found to be discharging pollutants into waters of the state. The law classifies these as medium or small CAFOs, with the latter designated as such by the ODA director. CAFOs that discharge pollutants must have an NPDES permit.

<sup>1</sup> Correll, DL. Phosphorus: a rate limiting nutrient in surface waters. [Poult Sci. 1999 May;78\(5\):674-82.](#)

66,989,147 chickens, turkeys, cows, horses, and pigs producing nearly 900,000 solid tons and over 1.5 billion gallons of liquid manure annually according to each CAFF's fact sheet that is issued by the Ohio Department of Agriculture's (ODA) Division of Livestock Environmental Permitting (DLEP). To put this into perspective, this amount of manure would fill the entire Ohio State University football stadium more than two times over (2.3 to be exact). The 64 CAFFs in the western Lake Erie watershed produce 24% (215,098 tons) of all the solid manure and 42% (658,030,505 gal.) of all the liquid manure in the state of Ohio. These amounts are greater than the fecal waste produced daily by the entire metro areas of Los Angeles, Chicago, Dallas and Cincinnati combined.



These numbers are not direct measurements and determining more precise amounts with existing, publicly-available records is extremely challenging. A significant portion of manure applications do not take place under the control of the CAFF, but instead through the distribution and utilization method of manure management (D&U) established in regulations. These rules allow a certified livestock manager or certified fertilizer applicator to apply manure to cropland - nearer to the CAFF for liquid manure (5 miles averaged), or farther away for solid manure (3 - 400 miles with many reporting a 50 mile average).

Annual estimates show 87% of the solid manure and 36% of the liquid manure was applied through D&U for all of Ohio's CAFFs. In the WLEW, the numbers increase to 91% of solid manure and 53% of liquid manure. This has important implications for understanding overall phosphate inputs from both manure and commercial fertilizer in watersheds throughout the state.

Determining if there is adequate cropland available for appropriate manure applications is also challenging and requires detailed analysis of each CAFF's manure management plan (MMP). However, available cropland frequently changes when a CAFF leases additional acres or transfers manure through the D&U. In some cases, fields will no longer be available for application if the Bray-Kurtz P1 soil test phosphorus results exceed 150 parts per million (ppm).<sup>2</sup> Regulations allow manure applications even when tests show levels exceed what is necessary for optimal crop production, which is 40 ppm for corn and soybeans. This is the upper limit for the amount of phosphorus three land-grant universities recommended be maintained in the soil to produce maximum yields of corn and soybeans, this is also called the critical level, beyond which phosphorus begin to build up in the soil. This report uses agronomic rate to refer to keeping soil phosphorus levels at or below this critical level. When the soil test phosphorus level is above 40 ppm, manure applications are typically unnecessary to grow corn and soybeans, and could be considered an excess application in most instances. To fully assess the extent of this practice, one

<sup>2</sup> Bray-Kurtz P1 refers to a testing method and specific extraction solution used to measure soil phosphorus levels and used to establish critical soil phosphorus levels in the [Tri-State Fertilizer Recommendations](#). References to soil test phosphorus results are those obtained through the Bray-Kurtz P1 testing method.

must look at each CAFF's inspection reports to find soil phosphorus levels at the time of manure application. However, many of these reports lack specific enough details when soil phosphorus levels fall below 150 ppm to track excess applications. The reason is 150 ppm is the amount where regulations discourage further application, and fields below this level are not consistently listed in CAFF inspection reports.

Several inspection reports do list soil phosphorus levels at the time of application, allowing for more detailed analysis for the CAFFs in the WLEW. These reports showed, of the 43 facilities where information was available, 38 (88%) applied manure when soil test phosphorus levels were above 40 ppm. Unfortunately, inspection reports lack adequate detail to effectively track manure applications completed through D&U. If these manure applications follow this trend, it represents a significant risk of excess application since, in the WLEW, 53% of liquid manure applications and 91% of solid are done through D&U. Even more concerning are the number of unpermitted AFOs in the watershed that may be following this same trend.

The OEC provides several recommendations to begin addressing these systemic problems and to transition to a system that effectively reduces the risks of pollution, (see Box 2). These recommendations include establishing clearer and more consistent reporting protocols, and bringing more accountability for manure managed through D&U. To address more systemic problems, the ODA needs to begin transitioning manure management towards ensuring applications adhere to appropriate agronomic rates (the amount of nutrients crops need for optimal growth). This will take time since the rules establish an industry standard where each CAFF's storage capacity and operational design rests on the allowance to apply manure with soil test phosphorus levels reaching 150 ppm. Therefore, if regulatory reforms are to be accepted and successful, they must allow for a reasonable transition period for existing CAFFs. The first step is to establish a cap on manure applications when soil test phosphorus levels are at 100 ppm, unless there is an emergency situation. Current rules direct that when soil levels reach this amount, then phosphate applications must match the agronomic rate for a single growing season. Therefore, this seems like a reasonable level for an immediate cap on applications as the state works with producers to ratchet down rates to the proper amounts. For new or expanding CAFFs, the rules should direct applications match the agronomic rate. Finally, and perhaps most important, Ohio needs to establish a system to manage the thousands of AFOs that do not have any type of state permit. At the very least, lawmakers should require each one to register with the ODA's Division of Soil and Water Conservation and direct all operations of a certain size to develop and follow publicly available operation and management plans.<sup>3</sup>

## Box 2. Top Recommendations

### *Establish Regulatory Safeguards*

- Require all AFOs to register with ODA, and direct those that would meet the medium sized CAFOs definition to follow a pollution prevention plan.
- Revise Distribution & Utilization regulations to require soil tests and field maps before manure application.

### *Improve Reporting*

- Require annual reports to include more detailed Distribution & Utilization information.
- Ensure inspection reports include soil phosphorus levels for all fields that receive manure applications and list phosphate application rates.

<sup>3</sup> That size should be equal to the number of animals listed as a medium CAFO in [ORC 903.1\(Q\)](#)